CHAPTER 3

INDOOR RANGES

INTRODUCTION

0301. **Aim.** The aim of this chapter is to give the design and construction details for existing and new indoor ranges. Those involved in the planning of new ranges should also refer to the Type Standard. For test ranges refer also to Chapter 21. This Chapter covers:

0302. **Description.** Indoor ranges are constructed to meet many requirements. The main advantage of indoor ranges is that they provide protection from the elements and external noise can be reduced. The main disadvantage is that noise is more of a problem for range users and weapon emissions become a key safety issue. These disadvantages also affect any range with enclosed or semi enclosed firing points. Indoor ranges may be constructed to meet specific ballistic requirements and practices. Ranges are at times constructed in tunnels or in existing buildings converted for range use. Proprietary purpose built indoor ranges are available provided in modular sections or constructed on site. Refer to Chapter 6 for all tactical shooting indoor ranges

0303. **Purpose**. The indoor range was developed primarily for rimfire SA which are commonplace with the Reserve Forces and Cadets. There is now a demand for indoor ranges which like the tube range, allow any authorised centrefire weapons.

0304. **Environmental Issues**. In all cases Reference shall be made to Chapter 30, Control of Hazardous substances in Indoor Ranges. For ranges where air weapons are used refer to Chapter 26.

DESIGN

0305. **General.** Indoor ranges present ballistic and potential environmental problems for the designer. The structure must contain all shot without causing damage or injury from ricochet or backsplash. Environmental problems include noise, particularly reverberation, airborne contaminants including lead, carbon monoxide pollution and unburned propellant. An outline layout of a traditional rimfire range is illustrated in Figure 3-1. The backsplash hazard and ballistic limitations are given in Chapter 2 Tables 2 and 4. Existing ranges were generally designed with a maximum range of 25m. New ranges can be constructed for many situations and distances with the design based on the ammunition nature and using both the vertical and horizontal components of the worst case firing positions.

0306. **Components.** The capture of bullets fired in an indoor range relies upon defence structures, the sizes of which are deduced from a series of safety distances and angles. The required degree of protection increases with the probability of strike. The structures (safety features) which produce the level of protection are called components. These and their purpose are:

a. **Defence Zone**. The defence zone is the part of a range which may be struck by unintentional shot, ricochet or backsplash. The zone is specifically designed to resist penetration of the occasional single shot.

b. **Backplate.** The backplate is constructed behind and around the bullet catcher, and is designed to capture predicted shot that misses the bullet catcher. Therefore the backplate must resist the penetration from multiple direct fire and ricochet.

c. **Bullet Catcher.** The bullet catcher is designed to stop and contain the majority of direct fire and ricochet and must withstand continuous attrition.

d. **Floor.** The floor of the range is to have a smooth surface free of any protrusion or indentation which could generate a high ricochet or backsplash.

0307. **Component sizes**. The data given in Chapter 2 Table 6 is used to calculate the required sizes of the bullet catcher, back plate and defence zone (see also Figure 3-2). Chapter 2, Table 7 provides the material thickness considered suitable to prevent single round penetration.

0308. **Design**. Each component may be sized using the following guidelines;

a. **Vertical Axis.** The LofS is established by determining:

(1) The maximum and minimum target centre height to be permitted on the range.

(2) All firing postures applicable to that range:

(a) Standing 1500 mm (C).

(b) Kneeling 800 mm (C).

(c) Prone 300 mm (C).

Notes

a. If a raised firing point is to be used, its height is to be added to the firing posture height.

b. The LofS from all firing postures is projected from all firing distances to target centres. From the line so produced, the distance and angle or angle taken from Table 6 is struck to determine the height of the appropriate range component.

c. The range component is taken to extend down to the range floor in all cases. Where there are penetrable floors with occupied rooms or services below the defence structure must extend over the floor area concerned.

b. **Horizontal Axis**. The LofS is established from the centre of all flank firing positions to that flank target centre. The distance and angle found in Table 6 is projected to determine the minimum width of the range component.

0309. **Backsplash hazard**. Care is needed to ensure any structure down the range either stops the bullet or is sufficiently weak to allow the bullet to pass through without great loss of energy. Where a low velocity bullet is decelerated on it's way down range it may not penetrate the anti-backsplash curtain and therefore may bounce back to the firing point. To minimise this hazard targets should be fixed with light material, timber less than 25mm, plastic, cardboard, string, netting or Hessian. Where timber is increased in thickness to capture bullets, be sure there is no chance of a round cutting through the corners of the timber generating a backsplash hazard.

CONSTRUCTION

RANGE BUILDING

0310. **General.** A building with a minimum length of firing distance plus sufficient room to allow for the construction of firing points and bullet catcher is required. Some bullet catchers have bigger footprints than others. Each firing lane shall be in accordance with Chapter 2 paragraph 0298b. A clear height of 600 mm should be provided above the LofS at the firing points and 250 mm above the LofS at the target (see paragraph 0341). The floor, ceiling

or roof and all walls within the defence zone shall contain shot. The thickness of various types of construction to contain shot is given in Chapter 2 Table 7.

0311. **Adjoining Rooms.** Where other occupied rooms or passageways adjoin the range, or where the range floor or ceiling separate it from other floors, the complete area of the separating structure must be suitably protected from bullet penetration. Timber floors or ceilings may have to be protected over their complete area the details of which are given in Chapter 2 Table 7. Alternative shot resistant materials may be used on DLR refer to TAS(RE) for details. The reduced material specification for engagement at 7^0 (125mils) or less should not be used where there are adjoining rooms. Noise reduction measures may be required if the adjoining rooms are occupied.

0312. **Doors and Windows**. In new ranges, the inclusion of windows in the protected area shall be avoided. The inclusion of doors should be avoided though in some instances, such as fire doors, this may not be possible. In existing buildings all windows and unnecessary doors must be sealed up and rendered impenetrable. The range entrance door should be located behind the rearmost firing point. One other door may be required by the Fire Officer for emergency exit, located down-range. All down-range doors within the protected areas should be flush with the wall otherwise the reveal shall be baffled or clad to prevent backsplash. Down-range doors within the defended area must be impenetrable to any direct fire, ricochet or backsplash with all furniture protected from strike. These doors are to be fitted with a panic bolt, fitted so that its status is obvious to the RCO, or a push bar regardless of other locks, fitted so that its status is obvious to the RCO. All down range doors are to be controlled by the RCO. Where it is possible to open down range doors from the outside, an audio visual alarm must be fitted. Control measures are required outside the main access door warning against entry when the range is in use. Where a range opens onto a public area, a secondary outer door may be necessary to overcome the problem of vandalism or to reduce noise. Red lights or notices, or a combination of the two may be used to provide the control measures. Where it is difficult to see a red light in daylight a sign on or near the door that indicates “Range in use Keep out” or “Range not in use” may be used*.*

0313. **Ventilation.** The requirements for ventilation in all indoor training ranges are given in Chapter 30. New ranges should be designed to minimise the potential for air turbulence. Services and other obstructions in the range must be baffled for protection and such baffles will cause air turbulence in the range. To overcome this, the envelope may be designed to minimise this effect by sloping floors, walls and ceiling to provide recesses in which services or obstructions may be safely placed. See Fig 3 - 9 for details.

0314. **Dust Control**. Dust in the range will contain contaminants such as lead and unburnt propellant, both cause environmental problems and shall be removed. All indoor ranges shall be constructed to minimise the accumulation of dust and ease cleaning. All unnecessary surfaces such as shelves, open cupboards or roof members should be removed or sealed. Walls, ceiling and floors shall be designed or covered with surfaces which are impervious and easily cleaned.

0315. **Safety Signs**. The risk assessment for the range will determine what safety signs are required. Details of the ballistic related signs are illustrated in Chapter 2. Other signs covered by SHEF may be required (See Reference E).

0316 – 0319. Spare

DEFENCE ZONE

0320. **Requirements**. The positions of the defence zone in the range structure are shown in Figure 3-2. It is essential that all parts of the structure within the defence zone are impenetrable to shot (see Chapter 2 Tables 7). Alternatively, the defence zone may be protected by baffles as specified in paragraphs 0348-0351 (however see paragraph 0313 - air turbulence). No services or other obstructions whether temporary or permanent, which could cause ricochet or backsplash, should be in the defence zone. Any protrusion unavoidably in this area shall be protected and obstructions clad to prevent backsplash. The area of the defence zone is calculated using Chapter 2 Table 6.

0321. **Fixings.** Any fixings used in the defence zone must not cause backsplash or excessive ricochet (see Chapter 2).

BACKPLATE

0322. A backplate is used where necessary to provide added protection around the bullet trap. In low velocity ranges the backplate is the part of the back wall, around or behind the bullet catcher, which is designed to be struck by a poorly aimed shot. The complete backplate area shall be protected by steel plate except where the bullet catcher is sized to include the backplate. On very narrow or low ranges this area may extend down the sidewalls, floor and ceiling. The size and thickness of the backplate are calculated using Chapter 2 Tables 6 and 7. To prevent backsplash the backplate area in direct line of fire and any protruding surfaces or baffles in this area must be protected by the anti splash curtain or be clad by a material, typically timber boarding generally fixed to battens, that will prevent backsplash. The battens provide a gap where the bullet energy can dissipate without damaging the back of the boarding and are fixed vertically to allow bullet debris to drop out. Backsplash cladding is described at para.0298c. Hidden attrition as described at para.0296d shall also be considered and avoided or minimised by providing access to the hidden elements.

BULLET CATCHER

0323. **General.** The bullet catcher must safely stop and contain all correctly aimed shot. There are many variations available. Examples with respective advantages and disadvantages are illustrated in-Fig. 3-5 to 3-8. This Chapter covers traditional down range in lane shooting bullet traps where there is an MPI (Mean Point of Impact) behind each target. For judgmental shooting bullet catchers see Chapter 6. For low velocity ammunition modern environmentally friendly bullet catchers are available and should be used. For high velocity ammunition there are modern trap systems available but only the "Snail", sand and granulated rubber traps have been successfully tested by MOD.

0324. **The Sand Bullet Catcher.** The traditional sand faced bullet catcher is ballistically suitable for all weapons. Details of sand bullet catchers are provided in Chapter 2. It is however not the ideal solution indoors due to the dust and cleaning problems associated with such traps.

0325. **Vertical Steel Plate with Anti-Splash Curtain.** Existing low velocity ranges traditionally have the minimum requirements outlined in Figure 3-5. In this case the bullet catcher and the backplate are to be firmly fixed to a sound brick, blockwork or concrete wall. Steel plates should be mounted so that sheets are flush to each other, preferably with fixings made flush. The bullet catcher plates should be so arranged that the target positions will not coincide with the edges of the steel sheet. This design is the minimum requirement for rimfire weapons. It is simple and reliable, and breaks up the round on impact. Backsplash is prevented by an anti-splash curtain in front of the plate. A timber batten on the floor behind the curtain helps contain lead fragments. The main disadvantage of this trap is noise and the lead dust generated by bullet impact on the steel plate. The size and thickness of steel plate may be determined from Chapter 2 Tables 6 and 7. To minimise reverberation and noise when the bullet catcher is struck, an absorbent layer should be sandwiched between the steel sheet and the back wall. A sacrificial plate will increase durability at the MPI, especially if centrefire pistol is to be fired. As continued strike will buckle this plate, it should be fixed to allow for creep. Fixing bolts and screws should be countersunk.

0326. **Angled Steel Plate with Anti-Splash Curtain**. A single steel plate deflects rounds downwards to a bullet stop at floor level. It is effective but less safe and reliable than the vertical plate. Deflected rounds may not behave in a predictable manner and there is a much higher reliance placed on the anti-splash curtain. Multiple deflectors of the "Venetian blind" type are only to be used with an anti-splash curtain fixed in front of and clear of the bullet catcher.

0327. **Snail Bullet Trap.** This trap is a patent design by Savage Arms Corps of USA and is suitable for all lead based ammunition types. During 2006 the specification of the “Snail” trap has been upgraded to cater for the introduction of steel ammunition. The use of steel ammunition in existing “Snail” traps should not cause sudden failure but inspection of the impact surfaces in the throat of the trap will be necessary to ensure wear is not taking place. The bullet catcher works by directing the bullet into a tight spin allowing the round to decelerate whilst contained within the trap. Lead dust is still produced but is contained. Noise remains a problem with this type of catcher. Such catchers once properly installed should need little maintenance. It is however expensive and the range must be designed to accept the high point loads and component size of the Snail Bullet catcher which does have a large footprint. See Fig. 3-6a.

0328. **Granulated Rubber Traps.** The vertical granulated rubber trap was not successful in use however the granulated rubber trap used at a natural angle of repose is a very cost effective and environmentally friendly solution. Details of this trap are provided in Chapter 2 and it is illustrated at Figure 3-6b.

0329. **Other Bullet Catcher Systems**. There are many bullet catchers available commercially, more for low velocity than for high velocity. Whichever trap system is selected it must meet the following safety criteria;

a. It must be fit for the purpose for which it was intended. It must capture all rounds safely without inducing ricochet or backsplash.

b. Where centre bull targets are used the trap must be able to withstand heavy localised attrition without excessive deterioration.

c. The catcher must be easily inspected in depth to provide assurance that penetration resistance is effective.

d. The bullet catcher ideally should capture rounds intact eliminating lead dust problems in the bullet catcher.

e. Impact noise should be minimised.

f. The bullet catcher should require only occasional maintenance and there should be no element that cannot be maintained by range staff.

g. It should be cost effective in use.

ANTI-SPLASH CURTAIN

0330. **Material.** Any bullet catcher that may generate backsplash must always be provided with an anti-splash curtain. Only the sand bullet catcher, the Snail Bullet Trap and granulated rubber traps may be used without a curtain. The curtain material is 6 mm (S) thick soft latex rubber or similar material, refer to TAS (RE) for details. It is required to resist penetration by a deflected round and to contain backsplash without damage to the rear of the curtain. It is known that where there are more than two layers of this 6mm material, 0.22" ammunition may not fully penetrate presenting a backsplash hazard. Patching in areas of overlap is therefore not permitted. The use of wadcutter and similar ammunition may render the antisplash curtain unsafe. These materials are available in a variety of colours, painting proprietary anti splash curtains is not permitted as it may alter the ballistic performance.

0331. **Fixing.** The anti-splash curtain is clamped to or fitted with hooks and eyelets to hang it onto the pelmet to cover the complete area of the bullet catcher in such a way that deflected rounds or backsplash cannot escape (see Figure 3-3). Alternatively, the anti-splash curtain may be fitted into a timber ply sheet covering only the expected area of impact on or around each target. Curtains should be hung in such a way to enable rotation of worn sheets and ideally shifting the MPI to extend the life of the curtain.

a. The curtain hangs approximately 300 mm (S) in front of the bullet catcher to ensure the rear of the sheet is not damaged by the break up of the rounds on the steel plate.

b. It overlaps the pelmet side cheeks which require protection from backsplash.

c. Each sheet overlaps the adjacent sheet by approximately 150 mm (S) ensuring that even if the hanging curtain is not exactly vertical full coverage will be achieved.

d. To prevent the curtain curling, a timber batten is fixed near the bottom of each sheet, staggered back and front on alternate sheets.

e. The curtain is to hang just clear of the floor.

f. The maximum number of layers of anti splash curtain that can be used to ensure there is no backsplash is two. Patching over the areas of overlap is prohibited.

g. Where a range is used for air weapons it will be necessary to make provision to remove the backsplash curtain or fit an additional pellet catcher curtain of hessian or similar material.

0332. **Pelmet**. The pelmet is a timber shelf with side cheeks to prevent deflected rounds or backsplash escaping. The inner surfaces of the pelmet are lined with 3 mm thick steel to reduce the attrition caused by continued strike.

0333. **Anti-Splash Curtain Repair**. Latex rubber curtain is expensive. It can however have a very long service life, even on a heavily used range. The curtain should be moved around to prevent holing at MPI. Holes in the curtain can be patched once with material cut from another sheet and fixed with a suitable adhesive available from the manufacturer. Precautions must be taken when handling lead contaminated sheets. Latex rubber is inflammable and must be kept clear of heat sources such as target lights.

0334. Spare

TARGETRY

0335. **Targets**. There are many target systems available for indoor ranges. Static projected target or scenic, video film or live relay and computer generated target arrays. Traditionally fixed target frames are fitted to most indoor ranges. However, the electrically operated turning target mechanism provides better training. A Figure 11 target or, ideally, two Figure 11 targets should be fitted per lane. A lane width of 1.6 m is required to give half target width separation within a lane and a full target width separation between lanes. If this cannot be achieved, Figure 11A or B targets can be substituted. Consideration should also be given in the design to NSRA multi point competition targets used in cadet ranges.

0336. **Target Mechanisms.** Target mechanisms should be protected against damage, backsplash and ricochet. The protection required is established from the worst case line of fire. Fixed target frames are locally manufactured. They should be of lightweight construction with no fixings that may cause ricochet or backsplash. Timber used should be softwood and the total thickness not greater than 25mm thick to ensure after penetration there is sufficient energy to penetrate the anti backsplash curtain. Many suitable fixing methods are available for target cards. A convenient target frame can be constructed with cellular plastic board. Further details may be obtained from TAS (RE).

0337. **Moving Targets.** Moving targets may be possible in some indoor ranges, the arrangement for which must be assessed by TAS(RE) as the application of specific safety criteria is necessary. Such targets may only be used on military indoor ranges after a Board of Officers has considered the

implications and the RAO has authorised their use in accordance with Reference A1 (Volume I).

0338. **Target Positions**. The maximum target centre height and flank target positions are essential features in the design of the range as they determine the size of all range ballistic elements. Its safe operation cannot be assured if the proper height and position are not maintained. In the case of multi-point targets or screens, the target centre of the outermost targets is used to place the targets. The ruling target centre height and flank target positions must be marked on the range sidewalls and floor respectively. This may indicate maximum and minimum heights when the range is designed for a variety of targets. Positioning targets in accordance with the guidelines in Chapter 2 paragraph 0298d should assist in providing compliant positioning and enable realistic line of fire, whilst not compromising the safety of the range.

0339. **Target Lighting.** A simple row of fluorescent strip lights in an angled reflector, set into the range floor, ceiling or surface mounted with baffle or angled component protection will be found adequate for most shooting. Tungsten spotlights can be fitted either at floor or ceiling level but dimming will be required.

FLOOR

0340. **Floor Surfaces**. Any protrusions that may generate backsplash or ricochet on the range floor will require additional protection. Preferred materials are thick rubber, thermoplastic, vinyl sheet or timber. Timber floors should be sealed and have filled joints to prevent a build up of lead dust and unburnt propellant. See also paragraph 0355 for the requirements if pistols are fired without benches.

0341. **Lower Clear Vision Line**. There are to be no obstructions on the floor that interrupt the lower clear vision line (see Chapter 2 and Figure 3-3).

0342 – 0344. Spare

WALLS

0345. **Walls and Sound Attenuation.** Walls outside the defence zone should be clad with a sound attenuating material which will effectively reduce reverberation. The defence zone should also, where possible, be similarly clad. It will be necessary to consider the effect of strike on the material selected for the defence zone. The detailed design of sound attenuation may vary considerably from one building to another. Raking in the walls and stepping back for services will also provide some reduction in reverberation back up the range. Rimfire ranges may not require such a high level of attenuation as centrefire ranges. Selected wall finishes need to be durable to resist the knock and abrasion inevitable in a training range. The finish should be smooth, joint-free, and withstand frequent cleaning and wet scrubbing with agents to remove and neutralise lead dust and unburnt propellant.

CEILING

0346. **Ceiling or Roof and Upper Clear Vision Line**. The ceiling or roof, ceiling or roof members including baffles, and all fixtures and fittings should be above the upper clear vision line so as to provide sufficient clear height for safe firing (see Chapter 2 and Figure 3-3).

0347. **Sound Attenuation**. In buildings with a high ceiling or roof above about 3.5 m, sound attenuating linings to the roof or ceiling may be less necessary. With low ceilings or roofs, sound attenuating lining or a suspended ceiling may be required. The need for durability and to withstand cleaning, as previously described, is less essential.

BAFFLES

0348. **Purpose.** Baffles are used on an indoor range to:

a. Protect fixtures and fittings from strike.

b. Prevent rounds escaping where the walls or roof in the defence zone are not sufficient to prevent penetration by shot. The effect of baffles is however limited (see para.0349).

0349. **Locations.** Baffles are generally placed only to prevent direct shot escaping or to protect fixtures and fittings. They will not completely eliminate the danger of ricochet in the range due to the random nature of ricochet angles. The range structure within the defence zone must in all cases be impenetrable to ricochet. As there is no data for ricochet, use the detail for low angle strike in Chapter 2 Table 7. Baffles may be vertical or horizontal. They are designed with respect to each firing point and from each firing posture for which the range is designed: standing, kneeling or prone. It must not be possible for the firer to see any item protected by a baffle or to see between baffles which are protecting the defence zone. Baffles protecting the defence zone are designed so that the soffit of each baffle overlaps subsequent baffles by at least 150 mm when viewed as just described. The clear vision height should be maintained below the soffit of each baffle and the clear vision line maintained as described in para.0297e. Baffles will disrupt laminar air flow (See para.0313).

0350. Angled **Baffles.** Any baffle in the defence zone within the backsplash distance of a firing point is angled to prevent backsplash and to ensure that strike will ricochet down-range and not towards the walls or roof (see Fig. 3-4). Due to the proximity of the hazard and to provide greater backsplash protection, angled baffles should have an enhanced timber cladding as set out in Chapter 2 paragraph 0298c

0351. **Materials**. Materials used for constructing baffles are to conform with Chapter 2 Table 7 so that shot penetration is prevented. Cladding to prevent backsplash should be of a suitable ballistic material which allows the round to pass through and to capture backsplash without damage to that material. Where high velocity ammunition is used, particularly steel ammunition, the effectiveness of the steel can be extended by reducing the strike angle below 15^0. Detail of baffle construction is shown at Figure 3-4. For details of timber protection see Chapter 2 paragraph 0298c.

0352 – 0354. Spare

FIRING POINTS AND LANES

0355. **Firing Points**. When firing is conducted from the prone position on just one firing point a raised platform approximately 450 mm high should be provided. This reduces the possibility of ricochet from low shots hitting the

range floor. It may be built into the range floor or be a free standing structure. It should be about 2.5 m from front to rear with a fall of 1:12 from the front edge. The firing point should be surfaced with a smooth impervious material that can be vacuum cleaned and washed down. Carpets or other items that will trap lead dust and unburnt propellant are not to be used in the range. Where free standing firing platforms are used marks on the range floor indicating the correct positioning of the firing platform are to be provided.

0356. **Pistol Benches or Ricochet Protection.** If pistol is to be fired, using a bench to prevent the pistol being lowered below waist level is strongly recommended. This ensures that unintentional discharge during handling drills will not strike the range floor close to the firer and cause dangerous ricochet. If pistol benches are not used, the floor for 2 m in front of the firer must be constructed to capture shot and prevent ricochet. This may be achieved by either of:

a. A 2 m wide by 100 mm deep channel is formed across the full width of the range floor. The channel is clad with 50 mm timber boarding fixed on to 50 mm battens. Other shot absorbing material, such as rubber tiles or sheet flooring, may be used to capture shot (see para.0340).

b. The timber or rubber flooring required by sub-paragraph a. above may overlay the range floor with the leading edge and back edge ramped to the range floor to eliminate the hazard of tripping.

0357. **Firing Lanes.** The position of each firing lane should be clearly indicated on the firing point and each lane numbered. Minimum permitted lane widths are:

a. **Rimfire Rifle**. 1 m.

b. **Rimfire or Centrefire Pistol.** 1 m with screens or 1.8 m without screens to provide protection from ejected cases and space for coaching.

c. **Centrefire Rifle**. 1.8 m SS or 2.5m A.

d. **Flank Clearance.** Each flank should provide a 0.5 m clearance, parallel to the flank LofS, down the complete length of the range (see Chapter 2).

0358. **Firing Lane Width.** In designing lane width and the depth of the firing point, consideration has to be given to:

a. **Screens**. These assist preventing adjacent firers being distracted by noise and ejected cartridge cases when firers are close together.

b. **Coaches**. On any training range it is desirable that space is provided for a coach to work beside each firer.

c. **RCO**. The RCO has to be able to move freely behind the firers and to have a clear view of all activity on the firing point.

0359. Spare

FIRE HAZARD

0360. **Hazards**. When specifying materials for range construction, the fire rating must be considered. Materials such as rubber compounds and timber can present a fire hazard. This, combined with factors such as heat from target lighting and the presence of unburnt propellant, require that careful consideration is given at the design stage to fire prevention. A light rubber sheet over granulate rubber traps will prevent target debris and unburnt propellant getting into granulated minimising the fire risk. This is particularly important where close engagement practices are authorised. Means of escape should conform fully to the Fire Regulations.

0361. **Approval.** Attention is drawn to the Regulatory Reform (Fire Safety) Order for England and Wales; the Fire Safety (Scotland) Act and the Fire Safety (Scotland) Regulations, the Fire and Rescue Services (Northern Ireland) Order. The requirements include a general duty to carry out a risk assessment and take precautions against fire. Fire safety is also covered by the respective Building Regulations (England and Wales; Northern Ireland; Scotland). The advice and approval of Defence Fire and Risk Management Organisation (DFRMO) is mandatory for all new or reconstructed indoor ranges.

COMMUNICATIONS

0362. A means of summoning the emergency services, ideally a land laid telephone, is to be available.

MAINTENANCE

0363. **Responsibilities.** Maintenance is the responsibility of the RAU. Responsibilities may be divided as follows:

a. **Range Warden.** See Reference A1.

b. **Property Management**. General inspection with particular emphasis on the:

(1) Condition of the range structure.

(2) Stability of the back wall behind the bullet catcher.

(3) Warning signs and interlock safety systems.

(4) Prevention of dust accumulating out of sight.

(5) Ventilation system functioning properly (if fitted).

(6) Ensure there is no bullet damage to electrical or gas infrastructure.

c. **Equipment Management**. Repairing and servicing equipment installed by single Service contract.

0364. **Frequency**. Proper maintenance is dependent upon good liaison between the Range Warden and the RAU, and on properly scheduled maintenance periods. A heavily used range may need one day's maintenance each week plus one or two days' maintenance by the Range Warden each month. Two closed periods of a week or so may be needed each year for building and defence structure repair. For frequency of de leading .22" ranges refer to Chapter 30, deep cleaning. Proprietary trap systems should be de-leaded in accordance with suppliers' recommendations. The annual range inspector should determine when low use ranges are de-leaded.

0365. **Range Cleaning.** Range cleaning is an important factor in maintaining a safe range. Range cleaning including the requirements for routine and deep cleaning is contained in Chapter 30.

0366. **Bullet Catcher.** Regular inspection of the bullet catcher backplate and pelmet lining should determine that no excessive buckling, displacement or splitting of the steel is evident. Steel plate which is showing signs of failure must be replaced. Bullet catchers may also need frequent emptying and frequent cleaning.

0367. **Range Structure**. Other than the backplate area, it should be very rare for the range structure to be struck. Apart from the backplate, the range structure should be inspected regularly for damage from shot strike. Any strike is to be marked, and the cause investigated and recorded in the Range Log MOD Form 906. When such damage in the defence zone is significant, it is to be repaired immediately.

COMPLIANCE CHECKS

0368. The following are to be checked:

a. Authorised weapons, ammunition and practices.

b. Defence Zone, backplate and bullet catcher correctly sized and specified.

c. Floor, walls and ceiling clear specified for sound absorption and dust inhibiting surfaces free from obstruction or correctly protected.

d. Backsplash / ricochet hazards eliminated. Baffles (if any) correctly positioned and detailed.

e. Targets and firing points correctly sized and positioned.

f. Target centre height and flank positions clearly identified.

g. Adequate ventilation and lighting.

h. Correct safety signs number and location.

i. Adequate access and egress.

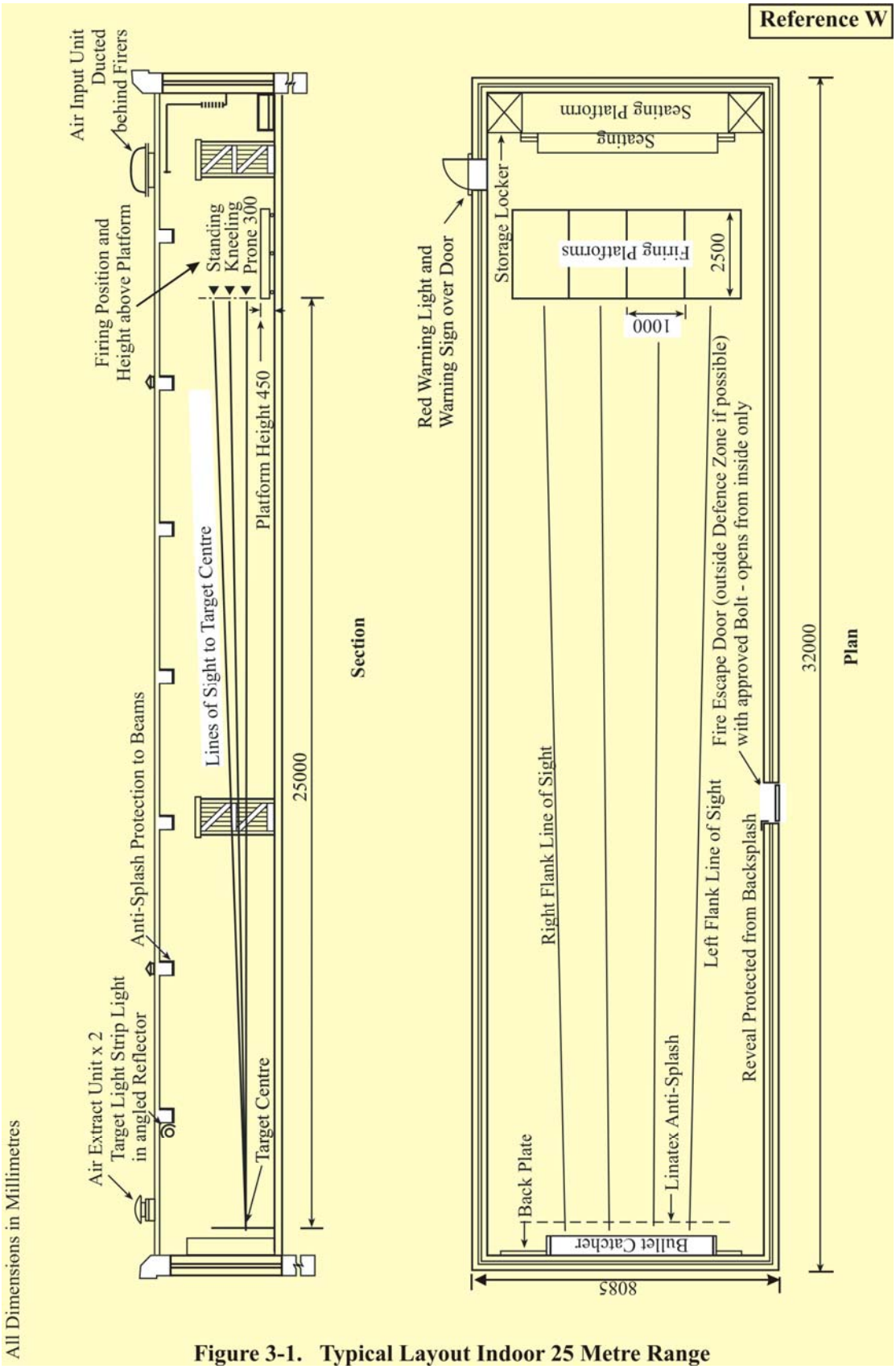


Figure 3-1. Typical Layout Indoor 25 Metre Range

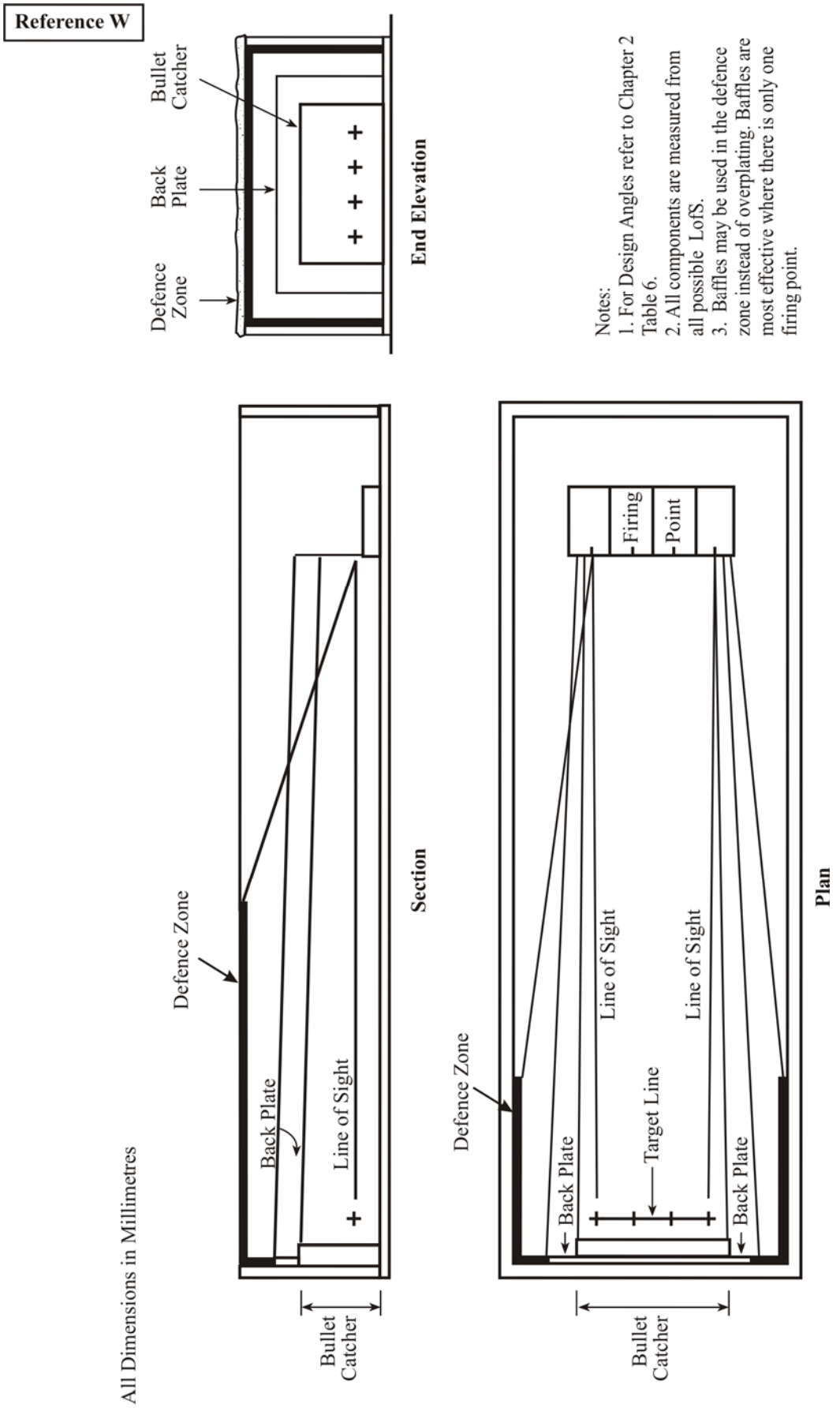


Figure 3-2. Defended Structure Details

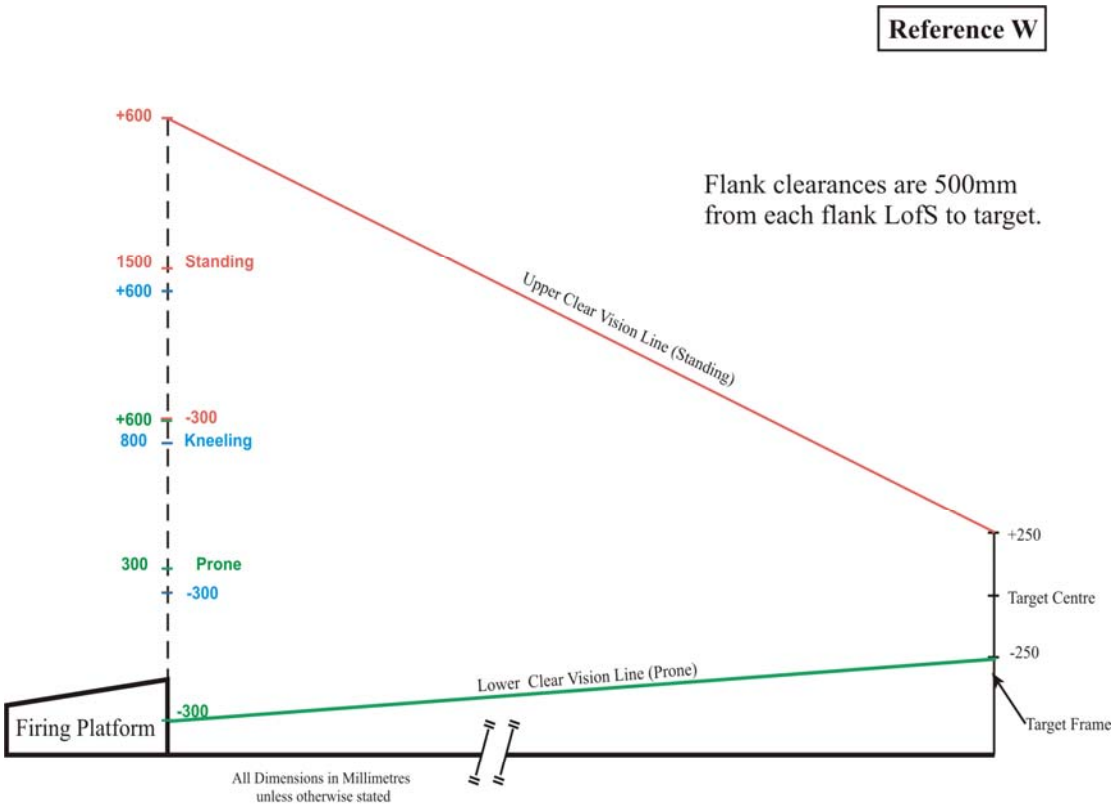


Figure 3-3. Clear Vision Line (T)

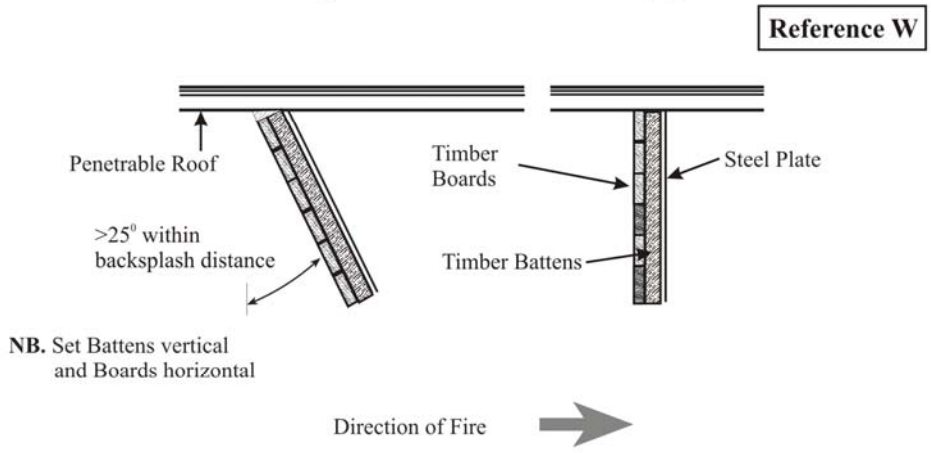


Figure 3-4. Baffle Construction

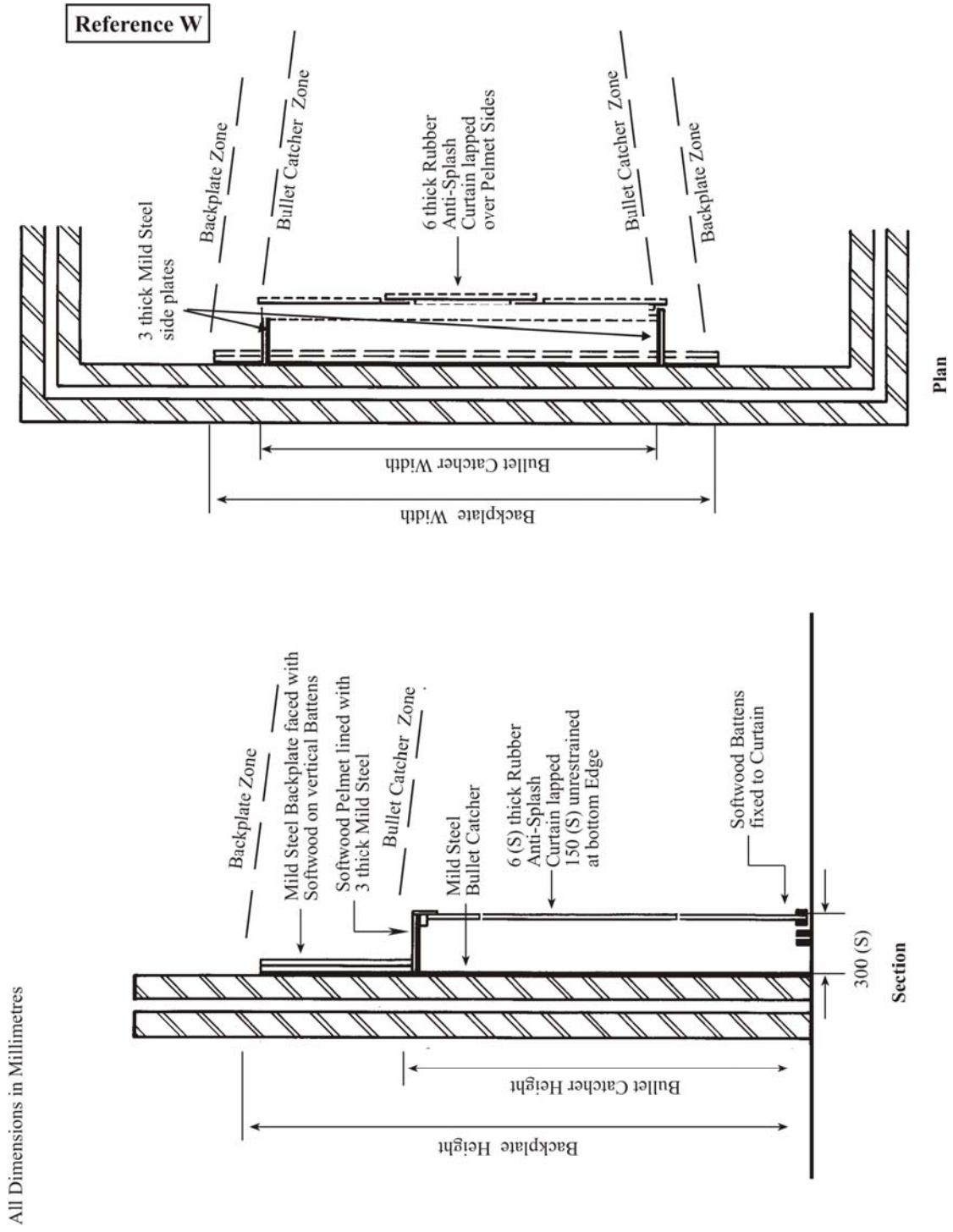


Figure 3-5. Bullet Catcher Construction

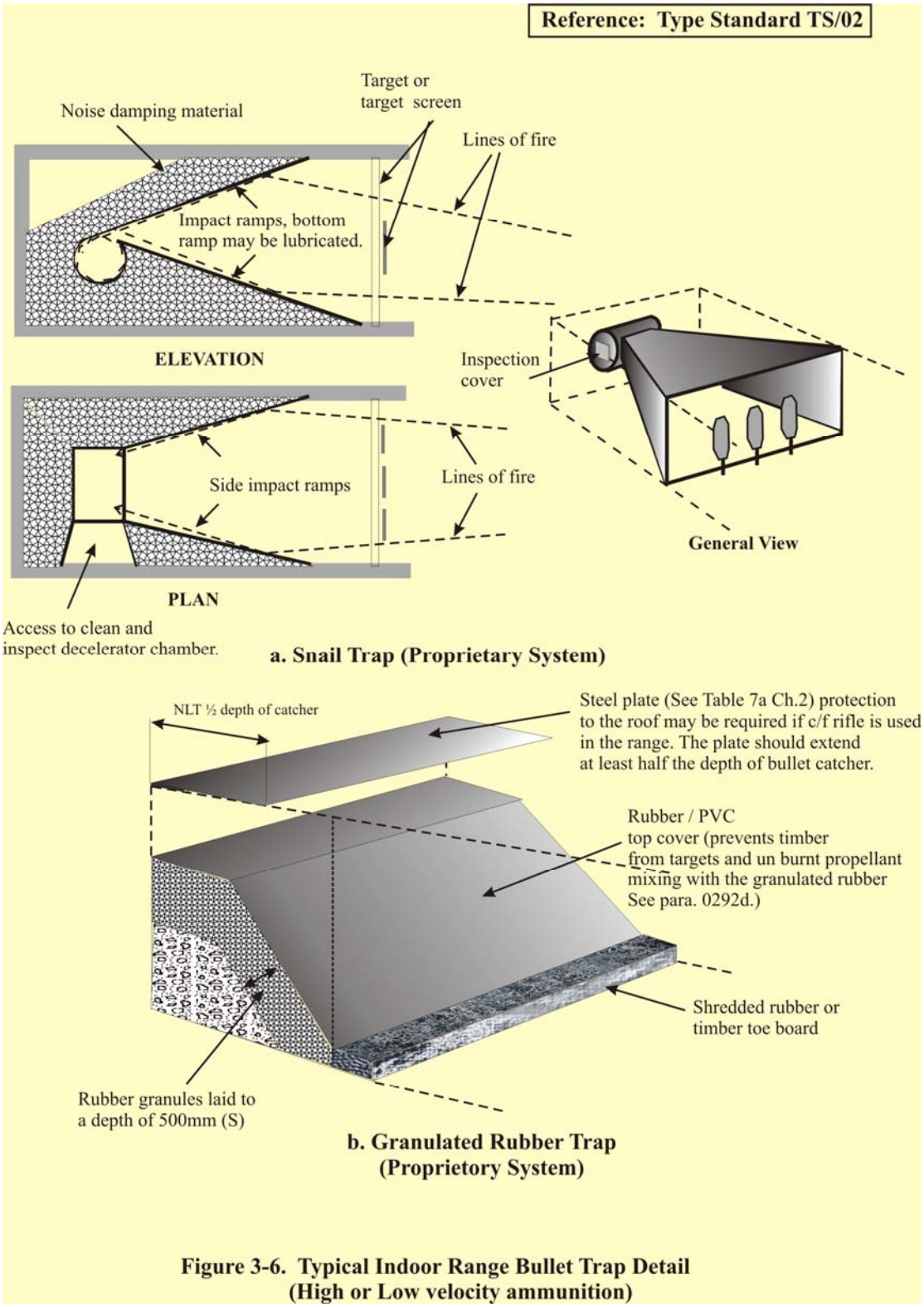
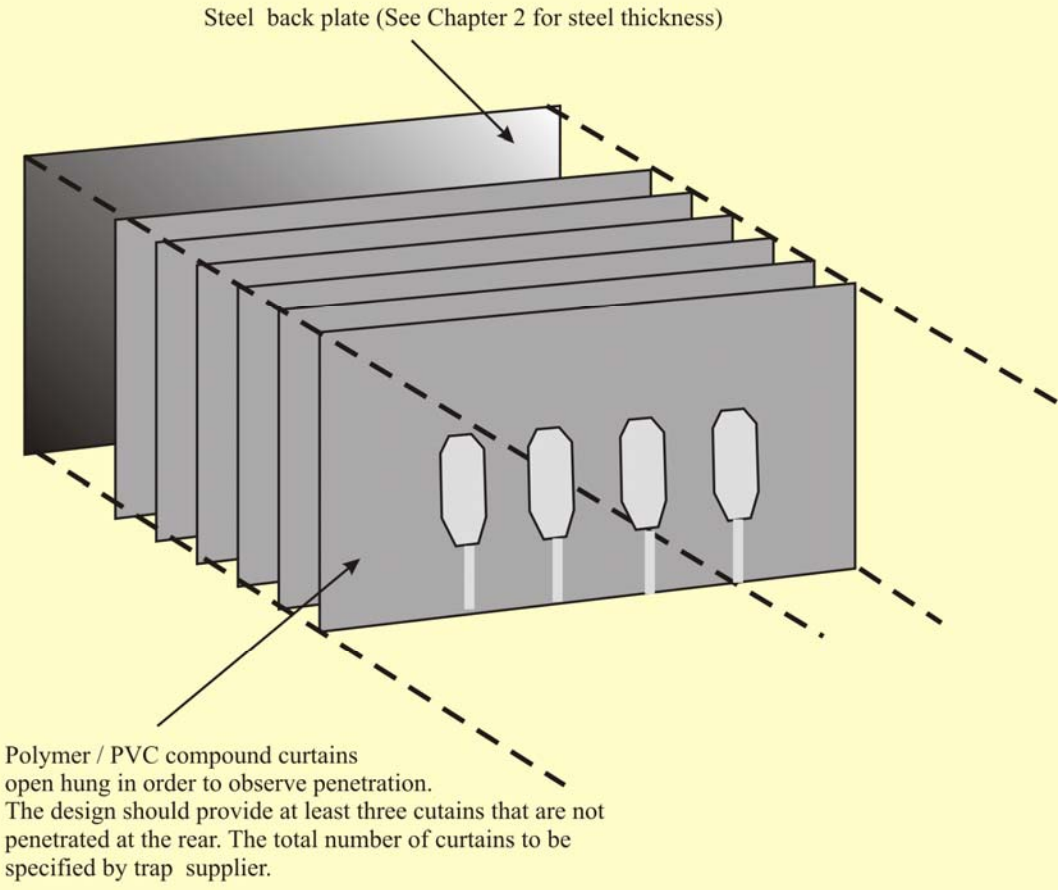


Figure 3-6. Typical Indoor Range Bullet Trap Detail (High or Low velocity ammunition)

Reference: Type Standard TS/02



c. Curtain Trap

Note:

A propietory system for 9mm or .22" ammunition only.

Figure 3-7. Typical Indoor Range Bullet Trap Detail (Low velocity ammunition)

Reference: Type Standard TS/02

Bullet Catcher Type	Ammunition type	Advantages	Disadvantages
Sand	All	• Traditional system • Inexpensive • No noise • Suitable for target or judge -mental shooting • Fall of shot visible	• Dust in range and catcher (lead & unburnt propellant) • Maintenance costs • Lead break up • Environmental hazard • Disposal costs • Attrition at MPI
Flat steel plate & Anti - backsplash curtain	Low velocity only	• Traditional system • Inexpensive • Suitable for target or judge-mental shooting • Small foot print	• Dust in catcher (lead & unburnt propellant) • Lead break up • Cost of Linatex • Fall of shot not clear. • Attrition at MPI
Snail	All	• Low cost in use • Minimal maintenance • Suitable for target or judge-mental shooting	• Lead break up • Noise • High initial cost • Large footprint • Fall of shot not clear. • Older versions suitable for lead ammo only.
Granulated rubber	All	• Little round break up • No lead dust • No noise • Low maintenance • Low cost in use • Suitable for target or judge-mental shooting	• Same footprint as sand • Fine rubber dust on high use ranges. • Fall of shot not clear. • Cover sheet attrition at MPI • Fire risk particularly when not fully maintained and with tracer.
Curtain (Open) Polymer / PVC compound sheet	Low velocity only	• No round break up • No lead dust • No noise • Very low maintenance • No cost in use (judge-mental shooting) • Low cost in use (Target shooting) • Effectiveness visible	• Large footprint • Low velocity use only
Curtain / herringbone Rubber recycled conveyor belt	All	• No noise • Smaller footprint • Suitable for target or judge-mental shooting	• Attrition at MPI • Rounds captured in rubber • Effectiveness not visible • Anti backsplash sheet required • High maintenance cost for target shooting

Figure 3-8. Advantages and Disadvantages of the Different Bullet Catchers

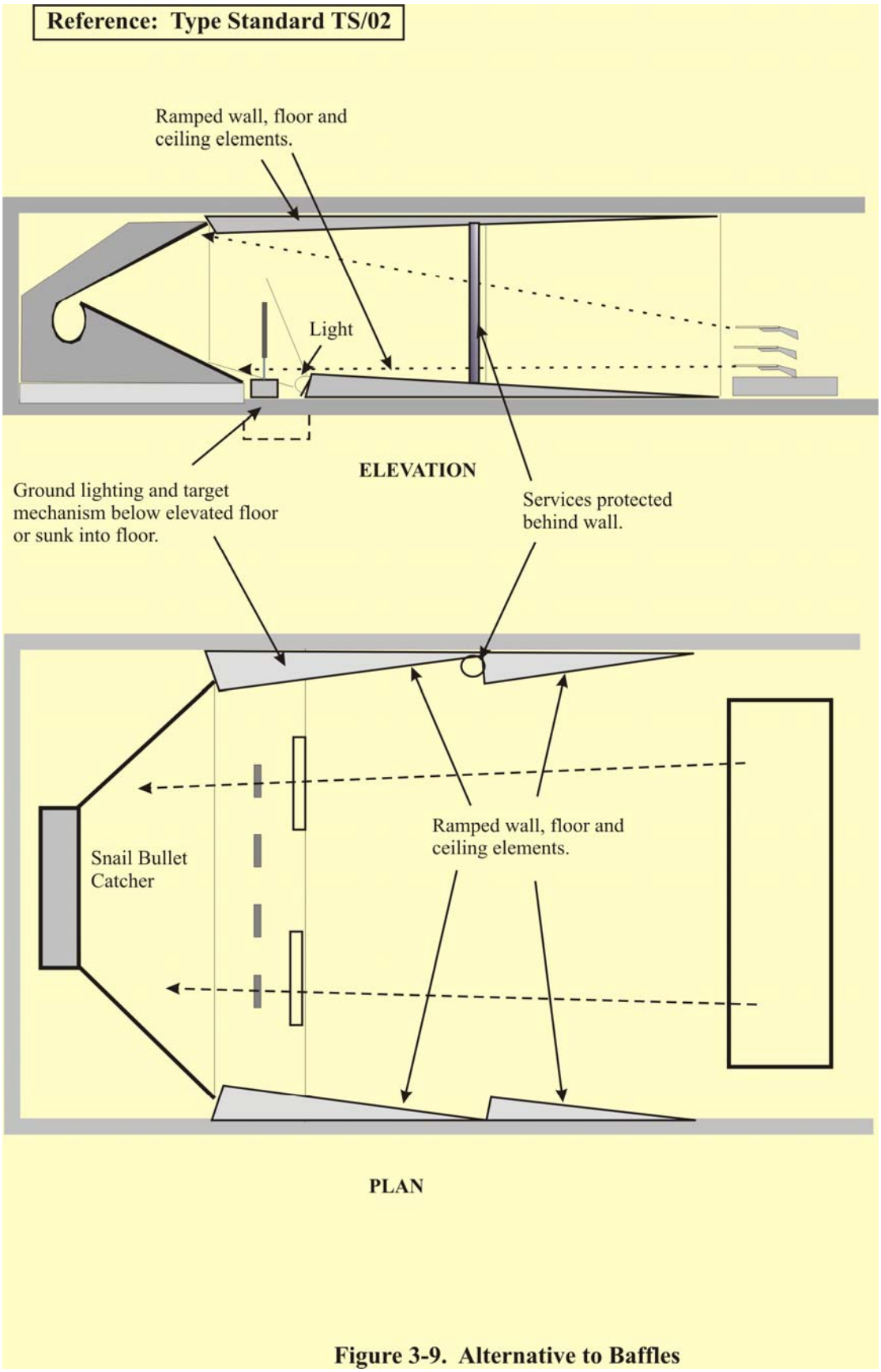


Figure 3-9. Alternative to Baffles