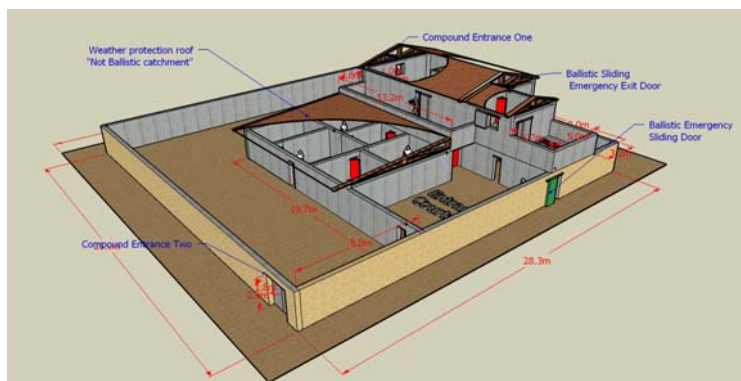


CHAPTER 6

THE CLOSE QUARTER BATTLE (URBAN) RANGE

INTRODUCTION

0601. **General.** The Close Quarter Battle (CQB) (Urban) (U) live fire range is an advance training facility. It provides a specific form of training in which command and control at all levels is developed in addition to shooting skills in the urban environment. It is primarily intended to provide realistic exercise before operational deployment in an urban area and relates to live fire ranges only.



Urban Live Fire Range.

0602. **Aim.** This chapter sets out the design criteria and construction details for constructed CQB(U) ranges and for tactical indoor ranges. For temporary and shoot through facilities refer to Chapter 19. In particular it covers:

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|----|----------------|-------------|
| a. | Introduction | 0601 - 0604 |
| b. | Danger areas | 0605 |
| c. | Design | 0606 - 0611 |
| d. | Range Options | 0615 - 0616 |
| d. | Construction | 0620 - 0628 |
| e. | Communications | 0630 - 0631 |
| f. | Maintenance | 0632 - 0634 |

0603. **Description.** The CQB(U) ranges are constructed to reflect typical urban environments with a variety of realistic scenarios. Domestic and industrial areas, wide and narrow streets, underground services, traffic and an impression of public activity. The range provides the troops under training with realistic operational situations in and around public activity. There is no set layout for a CQB(U) range. Facilities may be provided in isolation for specific situation training or as a self contained complex or located alongside existing range areas to incorporate assault and sniper practices in an urban environment.

0604. **Purpose.** This range provides operational training in the engagement of targets at varied ranges in an urban environment including Methods of

Entry (MoE), dealing with Improvised Explosive Devices (IED) and judgmental shooting.

DANGER AREAS

0605. **Templates.** A combination of WDA templates and NDA principles described in Chapter 5 are applied dependent upon arcs of fire available and range structures.

DESIGN

0606. **General Concepts.** CQB(U) ranges generally reflect current or projected operational situations. They may consist of a single structure or replicate an urban environment and they may be permanent, semi permanent or temporary structures. The urban ops skills to be practised in / on these ranges include:

- a. Urban assault – breaching, Methods of Entry (MOE)
- b. Street clearance – urban patrol skills.
- c. House / room clearance.
- d. Improvised Explosive Device (IED) clearance.
- e. Infrastructure clearance – drains, sewers.
- f. Defence – defended locations.
- g. Fighting within urban areas – collateral damage, judgmental shooting.
- h. Fighting from urban areas.

0607. **Physical Considerations.** Urban ranges should reflect current or predicted operational environments. Current operations would involve one or more of the following situations:

- a. Limited fields of fire (operating in narrow streets).
- b. Limited observation (by-passing enemy).
- c. Cover from fire and view (making use of urban layouts).
- d. Open areas (exposed to enemy fire).
- e. Industrial buildings (variety of layout).
- f. Towers (sniper activity).
- g. Religious structures (testing rules of engagement).

0608. **Siting.** These ranges are best constructed on larger training areas with the layout configured to permit firing within prescribed arcs. This also allows more realistic exercise scenarios. Isolated facilities provide only limited training capability.

0609. **Layout.** A SA loading bay forms the start point of an exercise which also finishes at an unloading bay. These bays are normally contained in an administrative building which also provides preparation, briefing, de-kiting and video debriefing rooms. The scenes simulate the features of potential operational areas. Facades of terraced houses, shops, garages etc. form the periphery or outer boundary wall. Buildings are laid out on internal roads with

such features as gardens, squares and car parks to produce the open spaces. Obstructions such as walls, fences, lamp posts and parked cars are included. The layout will be dependent upon and be formulated around a programme of incidents.

0610. **Special Effects.** Various effects are available to add realism to the urban environment:

- a. **Lighting.** Domestic and street lighting, and enemy headlights are directed to silhouette own troops. Floodlighting may be used as a prelude to an incident in darkened streets.
- b. **Motivations.** Various mannequins throughout the range can be moved remotely to attract attention.
- c. **Missiles.** Half-bricks, simulated petrol bombs and the like may be released in specifically designed areas.
- d. **Sound Effects.** A background of sound effects can be simulated by recordings; for example - urban activity, gunfire and increasing hostility.
- e. **Pyrotechnics.** Examples of electrically initiated pyrotechnics are available for use are:
 - (1) **Splat.** A splat represents a bullet striking a solid surface close to the firer and is operated in conjunction with the blank round fired from the enemy (target) position.
 - (2) **Gunfire.** The SA80 blank firing retaliatory device.
 - (3) **Ricochet.** Used in the same way as splat but gives a ricochet sound effect.
 - (4) **Bomblet.** A small 2 ounce gunpowder bag which gives off a large cloud of smoke to represent a bomb.

Note: All the above effects are remotely operated/activated by the target effects operator in the control tower.

0611. **Defence Structure sizes.** Where there is a need to provide NDA criteria for open ranges the defence structures are designed to meet the requirements set out in Chapter 5. For proprietary NDA bullet catcher systems the minimum height is to be 2.4m covering engagements up to 10m with Fig.11 targets at ground level or Fig.12 targets at not more than 0.5m off ground level. For enclosed or semi enclosed facilities the defence zone structure requirements used for engagements over 10m are 12deg (elevation and azimuth) from the line of sight to target as set out in Chapter 2 Table 6 and illustrated in Chapter 3.

0612. **Overhead Gantries.** Where overhead gantries are provided these are used only to monitor dry run through practices. During live fire activity they are not to be used. Where external engagement is possible the gantries should be constructed with timber and not steel unless the gantry is itself protected from bullet strike.

0613 - 0614. Spare

RANGE OPTIONS

0615. **Outdoor open range Live Fire Tactical Training Areas (LFTTAs).** Permanent or temporary CQB(U) ranges may be set up on LFTTAs. Permanent ranges are to be formally established in accordance with JSP 403 Vol.1. All structures are designed to meet the ballistic and protection standards set out in this JSP. For this type of range the following considerations are taken into account:

a. **Range Danger Area (RDA).** Where the Cone of Fire (CofF, see Chapter 2 Table 3) and predicted ricochet (see Table 1) is not captured an RDA shall be provided as set out in Chapter 19 Figure 19-2 and in 19-3 for High Elevation Fire (HEF) targets.

b. **Air Danger Height (ADH).** Where the Cone of Fire is not captured, an ADH is provided as set out in Chapter 2 Table 1.

c. **Arcs of Fire.** Where there is a limited area for applying RDA, clear arcs of fire are provided. Arcs of fire are particularly important where target designation is not tightly controlled. For example, targets mounted on roofs or upper storey windows will generate High Elevation Fire (HEF). RDA and ADH in these cases are taken from HEF tables and the worst case RDA, ADH used.

d. **Structures (Permanent or Temporary).** Where structures or façades are provided on LFTTAs there should be no hard surfaces that might generate ricochet or backslash. This includes unprotected ironmongery, round head nails, brackets or other fittings or fixtures. All surfaces within the CofF must be of a ballistic material or system. Ballistic materials include any material that absorbs rounds or an element made up of a hard surface protected by an anti backslash curtain or material. Consideration must be given to climatic conditions where this may change the ballistic properties of the material such as surface freezing in colder climates.

0616. **Outdoor No Danger Area (NDA) and Indoor CQB(U) range.** Outdoor ranges should meet the Non Standard NDA criteria provided in Chapter 5. Some outdoor NDA and all indoor CQB(U) ranges take into account the emissions detailed in Chapter 30.

0617. **Indoor Ranges.** All tactical indoor ranges are to meet NDA criteria in terms of the extent of protection. Proprietary solutions for walls, ceilings and other build elements may be used with supplier guarantees of performance based on weapons and extent of use.

0618 - 0619. Spare

CONSTRUCTION

(Permanent and semi permanent ranges)

0620. **Materials.** Structural elements may employ conventional building materials or specialist proprietary ballistic materials in areas where targets are to be sited. Facades in areas of expected engagement with small arms and grenades are constructed to absorb shot and grenade fragments, and to eliminate ricochet and backslash. Where rubber components are used consideration shall be given to the risk of fire particularly where simulated grenades, "flash bangs" are used. In complex covered structures compartmentisation is essential to prevent the spread of fire and to provide

safe areas in the event of a fire. In more open covered structures consideration should be given to the use of sprinkler systems. Advice from the fire officer at design stage is mandatory.

0621. **Targetry.** Fixed Electric Targets (FET) and radio-controlled targetry may be installed to meet exercise objectives. Moving targets are also possible. Both fall-when-hit and retaliatory devices may be employed. A range of target facings and model figures are available (see Chapter 29). All mechanised targetry will require full protection.

0622. **Ballistic wall options.** In order to minimise cost, urban live fire ranges may use common building materials in areas where shot is not expected. Celcon blocks are an effective option as they can absorb stray shot and grenade fragments without generating ricochet or backsplash. They will not however take high attrition nor capture direct shot. In areas where shot is expected the following wall or panel solutions that absorb shot without generating ricochet or backsplash may be considered. In heavy use ranges or where concentrated engagement is expected, bullet catchers in front of the structure walls should be considered to extend the life of the more expensive wall solutions.

- a. **Sand or earth.** Sand or earth used in gabion mesh containers or sandwiched between timber may be used as an effective protection wall or backstop for NDA solutions. Table 1 below provides an indication on the actual penetration depth to be expected from a variety of ammunition. Penetration close to the surface of such material will be much greater. Any defence structures using these solutions should be constructed with a minimum of 900mm thickness that will allow for some disruption within the structure and still capture rounds.

Ser	Ammunition Type	Range / Angle of fire	Penetration (See Note 1)
1	5.56mm	25m / 90 ⁰	425mm
2	9mm	25m / 90 ⁰	365mm
3	4.6mm	25m / 90 ⁰	195mm
4	7.62mm	25m / 90 ⁰	480mm
5	8.6mm	25m / 90 ⁰	540mm

**Table 1 – Expected Penetration of Damp Sand and Earth
from 5 rounds at a single point of aim.**

Notes:

1. Data from DTE SE Penetration Trials Jun 06.
2. Closer engagement is expected to generate greater penetration.
3. 900mm minimum, 1000mm standard depth of sand or earth to capture Infantry small arms ammunition in permanent structure bullet traps.

- b. **Sacon (US).** A proprietary fibre reinforced concrete supplied in block or panel form. It has a lead leaching inhibitor reducing the potential for

lead leaching into the ground. If lead is allowed to build up in this material it will eventually develop a backsplash hazard. In panel form, panels can be rotated after prolonged use away from target areas. In block form, areas of high use can be cut out and replaced.

c. **Tarcon (Turkey)** Similar to SACON without the lead leaching inhibitor. Less expensive than SACON.



TARCON interlocking panels.

d. **Slabcon (UK)** The original supplier of this material no longer exists however DTE SE have details of a similar concrete mix that is currently used on the .22" urban façade range.

e. **Rubber Panel & Block Systems.** A shredded or vulcanised rubber tile over armoured steel plate system is a common proprietary wall system suitable for all natures upto 7.62mm. Rubber tiles bonded directly to steel plate may present a fire and maintenance problem if sited in areas where regular shot is expected. Tiles provided with a gap between the steel and rubber tile are suitable for judgmental bullet catchers but the gap extends the depth of wall presenting safety issues on external corners. Target areas or predicted impact areas where bonded panels are used may be protected with a 2nd layer of blocks in front of the structure to capture most rounds fired and allowing block rotation as the blocks become loaded with lead bullets.



Example - Dura Block™ System using bonded tiles and blocks.

f. **Fire Hazard.** Unless specifically stated and certificated otherwise by the supplier, all rubber products are susceptible to fire when engaged with tracer ammunition. Unless documented and certificated “fire proof” products are used, Range Orders shall reflect the prohibited use of any tracer ammunition and direct that a physical check is made by safety staff prior to exercising units entering the facility. A prominent Prohibition sign is to be placed at the entrances to a rubber facility stating “TRACER AMMUNITION IS PROHIBITED”. Enclosed shoot house facilities are to be treated as places of work under the Fire Regulations. In addition the MOD Form 1057 and 904 must highlight such a restriction of use

g. **Other Solutions.** Concrete walls protected with timber or rubber tiles, armoured steel plate protected with timber boarding may also be considered but these need intensive maintenance support to remain safe. Stone filled cavity systems are not recommended due to potential settlement of the inner fill.

0623. **Bullet trap options.** Bullet traps may be used against ballistic walls to limit attrition of expensive materials or form the structure wall itself. All bullet traps must be capable of taking direct fire at close ranges without the need for constant maintenance. In some cases hidden attrition must be considered.

a. **Sand / Earth.** Large footprint trap. Smaller footprint gabion or timber solutions are not suitable due to attrition from concentrated fire. Traditional bullet traps are covered in Chapter 2.

b. **Granulated rubber.** Vertical granulated rubber traps with 500mm depth of granulate can take upto 7.62mm. Rounds are captured within the granulate. Not suitable for small MPI target practices.

c. **Lamella.** Illustrated in Chapter 3. Large footprint trap. A very efficient and clean trap system but suitable only for .22” and 9mm ammunition.

d. **Snail.** Another large footprint US proprietary trap. It will take all rounds upto 12.5mm.

e. **Flat steel** (AR500 minimum specification when 5.56mm SS109 is used). Used with an antisplash curtain offset 300mm or compressed shredded rubber tiles fixed 50mm off the steel plate. A small footprint solution. Panels may be constructed in isolation to provide flexibility in room layout.

f. **Angle steel (Venitian blind).** AR500 12mm steel panels fixed at 45⁰ to impact angle in steel frames. Bullets are deflected down to the bottom of the trap. Panels are loose fitted enabling rotation up and down away from areas of high attrition. Compressed shredded rubber tiles are used to retain ricochet and backspash. An expensive but long lasting trap system taking all rounds upto 7.62mm. Panels may be constructed in isolation to provide flexibility in room layout.

0624. **Method of Entry (MoE) Techniques.** Specially constructed doors and windows may be required to practice forced entry techniques either on or adjacent to fixed ranges. To use realistic MoE it is often better to provide isolated training structures away from the urban range.



MoE isolated stands.

0625. Closed Circuit Television and Public Address Installation. CCTV is provided to ensure the safe operation of the range; it can also be used to record exercises and for debriefing. Cameras are fitted with IR for night use. A public address (PA) system may be provided to enable the RCO to control the exercise.

0626. **Range Control.** A range control building may be sited to enable observation and to control exercise activity. In range control provision should be made for the RCO/exercise controller, target and effects operators, and video recording operators. Controlled and protected access to the range control and administrative buildings should be provided.

0627. **Electricity and Water.** Mains electricity and water supply are essential for a range of this type. The provision of a fire fighting main should be considered.

0628. **Ancillary Buildings.** The range requires extensive repair and maintenance which makes a target store and well equipped workshop essential. Consideration must also be given to the number of waiting troops necessary for an efficient through-put on the range. Waiting areas with adequate facilities will be required.

MAINTENANCE

0629. **Essential maintenance.** In order to maintain a safe facility these facilities require detailed knowledge of how materials stand up to live fire to determine when rotation, replacement or repair of ballistic elements is needed.

- a. **Ballistic Walls.** In some cases bullet attrition will not be apparent on the rubber surfaces whilst the steel or structure behind deteriorates from bullet impact. Shot in areas where shot is not expected, or high volume shot is seen in areas where only occasional shot is expected is to be reported to the Range Officer.
- b. **Water ingress.** During winter months any standing water within these facilities will cause a slip hazard. All drains on open balconies exposed to the weather are to be kept clear.
- c. **Services.** Where services are provided within the facility there is a need to inspect for bullet strike damage from direct fire or ricochet.

COMMUNICATIONS

0630. **External.** A means of summoning the emergency services, ideally a land laid telephone, is to be available.

0631. **Internal.** Provision should be made for the following communications:

- a. RCO to exercising troops.
- b. RCO to safety supervisors.
- c. An intercom for range management between RCO/targets effects operators and video recording operators.

0632. The preparation of the range, its operation and follow-up maintenance are the responsibility of the RAU. Proper cleaning of the range area is essential to prevent a build-up of lead dust and unburnt propellant. Reference should be made to Chapter 30 regarding safe cleaning and disposal procedures. Shot damage, in particular to anti-ricochet cladding, will require careful monitoring. Some designs allow rotation of the cladding away from areas which are regularly struck. This should be undertaken before damage becomes too extensive.

0633. **Responsibilities.** Responsibilities may be divided as follows:

- a. **Range Warden.** See Reference A1.
- b. **Property Management.** General inspection with particular emphasis on:
 - (1) All facades including supports and access points.
 - (2) Observation towers and other elevated structures.
 - (3) Electrical safety, alarm and warning systems.
 - (4) Fire escapes in indoor facilities.
- c. **Equipment Management.** Repairing and servicing equipment installed by single Service contract.

0634. **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 maintenance after each use plus one or two days' more detailed maintenance by the Range Warden each month. Two closed periods of a week or so may be needed each year for structure rotation and repair.

ADDITIONAL DETAILS FOR CQB (U) SHOOT THROUGH LFTT FACILITIES

1. General.

CQB (U) Shoot Through LFTT facilities are provided for Dismounted Close Combat (DCC) units to practice their Close Quarter Battle (CQB) skills in a LFTT environment. The facilities are a cost effective means of providing realistic and demanding training to personnel involved in the close fight. The facilities may be permanent i.e. constructed and maintained by a RAU, or temporary i.e. erected by a user unit and removed after use.

2. Aim.

These principles outline the requirement, design and construction of CQB (U) Shoot Through LFTT facilities to ensure structure and layout do not compromise safety.

3. Description.

CQB (U) LFTT facilities replicate compounds that might be encountered on operations. Compounds normally consist of an outer area within which buildings may be positioned. Each building will typically have one entrance and exit and may have a number of windows. Each building will have a series of adjacent rooms, all linked by corridors. There is no set layout for the compound as they can be constructed to present different scenarios such as factories or small dwellings and even specific locations that may be encountered on operations. Structure layout and target positions, including position of judgemental/friendly targets that would not normally be engaged, are limited only by the available arcs. The compound may be constructed so that more than one team can advance concurrently.

4. Danger Area

The facilities provide no ballistic protection and a Range Danger Area (RDA) trace is required to accommodate the Weapon Danger Area (WDA) template in the same way as other conventional LFTT activities. Where the assault team breach into a compound or room no troops are to be forward of the breach.

5. Safety Angle.

Target siting and triangulation is fundamental in ensuring that the individual weapon safety angle is not compromised. Communication between the RCO, safety supervisors and the exercising troops ensures a safe practice and can not be over-emphasised.

6. Design

The facility can have a number of adjoining rooms but are designed in such a way that the rooms funnel the troops in the desired direction. Whilst a room may have several entrances only one is to be available for use to exercising troops at any one time. Other entrances should be firmly closed and not be used by exercising troops.

7. Construction.

- a. CQB (U) LFTT facilities are made of penetrable materials, sometimes Hessian screens are erected but more than likely the facility will be made of sheet timber such as ply-wood. Whatever material is chosen it is essential, because of the close nature of firing, that no ricochet inducing material is used to support the structure. Metal pickets are to be protected and nails, if used to build the facility, are completely sunk or covered. (See details of nails at paragraph 02096e)

- b. Trip hazards are to be kept to a minimum although obstacles may be factored into the compound as part of the tactical scenario. However, there must be no obstacles on the exits in case of fire, injury or any other such emergency.
- c. Walls may be strengthened to provide the ability to place ladders if required.
- d. Targets, including judgemental/friendly targets, are to be entirely penetrable and positioned in such a way that rounds pass through and into the danger area. Elevated targets with target centre in excess of 90 mils will require the application of the detail in JSP 403 Vol.2 Fig.19-2 with QE max 150 – 1250 mils.
- e. The structure is to be sufficiently robust to withstand inclement weather. In particular the structure must be stable in strong winds.

8. Targetry.

Targets are positioned so that firers entering the room engage targets within the arc of fire. Further rooms will present targets in the same manner. Firing is therefore always away from any supporting troops and is safe. This principle also applies to judgemental targets that should not normally be engaged. Permanent structures are to be handed over to units with no targets present. Range planning staff are then responsible for the positioning of targets so that all firing is within the arc of fire. Only those targets placed by the RCO are to remain in the structure, all spare targets and debris is to be removed to avoid any confusion for exercising troops.

9. Record of the Facility.

Permanent CQB(U) Shoot Through LFTT facilities i.e. those constructed and maintained by a RAU, are to be approved by the RAO and recorded on the range's MOD Form 1057.

10. Typical CQB (U) LFTT Shoot Through Facilities.

