ADF LAND DOMAIN PUBLICATION

LP 7.2.9 OLVANAN PEOPLES ARMY COMBAT ENGINEER TACTICS

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EDITION 1

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[1] https://www.legislation.gov.au/Series/C1968A00063
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[3] https://www.legislation.gov.au/Series/C2004A03712
[4] http://drnet/AssociateSecretary/security/policy/Pages/dspf.aspx

Preface

1. ADF Land Domain Publications (LPubs) describe the fundamental principles that guide land forces' actions, and provide the common frame of reference on how the Army achieves its mission. LPubs are the basis of the Army's training system based on time-tested, proven principles of war, combined with the critical analysis of contemporary lessons. LPubs have been shaped since 1901 by Army's proud history and culture, while being constantly adapted as required, thereby representing the sum of the Army's collective historical knowledge, presented into objective guides for action. In essence LPubs explain and guide 'who we are', 'what we do' and 'how we do it'.

2. ADF doctrine provides the framework that guides thinking but does not dictate what to do. While doctrine publications are written in a non-prescriptive style that allows latitude in interpretation and flexibility in application, they are specific enough to provide informed guidance. Doctrine is about fighting power and the integration of its three components: intellectual, moral and physical, applied through mission command and our manoeuver approach to warfighting.

3. Land procedural publications provide the authorised procedural and technical knowledge required for land forces to achieve their mission. Unlike doctrine, procedural publications convey information covering a range of activities based on best possible practice, in clear detailed steps that, depending on the publication, describe and/or prescribe how to perform specific tasks and drills. Whilst the majority of procedural publications are descriptive in nature, the decision not to follow the guidance contained in the publications should be justifiable. Land procedural publications are aligned and subordinate to ADF doctrine.

4. Land procedural publications include a number of publications that prescribe the procedures for the safe conduct of a range of tasks and activities required for delivering a range of lethal warfighting capabilities. Procedural publications which are safety in nature are written with an expectation of compliance, and therefore do not attempt to prescribe every 'do' and 'don't'. A number of land procedural publications are classified as "Landworthiness" Regulations in accordance with *Defence Landworthiness Management System Manual*. **LPubs constitute a lawful general order when written in mandatory terms and apply to all personnel**.

5. **Land Domain Publication - Note (LNote)** is a provisional publication valid for no more than 24 months from its release until it is cancelled, released as an enduring LPub or absorbed into an existing LPub. LNote can be released:

a. as an addendum to an existing land publication

b. to provide additional information of significance in a timely manner to address an emerging issue, an identified lesson, or to satisfy a major/critical knowledge gap

c. as an unscheduled/short notice new publication, published in response to changing strategic guidance, introduction of new capabilities, emerging threats or opportunities.

6. **Land Domain Publication - Developing (LDev)** is developed for use during a specific Army trial or experiment, they are limited in their distribution, and are only valid for the duration of the trial or experiment. Following their validation, LDev may be incorporated into an existing LPub or released as an enduring LPub.

7. **Land Training Information Bulletin (LTIB)** is developed by a Training Authority, Training Centre or LDP, as a means to provide specific direction and training guidance related to a specific land capability.

8. **Land Aides-Memoire (LAM)** are a practical guide that succinctly contain information on a particular theme, task, position or employment category. They are drawn from wider authorised LPubs, or other Defence authorised documents.

Aim

9. The aim of this publication is to inform readers of the principles of operation of the Olvanan Peoples Army Combat Engineers, and to illustrate how Combat Engineers are likely to conduct a range of military engagements that involve their use to support manoeuvre, to impede the mobility of enemy forces, and to provide protection at Brigade and lower echelons. Olvana is a fictitious, nation-state construct, training adversary, as defined in US Army Transformation and Training Command's (T2COM) ODIN system.

Associated references

10. This publication should be read in conjunction with other references, in particular:

a. Olvana – Operational Environment - https://odin.tradoc.army.mil/DATE/a7f54b856bdda3a8a4666108b3f05c6e

b. Olvana – Army Structures - https://odin.tradoc.army.mil/FS/INDO-PACIFIC/OLVANA/17_ARMY

c. T2COM Worldwide Equipment Guide

d. LNote 7.2.1 Olvanan Small Uncrewed Aerial Systems Tactics at Company Detachment and Below

e. LNote 7.2.2 Olvanan Urban Doctrine and Tactics – Enclosure Warfare

f. LNote 7.2.6 Olvanan Peoples Army Logistics in support of the Combined Arms Brigade

g. LNote 7.2.8 Olvanan Tactical Employment of Electronic Warfare

h. Australian Army Forces Command Red Book, 2026.

Land publication L-Library

11. The ADF Land Power Library (L-Library) is the single access point, and digital catalogue for Army's authorised land power artefacts, supporting resources, including other related publications. In addition to accessing all current and historical publications, the L-Library contains links to ADF doctrine, and other ADF domain publications, as well as approved international partner publications. The L-Library is accessible via ADF Land Power Library and Army Knowledge Online.

12. Additional printed copies of Land Publications may be ordered using the Defence Print Ordering Portal which can be accessed via this link: https://printportal/overview.web.

Security

13. This publication is classified as OFFICIAL. Under Defence Security Principles Framework (DSPF), this information in this publication is available to the general public and there are no security clearance requirements for access.

Amendment record

1. Amendments to this Land Publication are issued on the authority of the Chief of Army pursuant to Army Standing Instruction (Knowledge Management) Part 2 – *Management and Governance of ADF Land Domain Publications.*

Number	Date of amendment	Authorised by
1.	Month 2026	Director, Battle Lab
2.		
3.		
4.		
5.		

Contents

Figures

Tables

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Chapter 1
Introduction

Section 1-1. Scope

1.1 This publication describes how Olvanan Peoples Army (OPA) Combat Engineer units provide:

a. Mobility [including obstacle breaching, bridging, ferrying on inland waterways],

b. Counter-mobility (including mine warfare, obstacle construction such as anti-armour, anti-personnel, counter-airmobile, counter littoral) and

c. Physical protection (including survivability such as construction of defensive positions, deliberate and hasty preparation).

1.2 For Combined Arms Brigade (CAB) to Company (CAC) echelons, of all types of Combined Arms formations. (Amphibious, Armoured, Marine, Mechanised & Motorised).

1.3 At the tactical level, considering tactical actions to disrupt, block, turn, fix.

1.4 Taking into consideration the effects of:

a. Command and control

b. Civil military fusion

c. The degree of respect with which Combat Engineers (CBT ENGR) are regarded by the wider OPA

d. Limitations to CBT ENGR employment, given the degree of specialisation of CBT ENGR sub groups

e. Power distance[5] on CBT ENGR actions

f. Political Advisors on CBT ENGR actions.

1.5 This publication will not examine:

a. Horizontal and vertical construction outside the time-span of combat operations

b. Decontamination conducted by chemical, biological, radiological and nuclear (CBRN) defense formations

c. Mechanical maintenance tasks for vehicles

d. Electrical and electronic engineering tasks in support of aerial, naval, electronic warfare, missile, UAS, radiotelecommunication, all radars and surveillance system

e. Rocket Force engineers

f. Strategic Support Force engineers

1.6 Since detailed information is available on T2 COM's ODIN, this publication will not examine:

a. Tables of equipment such as detailed lists of engineer vehicles and assets

b. Comprehensive listing of Engineer ORBATs

[5] Power Distance is the extent to which the less powerful members of organizations and institutions accept and expect that power is distributed unequally. This concept was investigated by Hofstede in his book Culture's Consequences: International Differences in Work-Related Values

Figure 1.1: Olvana's relative position in Asia

Section 1-2. Background

1.7 This document refers to the fictitious nation of Olvana, part of the Decisive Action Training Environment – Indo-Pacific (DATE-IP). DATE-IP is a common training environment used across the Australian Defence Force and by the armies of the United States, United Kingdom, Canada, and New Zealand. Olvana is the land mass shown in red in Figure 1.1. Further information on Olvana and DATE-IP can be found at https://date.army.gov.au/

1.8 This document was developed on the following basis:

a. Open source information from real-world pacing threat Combat Engineer tactics as reported during military exercises or in response to humanitarian assistance and disaster relief tasks,

b. OPA force structures drawn from US T2 ODIN for the nation of Olvana, notably the 17th Group Army,

c. ATP 7-100.3 Chinese Tactics,

d. The potential impact of cultural differences between Western and Eastern social, cultural and military norms on Engineer tasks

e. The potential impact of Political Officers edicts on Engineer tasks.

1.9 No artificial intelligence was utilised in the composition of the written content this document. Omissions, errors, inconsistencies, shortfalls and the possible lack of continuity are the consequence of human failings and are rooted in biochemical processes.

1.10 Some images have been derived by the treatment of actual images with artificial intelligence.

1.11 The tactical actions depicted are based on how a well-equipped and modern state sponsored military would conduct engineer taskings using straightforward tactics.

Chapter 2
Olvanan Peoples Army Combat Engineer functionality

Section 2-1. Introduction

2.1 The broad role of Engineers in the OPA is to provide:

a. Combat Engineer support

b. Maintenance support for all systems

c. CBRN Defense.

2.2 This publication will limit itself to the elucidation of the activities within Combat Engineer support only.

2.3 The specific role of Combat Engineers in the OPA is to provide four major capabilities to the CA formation:

a. Manoeuvre support (counter obstacle, bridging and ferrying)

b. Counter manoeuvre support

c. Physical protection

d. Engineer reconnaissance.

2.4 Note the use of terms (a) through (c) above is similar to but differentiated from western concepts of mobility, counter mobility and survivability, as this publication seeks to distinguish between Olvanan and western modes of operation. Also noting that there are only a limited number of ways these tasks can be achieved.

Section 2-2. Manoeuvre support

2.5 These effects are brought to bear in order to support the advance of Olvanan forces using combinations of mechanical and non-mechanical means. This includes:

a. Mine clearance/ breaching

b. Route clearance

c. Obstacle clearance

d. Bridging using equipment bridges, bridges constructed in-situ, armoured vehicle launched bridges, floating pontoon bridges

e. Inland waterway crossing using ferries

f. Road construction or creating a trafficable path where none or a rudimentary one exists.

Section 2-3. Counter manoeuvre support

2.6 These effects are brought to bear in order to significantly reduce the rate of advance of enemy forces, or to deliberately use a combination of natural and artificial obstacles and the local terrain to cause enemy forces to slow down, stop, change direction, or become canalised. These include:

a. Minefield laying

b. Obstacle construction and placement, including land, riverine, inshore

c. Obstacle integration with ambush planning – where possible and time permits, Engineers may support the construction and placement of obstacles, integrated with natural terrain features to canalise the enemy into an ambush position or a choke point.

Section 2-4. Physical protection

2.7 These effects are those that build new or improve existing structures to provide barriers such as fortification. This includes:

a. Bunker construction

b. Construction of fighting positions (such as trenches, pits)

c. Construction of blast proof structures (such as compacted earth walls, sandbagging)

d. Construction of underground facilities.

e. Development of camouflage, concealment, cover, and deception (C3D) for:

  (1) Fighting positions, harbour locations, or other sites where vehicles and personnel are situated

  (2) Mobility assets or other specific vehicular platforms in order to provide deception from aerial observations

  (3) Masking/ obscuration/ dispersal/ reduction of infrared and electromagnetic signature.

Section 2-5. Engineer reconnaissance

2.8 This capability is arguably the most important capability in terms of how effectively an Olvanan engineer task will achieve its intent and its battlefield effect on enemy forces. The three types of reconnaissance are:

a. Manoeuvre support task assessment

b. Counter manoeuvre task assessment

c. Physical protection task assessment.

2.9 Engineer reconnaissance supports the Engineer task to enable the Brigade's action elements to achieve its objective. Aligned to the OPAs doctrine of combining all available forces to achieve a task, Engineer Reconnaissance is tightly integrated with the Brigade's and the individual manoeuvre and Action Element's reconnaissance needs. Often, these are one and the same. Thus, when Combat Engineer Reconnaissance is conducted, it is conducted jointly with the manoeuvre or Action Element's reconnaissance elements.

2.10 Reconnaissance will require the junior officer and the senior sergeant working together with the reconnaissance platoon (or squad), to conduct an on-the-ground inspection of the proposed target location or site. They will make a detailed assessment of the following:

a. Intent – The CAB commander's battle plan.

b. Task – What the Manoeuvre element Commander has explicitly stated as an order to the Combat Engineer element, and how it will achieve the intent.

c. Threat – What the Manoeuvre element Commander has explicitly stated as the most likely enemy force composition to be countered.

d. Terrain – The location or area and approaches to it, both from Olvanan and enemy's perspective of where the task/ effect is to be achieved.

e. Troops – The number of Olvanan soldiers available to achieve the task, in terms of Combat Engineers, as well as all other Olvanan soldiers required to provide protection and security while executing the task.

f. Tools – What will be required by the Combat Engineers in terms of mechanised assets (such as bridging, pontoons, assault breaching vehicles, mine-laying vehicles, bulldozers, excavators, graders, dump trucks, concrete mixers, cranes, trench diggers and the like).

g. Time – The period available for conduct of the task, and the hour that the task must be completed by.

h. Supplies – The consumables required to achieve the task, such as construction materials (timber, sand, concrete, fixings, sheet metal, structural steel, demolitions and accessories and the like).

i. Logistics – How the manpower, machinery and materiel required for the task will be delivered.

j. Deception – How the preparation/ works can be masked/ camouflaged/ concealed and how enemy observers can be misdirected.

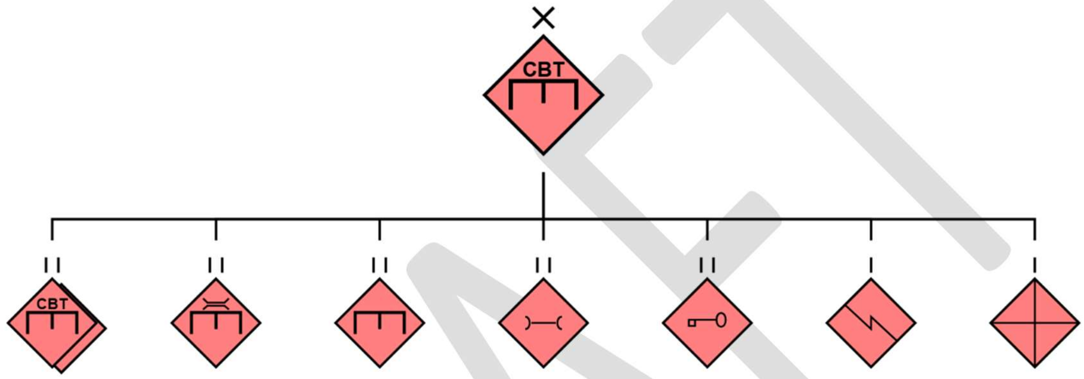
Section 2-6. Group Army Combat Engineer Brigade

2.11 Combat Engineer Brigade to provides the four major capabilities to Group Army, as stated in paragraph 2.3 above.

2.12 The Combat Engineer Brigade illustrated in figure 2.1 falls under the control of the Group Army Commander, who decides how it will be deployed in support of Group Army manoeuvres.

2.13 The Combat Engineer Brigade is directly commanded by the Combat Engineer Brigade Commander. The Brigade Commander decides how the elements within the formation are deployed.

Figure 2.1 Group Army echelon Combat Engineer Brigade ORBAT



2.14 The Engineer Brigade consists of:

a. Two Combat Engineer Battalions

b. A Pontoon Bridge Battalion,

c. A Camouflage, Concealment, Cover and Deception Battalion

d. Battalions and companies of enabling capabilities.

2.15 The Engineer Brigade plays a decisive role in enabling manoeuvre, protecting forces, and denying the enemy freedom of manoeuvre.

2.16 Its tasks include the enhancement of brigades' manoeuvrability by constructing pontoon and heavy bridges for armoured/mechanised units, breaching minefields, arrayed obstacles, and fortifications using mechanical minelayers and breaching vehicles and the conduct of route clearance in mined areas.

2.17 To enhance counter-mobility it lays minefields and create obstacles to canalise, block, fix or turn enemy armour, demolishes bridges, tunnels, or infrastructure to delay enemy advance, and employs engineer earthworks to shape the battlefield.

2.18 To increase survivability, it constructs field fortifications, command posts, shelters, and hardened artillery positions. It also builds protective works for air defence and logistics nodes, and provides camouflage and deception (such as the construction of decoy positions and false bridges).

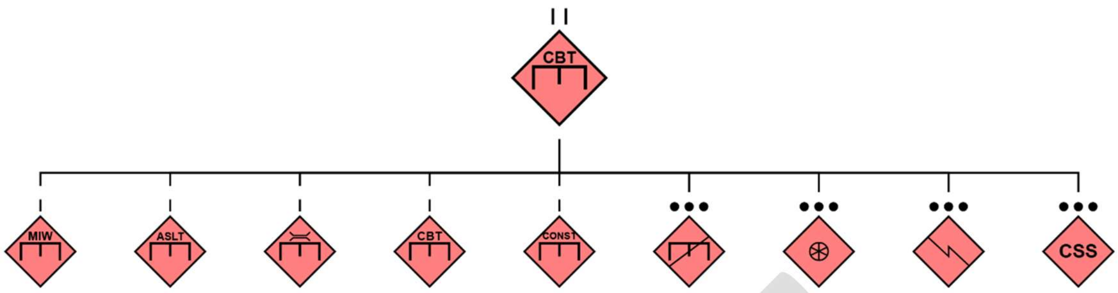
2.19 In the offense it enables rapid river crossings to maintain tempo, breaches obstacles in main attack sectors and builds logistics routes in austere terrain.

2.20 In defense it lays defensive minefields and obstacles to canalize enemy into kill zones and harden key positions for artillery and Air Defense brigades.

2.21 The Brigade Commander may, under orders from both the Group Army and the Combat Engineer Brigade Commander, task organise battalions to directly support one or more specific CABs and augment the dedicated CAB Engineer Battalions.

Section 2-7. Group Army Combat Engineer Battalion

Figure 2.2 Group Army echelon Combat Engineer Battalion ORBAT



2.22 The Combat Engineer Battalion at Group Army echelon, illustrated in Figure 2.2 has five Combat Engineer companies, specialising in:

a. Mine laying and Mine clearance

b. Assault Crossing

c. Pontoon Bridging

d. Road Bridging and

e. Construction.

2.23 It has its own Engineer Reconnaissance platoon, and three support function platoons.

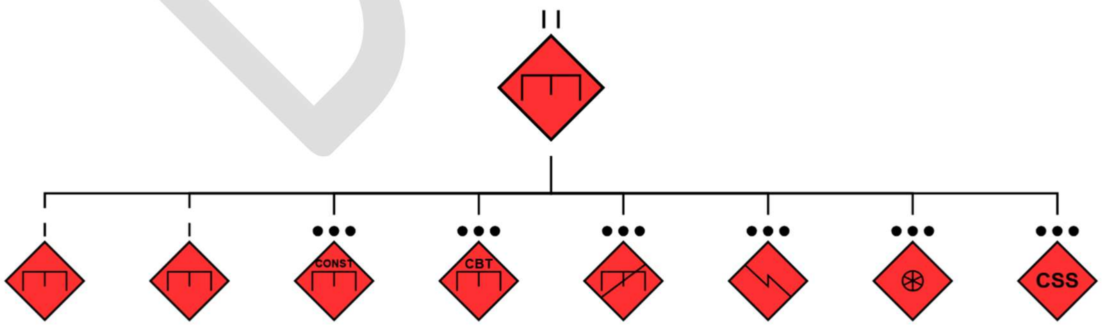
2.24 It differs considerably from the CAB Engineer Battalions, as it supports a heavier and extensively larger formation.

Section 2-8. CAB Combat Engineer Battalion

2.25 The CAB Combat Engineer Battalion[6] supporting Mechanised and Motorised Brigades fall under the control of the of the Brigade Commander, who decides how it will be deployed in support of the CAB. This is illustrated in Figure 2.3.

2.26 The Engineer Battalion is directly under the command of the Battalion Commander, who decides how the elements within the formation are deployed.

Figure 2.3 CAB Combat Engineer Battalion ORBAT



2.27 Engineer Battalions comprises

a. A Mine Warfare company

[6] Note: This formation only exists within the 17th Group Army under T2COM's ODIN. Other Group Armies do not have a Combat Engineer Battalion supporting a Combined Arms Brigade.

b. An Assault Crossing company

c. A Road Bridge construction platoon

d. A Combat Engineer platoon

e. An Engineer Reconnaissance platoon

f. A platoon each of Signals, Transport and Combat Support Services.

2.28 Combat Engineer Battalion supports Brigade level manoeuvre. Typically, the Engineer Battalion will support a CA-BDE within the Frontline Zone as the battlefield moves forward at key terrain such as river crossing points or to conduct obstacle breaches. It is deployable in company and platoon sized elements in support of Combined Arms Battalions and Combined Arms Companies, in task organised formations for specific engineer missions.

2.29 Note that this is a lighter and smaller formation than the Group Army Combat Engineer Battalion. The CAB Combat Engineer commander may request support Group Army Combat Engineer Battalion when the scale or timeframe of a specific task of the CAB Combat Engineers cannot be met with the CAB Combat Engineers' internal resources.

Section 2-9. CAB Combat Engineer Company

2.30 The CAB Combat Engineer Company supporting Armoured, Amphibious and Marine CABs falls under the control of the of the Brigade Commander, who decides how it will be deployed in support of the CAB. This is illustrated in Figure 2.4.

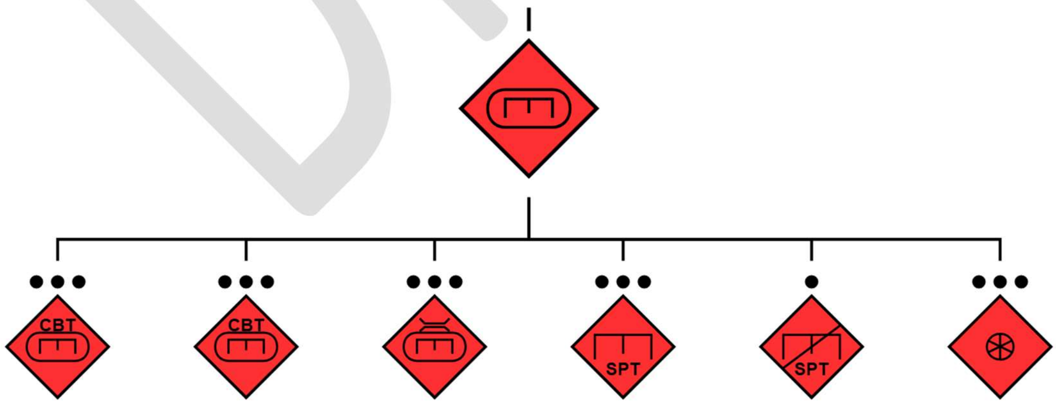
2.31 Note that both Armoured, Amphibious and Marine CABs are supported by Combat Engineer Companies which have similar ORBATs and assets.

a. Marine and Amphibious Engineer Companies may be smaller in order to lower maritime lift capacity requirement. This decreases the number of landing craft required to ferry non-amphibious Combat Engineer vehicles from ship to shore.

b. It is likely that Amphibious and Marine CAB Brigade commanders will seek support from Group Army Combat Engineer Brigade to increase the level of follow-on manoeuvre support, once an assault landing has been conducted and the beach head has been secured.

2.32 A sub-unit element of the Combat Engineer Company will be able to be detached to be able to support an Action element. While the Action element commander has control of the tactical actions, he will delegate the manoeuvre support task to the Combat Engineer commander.

Figure 2.4 CAB Combat Engineer Company ORBAT



2.33 Engineer Companies comprise

a. A Mine Warfare platoon

b. A Bridging platoon

c. A Combat Engineer platoon

d. An Engineering Support platoon

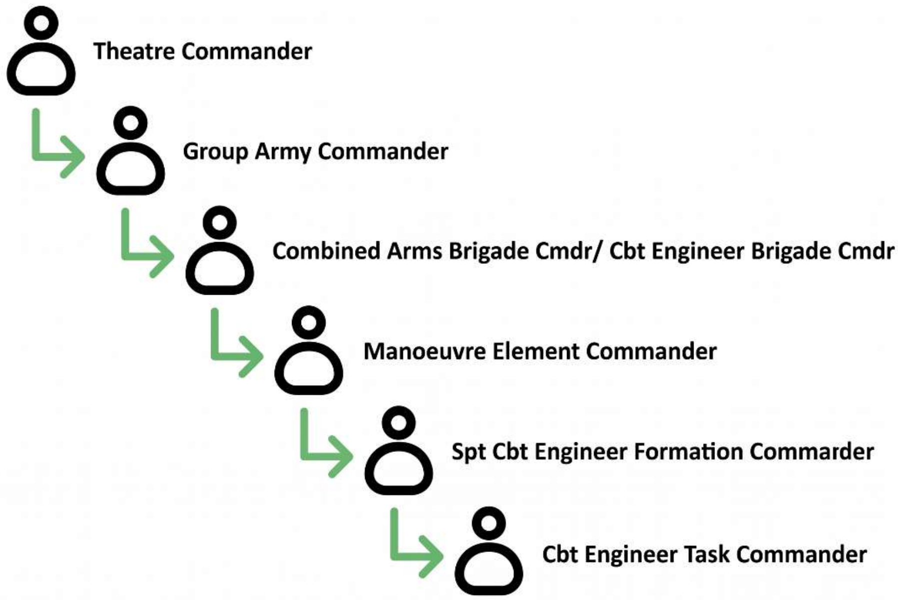
e. An Engineer Reconnaissance squad

f. A Transport platoon.

Section 2-10. Command and control

2.34 The overall command and control framework is illustrated in Figure 2.5.

Figure 2.5 Overall command and control framework



2.35 Within a Combined Arms Brigade, the Combat Engineer effort is aligned to support the Brigade Commander's intent.

2.36 The Combined Arms Brigade Commander will determine the priority of effort, in terms of:

a. Which of his primary combat elements will be supported by Combat Engineer effort.

b. Which Combat Engineer elements will be assigned to deception tasks and

c. Which Combat Engineer elements will be assigned to support any other effort.

2.37 Engineers on task do not provide their own organic defense. They require protective force elements from the manoeuvre element.

2.38 The typical hierarchy of control for Engineer tasking is as follows:

a. Combined Arms Brigade Commander

b. Manoeuvre Element Commander

c. Support Combat Engineer Formation Commander

d. Combat Engineer Task Commander

2.39 Figure 2.6 part A (on the left) illustrates the initial command and control framework for Combat Engineer tasking. This is applied when the task order first enters the formation, and is also used to communicate back up to the CA Bde Cmdr when the task is complete.

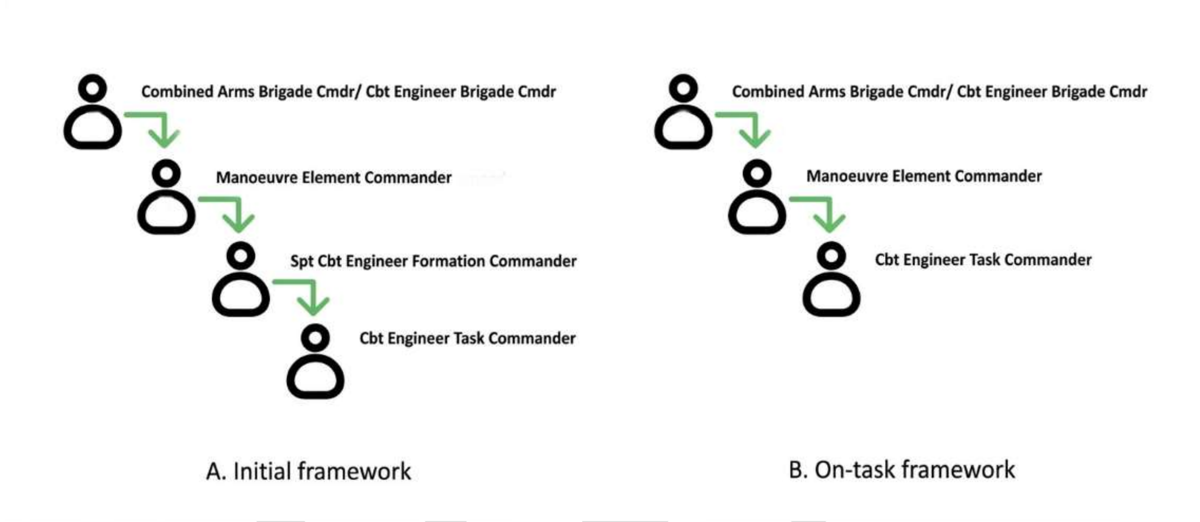
2.40 When the task is in progress, the Support Combat Engineer Formation Commander links the Manoeuvre Element Commander to the Combat Engineer Task Commander, in order to allow for a direct link and a shorter command and control structure. This is illustrated in Figure 2.6 part B (on the right), the on-task command and control framework for Combat Engineer tasking.

2.41 An Engineer element's effort is aligned to support the specific manoeuvre commander to which it has been assigned. If the task requires multiple task-organised elements from within the same Engineer formation, the smallest group that can be commanded will be a Platoon sized element, under the command of a Platoon Commander.

2.42 The reason for placing the smallest group under the command of a commissioned officer is that at present, the cultural legacy has been that there is not a sufficiently trained, educated and experienced cadre of non-commissioned officers.

2.43 This a consequence of a long period where there was no rank structure in the Olvanan Peoples Army. Subsequently, the rank structures were reinstated and there has been a deliberate and concerted effort to grow and train a cadre of non-commissioned officers, who can step up and knowledgably take control of tasks. However, this process of raising a technically proficient group of non-commissioned officers (corporals and sergeants) is in progress.

Figure 2.6 Initial and on-task command and control frameworks



Section 2-11. Task organisation

Task organisation defined

2.44 The simplest explanation of task organisation is:

a. the temporary grouping of forces,

b. in order to achieve a specific mission,

c. allocating available assets to subordinate commanders and

d. establishing their command and support relationships.

2.45 Olvanan military analysts and the OPA have observed, analysed and incorporated the learnings gleaned from studying Western tactics and methods of organisation, particularly from the Western force experiences in Operations Desert Shield and Desert Storm. Task organisation has been an element of military doctrine not for decades, but centuries, and its applicability is universal (at least global) and transcends time.

2.46 Task organisation can take place such that Combat Engineers are task organised with non-Combat Engineer formations, and also with other Combat Engineer formations.

2.47 An example of Combat Engineers being task organised with non-Combat Engineer formations is the conduct of an Engineer reconnaissance with an Infantry platoon in support.

2.48 Common Combat Engineer missions may require the task organisation of subordinate elements within a Combat Engineer battalion or company, for example the construction and emplacement of obstacles that incorporate minefields. For such a mission, the following groupings will need to be brought together temporarily:

a. A Combat Engineer platoon to construct the obstacles,

b. A Mine Warfare platoon to emplace a minefield,

c. A Engineer Support platoon to emplace the obstacles.

Task organisation – Command structure

2.49 In the example above, it can be foreseen that this is at minimum a company minus sized formation, however the primacy of command can be sequenced chronologically by phase, and the primacy of command shifts as follows:

a. In the first phase, construction of the obstacles places the task organisation under the command of the Combat Engineer platoon commander, as the Mine Warfare component cannot yet execute its contribution. The Engineer Support platoon can lift and load completed obstacles onto trucks for a potential road move.

b. In the second phase, the road move and obstacle emplacement places the task organisation under the command of the Engineer Support platoon commander, as the construction element is completed but still requires troops from the Combat Engineer platoon to direct and guide the specific placement of each obstacle.

c. The third phase, minelaying, places the task organisation under the command of the Mine Warfare platoon commander, as the mission has constructed and emplaced the obstacles, and now mines can be laid.

2.50 Alternatively, all phases of the task can be placed under the command of a Company Commander, however this would take the Company Commander's attention away from other, possibly competing and concurrent demands.

2.51 Upon the conclusion of the mission and the successful achievement of the task, the task organisation is dissolved and the constituent elements return to parent organisations and established command structures.

Task organisation – Example task organised groups and capabilities

2.52 Note that task organisation is possible only in Combat Engineer formations that have the scale to generate them. A Combat Engineer Battalion is capable of generating the following task organisations, whereas a Combat Engineer Company's capability to do so is constrained by its relatively small size. However, there is no reason that Group Army Engineers cannot be task organised. The request can be originated from the Brigade Commander to the Group Army Commander. There is the risk that the request may be denied, depending on the Group Army Commander's priorities.

2.53 Table 2.1 indicates the likely task-organised formations possible to be raised by a CBT ENGR Battalion

Table 2.1 Task organised Olvanan Combat Engineer formations

Task Organisation Name	Role/ Purpose	Elements	Drawn from	No. of possible DET
Counter Manoeuvre Detachment	Block/disrupt/ fix/ turn adversary movement	• Rocket launched minelayers • Manually operated mine layers	• Mine Warfare Coy	• 2 DET SCATMIN • 1 DET Manual
Counter Obstacle Detachment	Defeat obstacles to provide mobility	• Assault Breaching Vehicles • Mine rollers	• Mine Warfare Coy	• 3 DET
Manoeuvre Support Detachment	Provide all bridging capabilities for friendly force mobility	• Assault Bridging • Equipment Bridging • Non-equipment bridging • Ribbon Bridging	• Assault Crossing Coy • Road Bridge Construction PL • Ribbon Bridging will require GP ARMY level support	• 2 DET AVLB • 2 DET Deliberate • 4 DET Construction
Engineer Reconnaissance Detachment	Provide detailed assessment of Engineer taskings	• Reconnaissance • Functional Engineer capability representative	• Reconnaissance PL • Mine Warfare Coy • Assault Crossing Coy • Road Bridge Construction PL	• 3 DET

Beach Manoeuvre Support Detachment	Facilitate the egress of non-amphibious vehicles from beach landing site to MSR	• Bulldozers • Graders • Dump trucks • Excavators	• Road Bridge Construction PL • Transport PL	• 3 DET

Section 2-12. Disposition of Engineer elements in manoeuvre groups

2.54 Combat Engineer elements are situated in the following groups. See Figure 2.7.

a. *Frontline attack* group

b. *Depth attack* group

c. *Thrust manoeuvre* group

d. *Combat reserve* group

e. *Frontier defense* group

f. *Guard force.*

2.55 Combat Engineers in the *Frontline attack* group support troops whose mission is to conduct the initial assault against a hardened enemy target, with the goal of achieving a breach or other small penetration. When positioned in this grouping, Combat Engineer forces will generally provide manoeuvre support.

2.56 Combat Engineers in the *Depth attack* group support troops that advance deep into the enemy position once the initial breach is achieved. When positioned in this grouping, Combat Engineer forces will generally provide manoeuvre support.

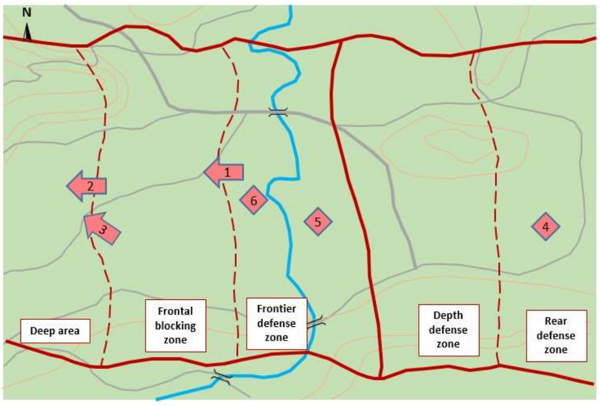
2.57 Combat Engineers in the *Thrust manoeuvre* group support troops that exploit the advantages created by the depth attack group. When positioned in this grouping, Combat Engineer forces will generally provide manoeuvre support.

2.58 Combat Engineers in the *Combat reserve* group support troops that remain in the operational system's rear area, with missions to reinforce the frontline attack group or depth attack group if necessary, spoil enemy counterattacks that threaten other offensive groups or the rear area, and deal with any other situations that may arise in the operational system's combat area. When positioned in this grouping, Combat Engineer forces will generally provide manoeuvre support should these reserve forces be called into action.

2.59 Combat Engineers in the *Frontier defence* group support troops assigned to the main line of defense. When positioned in this grouping, Combat Engineer forces will generally be used to provide physical protective works for defensive positions well in advance of enemy manoeuvre through the area.

2.60 Combat Engineers in the *Guard force* support troops whose role is to actively protect the main force, to stand off enemy forces in order to prevent observation, direct fire, and indirect fire observation on the main body from a significant enemy attack. When positioned in this grouping, Combat Engineer forces will generally be used to provide counter manoeuvre measures against the enemy, in order to fix enemy manoeuvre elements before other action elements move to destroy them.

Figure 2.7 Disposition of Engineer elements in manoeuvre groups



Loc	Group	Primary Cbt Engineer task
1	Frontline Atk	Manoeuvre spt
2	Depth Atk	Manoeuvre spt
3	Thrust Mnvr	Manoeuvre spt
4	Combat Res	Manoeuvre spt
5	Frontier Def	Physical protection
6	Guard Force	Counter manoeuvre

2.61 One potential disposition scheme for the task organised units attached to the six battle groups is presented in the table 2.2 below.

Table 2.2 – Disposition of Combat Engineer support to battle groups

Group	CBT ENGR Task Organisations in support	Purpose
Frontline Attack	• Manoeuvre Support Detachment • Counter Obstacle Detachment • Reconnaissance Detachment	• Reconnaissance • Brigade Advance
Depth Attack	• Manoeuvre Support Detachment • Counter Obstacle Detachment	• Support Brigade deep fight
Thrust Manoeuvre	• Manoeuvre Support Detachment • Counter Obstacle Detachment	• Support/ reinforce Brigade manoeuvre
Combat Reserve	• Counter Obstacle Detachment	• BPT rapidly support Frontline, Depth or Thrust Manoeuvre group
Frontier Defense	• Counter Manoeuvre Detachment • Manoeuvre Support Detachment	• Develop layered protective defences • Develop fortifications
Guard Force	• Counter Manoeuvre Detachment	• Develop layered protective defences

Section 2-13. Limitations on OPA Combat Engineer operations

2.62 While the following factors are not as significant in the context of domestic operations, OPA Combat Engineers face two sets of limitations should they be required to operate offshore in the course of expeditionary operations:

a. Mobility and

b. Sustainment.

2.63 *Mobility*, not in the context of battlefield manoeuvre support, but in terms of moving heavy engineer assets such as plant and equipment from domestic garrisons/ offshore staging locations to the battle front or where they are needed. Such movement is constrained by the following factors:

a. *Mass*. Modern heavy engineering equipment platforms (bulldozers, trench diggers, excavators, combat tractors and the like) are heavy. Consequently, these require significant Heavy Equipment Transport (HET) capability, such as prime movers and trailers rated at significant loads.

b. *Scale*. There is a limited number of HET and trailers available in the Olvanan vehicle fleet.

c. *Priority*. Extant HET and trailers will likely be employed for transporting fighting vehicles such as Main Battle Tanks and Mechanised Infantry Fighting Vehicles to the front lines.

d. *Road condition*. Roads that connect the staging location to the battle front need to be in serviceable condition to carry heavy transport vehicles. Poor condition roads and tracks will likely hamper mobility by potentially fracturing vehicle axles or by the road degrading under heavy use, thereby becoming poorly trafficable or impassable.

2.64 *Sustainment* support to Combat Engineer formations is constrained by the following factors:

a. *Supply lines*. Long supply lines for spare parts are required to maintain modern plant and equipment. Sophisticated and continuous use machinery, such as the equipment used by Combat Engineers, requires high levels of maintenance, repair and replacement spare parts. Each platform adds to the complexity of supporting these systems at or near the front line.

b. *Fuel requirements*. Heavy plant, equipment, generators for power tools and support vehicles all consume prodigious quantities of fuel – petrol (gasoline) and diesel. Keeping the fuel tanks topped up, as well as fuelling the fuel tankers within Combat Support Services (CSS) elements embedded in Combat Engineer formations will place a strain on supply lines and available resources.

c. *Priority*. There is highly likely to be a lower priority placed on fulfilment to support Combat Engineer elements compared to those of front-line combat units. This will constrain Combat Engineer units' abilities to complete their tasking, especially if Action elements and primary combat systems and formations are supported preferentially to Combat Engineer elements.

Section 2-14. Delivery of Engineer effects using non-Combat Engineer means

2.65 Anti-personnel, anti-vehicle and mixed minefields can be laid by two means:

a. by specific Combat Engineer minelaying assets, as well as

b. rocket artillery.

2.66 Rocket artillery creates an engineer effect without the use of Combat Engineers on the ground. The task, however still remains under the control of a Combat Engineer commander.

2.67 Note that minefields laid using rocket artillery will be surface laid, and relatively easy to observe and identify. Such mines will typically have programmable self-destruct mechanisms in order to facilitate removal, should the mined path be required for OPA traversal at a future date.

2.68 In terms of how this is executed, the Manoeuvre element Commander, Brigade through to Company sized, tells the Combat Engineer commander where he requires a minefield to be placed, its purpose and dimensions. The Combat Engineer commander then makes a time, space and capability assessment.

a. If it is within his echelon's capability to generate the effect, he will use his Mine Warfare element to emplace the minefield.

b. If it falls outside his echelon's capability to generate the effect, for example, it is out of range, not achievable within a timeframe, or the dimensions of the minefield means that the Mine Warfare element will have insufficient mines, he will then place the request to the allocated artillery, rocket artillery, or air element to deliver the effect.

Section 2-15. Level of Engineer Support

2.69 Combat Engineer support to the different types of Olvanan combat brigades varies as follows:

a. *Amphibious, Armoured and Marine* brigades have a **company** of Combat Engineers in support

b. *Mechanised and Motorised* brigades have a **battalion** of Combat Engineers in support.

2.70 This may have the following effects or consequences:

a. It could pose limits on Combat Engineer elements in the Amphibious, Armoured and Marine brigades to be able to achieve Engineer support tasks.

b. It may lead to requests for support to Amphibious, Armoured and Marine brigades from Group Army's Combat Engineer Brigade. All requests would flow through from the requesting Brigade commander, through Group Army commander through to Combat Engineer Brigade commander.

Section 2-16. Training the Olvanan Peoples Army Combat Engineer

2.71 The OPA invests heavily in its Engineer capability with extensive, thorough and specialist training. Recruits are selected for general intelligence, psychological condition, political alignment, physical fitness & general health standards and an aptitude for the role.

a. It takes between eight months to three and a half years to turn a new recruit into a specialist Engineer.

b. The specialist that emerges after the completion of the training programme is technically proficient, is grounded in theory, well versed in practise and has a degree of experience.

c. Trainees undertake exhaustive culminating exercises under simulated battle conditions where appropriate for their skill set, in order to be deemed as effective.

d. All trainees are expected to perform to a high standard in their specialist area, and can be drawn upon for their Fundamental Combat Engineering skills when required.

e. Note that if such a decision is required, this specific re-assignment is carried out above Brigade echelon level.

2.72 The training of the OPA Combat Engineer occurs in three phases.

a. Basic Military Training

b. Fundamentals of Combat Engineering

c. Specialist Engineering, which includes separate streams for the following.

(1) Mine warfare

(2) Construction and ancillary trades

(3) Plant operations

(4) Bridging

(5) Reconnaissance

(6) Urban warfare

(7) Camouflage, Concealment & Deception

(8) Chemical Defense. These soldiers are deployed in Chemical Brigades and Battalions.

(9) Repair & Maintenance. These soldiers are deployed in Maintenance Brigades and Battalions.

2.73 Both commissioned officers and other ranks participate in Fundamentals of Combat Engineering.

a. Commissioned officers undertake the training in order to have them appreciate the effort required of their troops and to understand both the capabilities and limitations of their troops and their equipment, under their future career commands.

b. This will be the only time in their careers where they will be "hands-on" with the tools of their trade, and upon completion, they will be leaders with a sound understanding of the achievable and the impossible.

c. Commissioned Officers undertake this training only after completion and successfully passing their Officer Training School, as well as their aptitude and career stream preferences. Given the relatively short duration of this course, it will have little impact on officer career progression.

2.74 *Basic Military Training* consists of drill, weapons, infantry tactics, military history, military customs, physical conditioning, land navigation, radio communications, first aid, CBRN training, shelter construction, field living, military exercises & drills. This takes a period of 50 days to complete, and qualifies the trainee as a combatant, ready for their military specialty occupation. Every combatant is trained as a proficient infantryman and rifleman capable of being employed in a squad and as a platoon.

2.75 *Fundamentals of Combat Engineering* consists of qualifying trainees in assault breaching, demolitions, area, building and route search, obstacle construction, bridging, use of small watercraft, use of a wide range of hand and power tools, as well as basic timber, brick, metal and concrete construction techniques. This takes a period of 90 days and qualifies the trainee as a general duty Combat Engineer. They are now in a position to either remain as a general duty Combat Engineer, or to specialise in one career track.

2.76 *Specialist Engineering as a Mine Warfare engineer* requires training in both breaching and laying minefields. Trainees are taught how to operate armoured and individual projected line charges, operate the Armoured Engineer Vehicle, as well as the manual towed PMZ-4 minelayer and the GBL-130/ 132 minelayers. This takes a period of 90 days, and qualifies the trainee to take up a role in the Mine Warfare element of the Combat Engineer formation.

2.77 *Specialist Engineering as a Construction and ancillary trades* requires a training course of 2-3 years depending on the selected trade. Concrete construction, plastering, road construction and bricklaying are shorter courses and courses such as carpenter, electrician, gasfitter/plumber are longer. Training is conducted at the OPA's dedicated trade training centres, however, trainees work on civil projects to build public roads, housing and other construction works to both bolster efforts of the OCP and to gain valuable experience in their trades. Upon completion of their trade, trainees are qualified to take up a role in the bridge construction element of the Combat Engineer formation.

2.78 *Specialist Engineering in Plant Operations* requires a training course of one year, to become proficient in all items of plant – bulldozer, backhoe, excavator, light engineering tractor, trench digger, skid steer loader, crane operator, dump truck operator. Training is conducted at the OPA's dedicated training centres, however, trainees use their skills to work on civil projects to build public roads, housing and other construction works to both bolster efforts of the OCP and to gain valuable experience in operating plant. Upon completion of their plant operations training, trainees are qualified to take up a role in the bridge construction element of the Combat Engineer formation.

2.79 *Specialist Engineering as a Bridging Engineer* requires a training course of 180 days, to become proficient in the operation of vehicle launched bridging systems, both truck and armoured systems, as well as pontoon and ribbon bridging systems. Upon completion of their bridging training, trainees are qualified to take up a role in the Bridging element of the Combat Engineer formation.

2.80 *Specialist Engineering as a Reconnaissance Combat Engineer* requires a training course of 50 days. This is conducted in conjunction with the Mine Warfare, Construction, Plant and Bridging training, so Reconnaissance Combat Engineers are aware of what the requirements for reconnaissance are for the elements that are going to be using the reconnaissance, and need particular attention paid to during the conduct of reconnaissance. This training requires the trainees to work with Special Purpose Forces as well as Aviation, to learn advanced insertion and concealment techniques. Upon completion of the reconnaissance training, trainees are qualified to take up a role in the reconnaissance element of the Combat Engineer Formation.

2.81 *Specialist Engineering as an Urban Warfare Combat Engineer* requires a training course of 120 days to complete. Trainees are taught the complexities, considerations and coping tactics presented by the Urban battlefield. Officers are required to complete the theory and practice of this element of the training, as it is an extension of their tactical and operational knowledge. The remaining trainees are instructed on how to operate specialised reconnaissance, search, demolition and breaching equipment, and to conduct combat engineer tasks in a complex, high-threat urban environment. The latter phase of training brings together Combat Engineers and Infantry to use joint protocols and procedures in Urban breaching. Upon completion of the Urban Warfare training, trainees are qualified to take up a Combat Engineer role in the Asymmetric Warfare Experimental Brigade in either the Enclosed Path Opening Battalion or the Enclosed Terrain Pioneer Battalion.

2.82 *Specialist Engineering as an Camouflage, Concealment and Deception engineer* requires a 90 day training course. This training enables the trainee to understand the fundamentals of camouflage and concealment in all operating environments from arctic, desert, jungle, and to appreciate signature management across commonly used targeting equipment spectra. They are also instructed and practice the construction of highly realistic decoy vehicular assets, which provide sensor feedback that simulates actual vehicles. Upon completion of the Camouflage, Concealment and Deception training, trainees are qualified to take up a Combat Engineer role in the Camouflage, Concealment Cover and Deception Brigade.

2.83 *Specialist Engineering as a Chemical Defense operator* requires a 50 day training course. This training enables trainees to understand the fundamentals of decontamination and become proficient in the decontamination of personnel and vehicles, set out decontamination sites, as well as to operate every item of equipment in the decontamination inventory from personnel decontamination stations up to specialised vehicle-mounted decontamination sprayers. Upon completion of the Chemical Defense training, trainees are qualified to take up a role in the Chemical Defense formation.

2.84 *Specialist Engineering as a Repair and Maintenance* operator requires a 2-3 year training programme depending on the selected specialty, learning the multitude of propulsion systems (conventional engines, gas turbines, electrical motors) mechanical systems, electrical and software sub-systems within specific vehicular platforms, and across vehicular multiple platforms. Upon completion of this training, trainees are qualified to take up a role in a Maintenance formation.

Chapter 3. Integration of Engineer Operations

Section 3-1. Integration of Engineer Operations with OPA Operational principles

3.1 The OPA has five Operational principles:

a. Integrate all available combat power

b. Utilise the entire battlefield

c. Employ multiple types of operations

d. Develop comprehensive plans for every phase of the operation

e. Deception.

3.2 Deception is further broken down under the following elements:

a. Camouflage, concealment, cover and decoys – the use of visual, thermal and electromagnetic barriers and physical dispersion to minimise or eliminate signatures in the visible light, infrared and telecommunication frequencies.

b. Feints and demonstrations – the deliberate use of spurious troop movements, either real or cyber signature, to lure an enemy into a location of the OPA's choosing, in order to induce an enemy reaction.

c. Electromagnetic and cyberspace – by presenting false signatures of both friendly and enemy troop dispositions and/ or by releasing large volumes of distorted or contradictory information, forcing the enemy to expend time and resources to intercept and process the data.

3.3 Engineer Operations are specifically influenced by:

a. Integration of all available combat power, as well as

b. Deception. For example, there are kits that can be employed to change the appearance, especially from enemy aerial reconnaissance assets, of Engineer vehicles such as ferries or bridge-laying trucks appear to be cargo trucks.

Section 3-2. Integration of forces to support Combat Engineer tasks

3.4 The OPA recognises that the achievement of a single battlefield effect may require the combined action of multiple seemingly disparate elements. These elements may need to be brought physically together or act in unison in order to achieve the desired effect.

3.5 High echelon commanders typically at the regional level, appreciate this, as do their subordinates. When orders flow along the chain of command, they are specific, and even though Combat Engineers are regarded as support to the action elements in an engagement, Combat Engineers require support from external units, to ensure the action elements can successfully achieve their military objectives.

3.6 During combat, no matter how well planned the operation, situations change rapidly. Shifting priorities are the consequence. Thus, during any operation, there may arise occasions where one or more supporting forces are not available to be employed by the Combat Engineer element.

3.7 Forces used to support Combat Engineer tasks may include the following:

a. Artillery

b. Aviation

c. Electronic Warfare

d. Infantry

e. Reconnaissance, intelligence, surveillance and target acquisition (RISTA), typically including uncrewed aerial systems (UAS)

f. Special Purpose Forces (SPF)

3.8 Artillery can be used to provide Combat Engineers with:

a. Persistent obscuration [smoke] fire missions, during for example, river crossings, or to provide deception.

b. Conventional supporting fires to suppress enemy forces attempting to thwart or disrupt OPA Combat Engineer elements as they conduct their mobility support tasks.

3.9 Aviation may be used in the following ways by Combat Engineers:

a. Medium utility helicopters to transport dismounted Combat Engineer elements to forward locations where, for example Combat Engineers are required for a tactical mobility task.

b. Light utility helicopters to either ferry, land and retrieve Combat Engineers to conduct Engineer Reconnaissance into target areas of interest, or to conduct aerial Engineer reconnaissance.

3.10 Electronic Warfare (EW) can be employed in support of Combat Engineers in the following ways:

a. EW Direction Finding formations typically include sensors signature detection in the electromagnetic (EM) and infrared (IR) spectrum, and this could be used to detect troop/ vehicle signatures in areas of interest.

b. EW Attack formations typically include high power jamming devices as well as assets that can emulate the signatures of large "phantom" or deception forces, which can be used to misdirect or spoof enemy formations to conduct reconnaissance by fire, or to manoeuvre forces to the location.

3.11 Infantry is necessary to support Combat Engineer breaching manoeuvres. This is effected by providing:

a. Protection to Combat Engineer elements prior to and during breaching tasks, and/or

b. The strike element once a breach has been made and is to be exploited.

3.12 RISTA

a. Olvanan forces make significant use of both medium altitude long endurance (MALE) and small UAS (such as sensor-equipped first person view) to provide tactical situational awareness.

b. These platforms can be used to detect troops/ vehicles in target areas, or locations of interest to Combat Engineer formations such as far banks of potential bridging sites, or potential river crossing sites.

3.13 SPF

a. Doctrinally, the smallest SPF element comprises twelve personnel, however this can be task organised into smaller detachments of four or six personnel.

b. An SPF detachment can be employed for reconnaissance, close surveillance/ detection of ground combatants in potentially hostile occupied target areas, prior to or alongside Combat Engineer reconnaissance elements.

c. An SPF detachment can also be used to conduct targeting and fire control.

Section 3-3. Deception to support Combat Engineer tasks

3.14 The use of deception, particularly the use of C3D and feints plays a critical role in Combat Engineer tasks. If planned in advance and resources such as sufficient time, construction material and manpower permit, C3D can be used to construct decoys that divert enemy formations away from critical areas, and more importantly, cause the enemy to engage with and expend ammunition in the destruction of decoys. Decoys are likely to be sufficiently sophisticated as to provide EM and thermal signatures of the targets they simulate.

3.15 Feints can also be used to redirect enemy forces away in order to buy time for the Combat Engineer effect to be developed.

Chapter 4
Combat Engineer Vehicles

4.1 This section sets out some of the principal assets used to provide manoeuvre support or counter manoeuvre support effect.

4.2 Current inventory consists of one of the following types of vehicles:

a. Donovian supplied legacy fleet,

b. Donovian-derived and locally improved/ modified or

c. Indigenously Olvanan developed, designed and manufactured.

4.3 Comprehensive details can be found in the Worldwide Equipment Guide (WEG), hosted on the US T2 COM ODIN website.

4.4 Types of vehicles

a. Mine laying. Engineer role: Counter manoeuvre support.

Figure 4.1 GBL-132 Mine Laying vehicle

Credit: T2COM Worldwide Equipment Guide

(1) GBL-132 6x6 Mine Laying truck with 96 tubes of rocket launched mines

b. Minefield breaching. Engineer role: Manoeuvre support.

Figure 4.2 GSL-132 Assault Breaching Vehicle

Credit: T2COM Worldwide Equipment Guide

(1) GSL-132 Tracked Assault Breaching Vehicle with an 8-barrelled rocket launcher for use against fortifications, a mine plough, and a dual rocket-launched projected line charge system for clearing an expedient lane through minefields.

c. Vehicle bridge. Engineer role: Manoeuvre support.

Figure 4.3 GQL-111 Vehicle Launched Bridge

Credit: T2COM Worldwide Equipment Guide

(1) GQL-111 15 metre span of bridge on an 8x8 all-terrain vehicle, Military Load Classification (MLC) 50 tons armoured, 15 tons wheeled.

d. River crossing. Engineer role: Manoeuvre support.

Figure 4.4 GZM-003 Ferry and Floating Bridge

Credit: T2COM Worldwide Equipment Guide

(1) PMM-2 Dual-purpose Ferry and Floating Bridge. Self-propelled amphibious vehicle that can be used as either a ferry or as an element of a floating ribbon bridge system. Load capacity [ferry] 50 tons. Two units can be joined to provide 85 tons load capacity

e. Assault bridging. Engineer role: Manoeuvre support.

Figure 4.5 ZBL-09 Assault Bridge

(1) 23 metre armoured vehicle launched assault bridge mounted on a ZBL-09 Infantry fighting vehicle, can be launched in 5-10 minutes enabling ditch/ crater crossing.

f. Reconnaissance: Note reconnaissance platforms will be mobility matched with the primary assault vehicle for the type of CAB. Wheeled CABs will have wheeled reconnaissance vehicles and tracked CABs will have tracked reconnaissance variant vehicles. Example shown is a wheeled platform as found in a motorised infantry CAB. Engineer role: Reconnaissance in development of Manoeuvre support and Reconnaissance in development of Counter manoeuvre support,

Figure 4.6 CSK-181 4x4 vehicle

Credit: T2COM Worldwide Equipment Guide

(1) CSK-181 Reconnaissance vehicle – 2 crew, 8 passengers

Chapter 5
Manoeuvre Support

Section 5-1. Obstacles

Nature and type of obstacles likely to be encountered

5.1 Obstacles are typically designed to create four effects on movement:

a. Block – to set and impose an untraversable path beyond which a force cannot move

b. Disrupt – break-up march units, delay operational timing, exhaust breaching assets, and cause separation between forward combat elements and their support assets

c. Fix – to tie an opposing force down for sufficient time to enable its neutralisation or destruction

d. Turn – to alter the direction of advance of an opposing force.

5.2 Regardless of the obstacles' battlefield and planning purpose at the adversary's higher echelon levels, it is the Olvanan Combat Engineers' responsibility to reduce them and enable the supported Action element to advance.

5.3 Olvanan Combat Engineers are well versed in adversary tactics and operations, both through theory and extensive war games against dedicated Olvanan Opposition Forces that exclusively employ western combat tactics and behaviours. They are aware that tactical obstacles are under observation and/or within range of fires. This informs their approach to obstacle clearance so as to maximise their probability of successfully breaching the obstacle at the lowest level of attrition of manpower and warfighting capability.

5.4 Obstacles themselves are many and varied, and are created by the use of explosives, plant and equipment, construction materials and combat stores.

5.5 Olvanan forces anticipate encountering a wide range of obstacles. This includes one or more of the following combined:

a. Minefields

b. Destroyed bridges

c. Road craters

d. Mined charges

e. Falling blocks

f. Abatis

g. Wire obstacles including:

(1) low wire entanglement

(2) barbed wire obstacle fences

(3) concertina wire

(4) brush entanglement

(5) knife rests

(6) cellular pattern fences

h. Anti-vehicle obstacles including

(1) Concrete based structure such as cylinders, tetrahedrons, cubes

(2) Steel based structures such as tetrahedrons and 'hedgehogs'

(3) Log cribs

(4) Log hurdles

(5) Ditches of varying geometries

(6) Beam post

(7) Hulks of vehicles filled with stone or sand

i. Anti-landing beach and riverine craft obstacles such as

(1) Horned scullies

(2) Scaffolding made from either timber or steel

j. Booby traps and anti-handling devices within obstacles

k. Mines – anti-tank mines and anti-personnel mines within obstacles.

5.6 Note that obstacles are limited in their design only by the imagination of the inventor and the materials available for their construction. The list shown above is indicative and covers typically encountered obstacles. There may well be other types of obstacles.

Submerged obstacles

5.7 Obstacles may be encountered on hostile territory tidal shorelines and on river banks, laid to thwart crossings and amphibious assault. Olvanan Combat Engineers are trained to be able to counter all obstacles regardless of location.

5.8 Underwater obstacles present a complex challenge for Combat Engineers. The tidal nature of coastlines means that it takes 6h 12m 30s for the water at the shore to go from high to low, or from low to high[7].

5.9 Ideally, at low tide, obstacles will be visible and able to be cleared, however Olvanan Combat Engineers must be able to clear these at high tide as well. High tide shoreline obstacle clearance is an inherently high-risk course of action, likely to result in fatalities from the combined action of breaking waves, strong tidal undercurrents and the nature of underwater obstacles which are deliberately designed to entangle, lacerate and drown soldiers as well as to rip open the hulls of thin-skinned surface craft.

Principles of obstacle breaching

5.10 Reconnaissance plays a significant role obstacle breaching. Action element Manoeuvre Commanders support the reconnaissance efforts by providing RISTA UAS. At this echelon [Brigade level], UAS are used to scan for and locate enemy observation posts, assault by fire positions and potential troop concentrations in the vicinity of tactical obstacles.

5.11 Combat Engineer commanders also make use of UAS. At this echelon, sUAS are used to survey the obstacle itself in order to determine its type, nature and extent.

5.12 Drawing these inputs together informs the Combat Engineer commander as to how the obstacle can be crossed.

5.13 As mentioned above in 5.3, Olvanan Combat Engineers appreciate that in order to be of maximum effect, tactical obstacles are under observation and/or fires. In order to maximise their odds of defeating the obstacle and any adversary force element protecting the obstacle, they follow the following procedure, S-M-A-C-S.

a. Subdue

b. Mask

c. Attain

d. Cross

e. Strike.

5.14 Subdue – Based on reconnaissance using electronic means, human presence and intelligence, and having sound knowledge of adversary locations from natural vantage points on the surrounding terrain, develop targeting locations. Then use a combination of intense direct and indirect fires to ensure the adversary is forced to take cover and protect their lives. During this period, there is a low probability of providing effective fires on Olvanan troops. This step also initiates the obstacle breaching effort.

[7] Ref: https://oceanservice.noaa.gov/education/tutorial_tides/tides05_lunarday.html

5.15 Mask – To use smoke munitions laid down upwind of enemy observation locations to block the enemy observation sightlines to the obstacle area to be cleared. This also reduces the visibility of friendly movement and breaching manoeuvres. It is prudent to note that while smoke can mask sight lines from ground-based enemy positions to the location of the obstacle, this does not effectively block sight lines from enemy small UAS specifically employed to provide optical and infrared surveillance.

5.16 Attain

a. Friendly forces attain crossing areas to prevent the enemy from interfering with the passage of the strike force through lanes created during the crossing. The attainment must be effective against outposts and fighting positions near the obstacle and against overwatching units. The far side of the obstacle must be attained by fires or by occupation before attempting efforts to cross the obstacle.

b. Identifying the extent of the enemy's defenses is critical before selecting the appropriate technique to attain the point of breach. If the enemy controls the point of breach and cannot be subdued adequately, the force must attain the point of breach before it can cross the obstacle.

c. The breach force must be resourced with enough manoeuvre assets to provide effective opposition to enemy forces. Elements within the breach force attaining the crossing area also may be used to subdue the enemy once the crossing is complete. The breach force also may need to strike on the far side of the breach and provide local security so the assault element can seize its initial objective.

5.17 Cross – This step consist of making and marking a path through the obstacle. Breaching forces create and mark lanes through/ over/ around the obstacle. This path must be sufficient to enable the crossing force to pass rapidly. Follow on units may widen the gaps in the obstacle belt or make and mark additional paths through the obstacle.

5.18 Strike - The strike force's primary mission is to seize terrain on the far side of the obstacle to prevent the enemy from placing or observing direct and indirect fires on the crossing area.

5.19 This principle is taught and learned, however it is not able to be applied in practice in all instances. On the contemporary battlefield, the ubiquitous presence of surveillance UAS does not readily permit the use of amassed formations, as these are identified and struck within minutes of being identified.

Section 5-2. Minefield Clearance/ Breaching

5.20 Minefield breaching is conducted on order from the Action element Commander, who commands the fighting element that the Combat Engineers are supporting.

Mechanised mine clearance platforms

5.21 Olvana has advanced the rate of development of unmanned systems in the mid-2020s. Every year, it displays versions of unmanned systems not encountered in previous years. It also seeks to export such technology, worldwide. It has prominent and public displays in domestic and international arms fairs.

5.22 Add to this a deliberate and significant reduction in manpower across its army over the last decade, such an advanced rate of development and pressing into service is unsurprising. The evidence points to the substituting of manpower with automation, and seeking higher quality, better armed and trained troops who are supported by high tech equipment rather, than relying on the previous doctrine of the force of numbers.

Figure 5.1 – A GBP-127 Rocket being fired

5.23 Olvanan in-service Assault Breaching Vehicles include the GSL-132 and the GSL-133. Publicly available data estimate that this platform uses the GBP-127 (projected line charge or PLC). The GBP-127 is a rocket projected explosive-filled hose that will detonate surface laid mines along a path measuring 100 m (328 ft.) in length by 4-4.5 metres (13 ft. 1.5 in – 14 ft. 9 in) in width.

5.24 This is similar to the US developed M58 Mine Clearing Line Charge.

5.25 WEG also lists Combat Engineer variants of infantry fighting vehicles and armoured personnel carriers, including:

a. The ZBL-08 Engineer variant IFV supporting Light/ Motorised and Medium/ Mechanised CA BDEs and

b. The ZBD-05 Engineer variant IFV supporting Heavy/ Armoured, Amphibious and Marine CA BDEs.

5.26 These are both capable of being fitted with multiple GBP-127 rocket projected line charges onto the vehicle, or via a towed launch unit.

5.27 Recent developments in Assault Breaching Vehicles include the Olvanan Multifunctional Unmanned Mine Clearing Vehicle (MUMCV) shown in Figure 5.2.

Figure 5.2 Olvanan MUMCV

5.28 Briefly, the Olvanan MUMCV has:[8]

a. A top mounted compact robotic “crab” arm designed to manipulate lightweight obstructions, clear vegetation, or access confined spaces where the primary arm cannot operate

b. An integrated 1.8 m wide dozer blade

c. An advanced multi-tool front assembly capable of hosting one of several mine-clearing tools:

(1) A self-propelled mine sweeper

(2) A rotating mine flail that destroys buried mines using rotating chisels

(3) A demining trawl.

5.29 WEG lists the following Assault Breaching Vehicles, which provide similar effects, being equipped with mine rakes and projected line charges:

a. GSL-130

b. GSL-132 – Additionally has an eight barrelled rocket launcher to enable the destruction of defensive positions such as hardened pillar boxes and bunkers.

c. GSL-133

5.30 WEG does not list the most recent manned ABV, the GSL-135E, which appears to be an evolution of the GSL-133.

5.31 Minefields are typically one of four types:

a. Protective - employed to protect soldiers, equipment, supplies, and facilities from enemy attacks or other threats.

b. Tactical - directly affect the enemy's manoeuvre in a way that gives the defending force a positional advantage.

c. Nuisance - impose caution on enemy forces and disrupt, delay, and sometimes weaken or destroy follow-on echelons.

d. Phony - deceive the enemy about the exact location of real minefields. They cause the attacker to question his decision to breach and may cause him to expend his reduction assets wastefully.

[8] https://www.armyrecognition.com/archives/archives-defense-exhibitions/2026-archives-news-defense-exhibitions/umex-2026/china-reveals-new-tracked-unmanned-mine-clearing-vehicle-at-umex-2026

5.32 Olvanan Combat Engineer elements supporting Brigade and lower echelon manoeuvre are most likely to encounter Tactical and Nuisance types of minefields, unless of course, the formation they are supporting intends to assault an established and well defended enemy position.

Minefield breaching sequence

5.33 The Minefield Breaching Sequence is illustrated in Figure 5.4. A detailed explanation follows, below.

5.34 Unless informed by either intelligence or Engineer Reconnaissance, minefields are typically found when a friendly vehicle has been struck by a mine. In the following instance, a leading vehicle has struck a mine along an axis of advance. The remainder of the formation is brought to a halt and postured defensively.

5.35 The vehicle immediately behind the stricken vehicle halts and dismounts its infantry, who take defensive positions. Two soldiers approach the stricken vehicle to assist injured soldiers, moving in the proven track or wheel road indentations behind it. Mobile soldiers walk back in the proven track marks. Injured soldiers are rapidly assessed and stabilised in-situ before being assisted or improvised sledded and rope-dragged back along the proven track marks, and then located in a casualty collection point.

5.36 The vehicle behind the stricken vehicle sends forward another two soldiers, this time with SWR and towing hooks to attach to the stricken vehicle, to tow it backwards and off the route of march to permit egress.

5.37 The Olvanan Action element Commander has orders his Combat Engineer commander to clear a lane through the minefield.

5.38 Olvanans are aware that under Western doctrine, employment of obstacles requires that they be either under observation or covered by fires.

5.39 This informs their deception plans. As a consequence, minefield breaches are conducted using one or more of the following deceptions:

a. Supporting fires providing smokescreens, under favourable wind conditions – that is, Olvanan forces can see what they're doing, and their enemy cannot.

b. Dummy mechanised equipment [Full-scale GSL-133, Resupply vehicles and UGV mine rakes 3D models] positioned at alternative breach lanes.

c. Feint troop concentrations at alternative breach lane sites.

5.40 The Olvanan Combat Engineer formation commander is advised by his Action element Commander to conduct a minefield breach. The Action element Commander advises the Combat Engineer Commander of the location of the vehicle strike and the compass bearing of the axis of advance.

5.41 The Combat Engineer Commander notifies his Combat Engineer Mine warfare Platoon Commander of the task to be completed, and relays the information of the strike location and the compass bearing. This enables the Mine Warfare Platoon Commander to set the task for his platoon.

5.42 The Mine Warfare Platoon Commander orders his Survey squad to employ the platoon's visible light, LIDAR & IR sensor equipped UAS to assess the nature of the minefield.

5.43 The same UAS also conducts a grid pattern survey of the area beyond the minefield to assess enemy troop and vehicle presence.

5.44 These follow the launch and recovery drills indicated in *LNote 7.2.1 Olvanan Small Uncrewed Aerial Systems Tactics at Company Detachment and Below*. This survey procedure takes up to 30 minutes.

5.45 This Platoon Commander assesses the dimensions, density and nature of mines in the minefield, to determine how many firings of the GSL-133 will be required to effect a breach through the minefield.

Figure 5.3 – GSL-133 detonates its line charge

Image: Requires AI enhancement

5.46 Depending on the Action element Commander's orders as to how many lanes are required, a minimum of one and a maximum of two GSL 133s are positioned forward to 50-60 m short of or behind vehicle strike location that indicates the start of the minefield. They are orientated in the direction of the breach lane/s advance. Their support vehicles are brought up behind them.

5.47 Each GSL-133 launches one projected line charge. As these are projected at a relatively high angle, they are able to fly clear of any object directly in front of the GSL133 vehicle. In addition, there is approximately 60 metres of non-explosive line behind the 100 m length of explosive line to provide stand-off between the GSL-133 and the start of the cleared lane.

5.48 The line charges are detonated, and the pressure wave sympathetically detonates mines along the 100 m x 4.5 m strip. The PLC on the GLS 133s are reloaded using the support vehicles.

5.49 When the dust has dispersed, and as the GSL133s are being reloaded, a MUMCV is sent forward along the length of the pressure-wave detonated path. The MUMCV's plough moves any undetonated mines off the path.

5.50 The GSL 133 and its support vehicle move forward in the tracks of the MUMCV and halt short of it.

5.51 Steps 5.45 through 5.49 are repeated in a caterpillar motion until there is trafficable lane through the minefield.

5.52 The GSL 133 marks the left and right sides of the lane as it advances.

5.53 At the entry of the cleared lane, signage is erected to channel vehicles into the lane, in order to prevent them entering the uncleared area of the minefield.

5.54 At the exit of the cleared lane, signage is erected to channel vehicles out of the safe lane.

5.55 If available, Military Police or Civilian Police deployed forward provide traffic control to ensure the orderly movement of traffic through the cleared path.

Minefield breaching in a Jungle Warfare environment

5.56 Minefield breaching in a jungle environment is conducted as a dismounted task, due to the limitations of manoeuvre imposed by jungle environments, including:

a. Trafficability of heavy tracked vehicles on narrow and poorly developed paths being unable to accommodate more than one lane width

b. Roads and tracks being potentially being washed out or unstable due to monsoonal weather

c. Jungle canopy being a potential impediment to the deployment of projected line charges.

d. Forestation that may require tree felling in order to create a path.

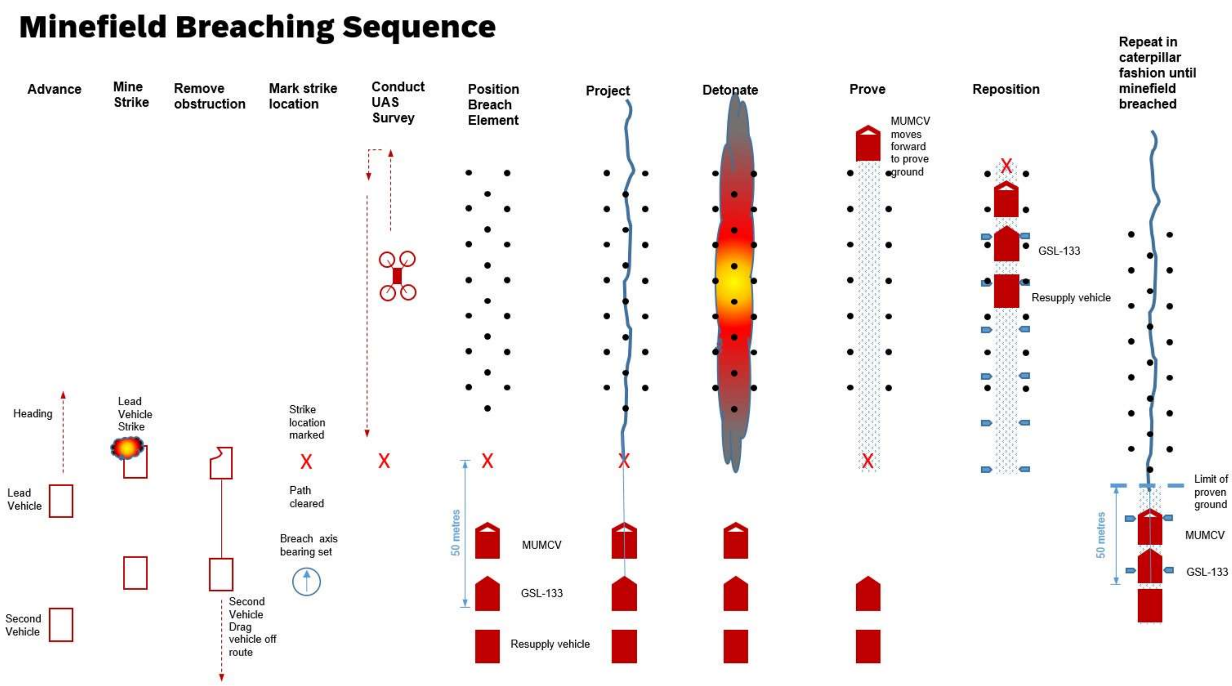
5.57 This slows the rate of advance significantly, as the process becomes manual rather than mechanised, and requires the painstaking task of detecting and blowing-in-place manually of mines in order to create proven lanes through.

Figure 5.3 – GBP-12 Man packable line charge

Images: China Defense Blogspot.com

5.58 Olvana also fields a man-packable line charge, the GBP-12. This is used by dismounted infantry without supporting breaching assets to be able to clear a safe lane 20 m long by 9 m wide through a minefield. Where canopy has been cleared, for example along an unpaved track, this can be deployed without the line charge snagging on overhead trees. See Figure 5.3.

Figure 5.4 - Mechanised minefield breaching sequence



Section 5-3. Route Clearance

5.59 The Olvanan Combat Engineer formation commander is advised by his Action element Commander to conduct a Route Clearance. The Action element Commander is advised of the threat based on intelligence reporting, or by having the lead vehicle actuate an improvised explosive device.

5.60 He notifies his Combat Engineer Mine warfare Platoon Commander.

5.61 This is an inherently high-risk task, and the risk of multiple casualties is ever present. This complicates the task, of having to treat casualties as well as finding additional Combat Engineer resources, given that Olvanan Combat Engineers are functional specialists with foundational Combat Engineer skills.

5.62 The task is divided up into three major repeated steps.

a. First step is Survey – Conduct an initial hazard check.

b. The second step is Prove - Threat identification & reduction.

c. The third step is Observe – Ensure the route remains safe.

5.63 The Combat Engineer Platoon is divided into three squads.

a. Aerial Survey squad

b. Ground Proving squad

c. Overwatch Squad.

5.64 The Combat Engineer Platoon used in the following instance is an element of the Engineer Battalion supporting a Motorised Infantry Brigade. It comprises 33 Combat Engineer elements and 13 vehicle drivers and crew, mounted in one EQ-2050 HMMWV Command vehicle, and six EQ-2102. This is illustrated in Figure 5.5.

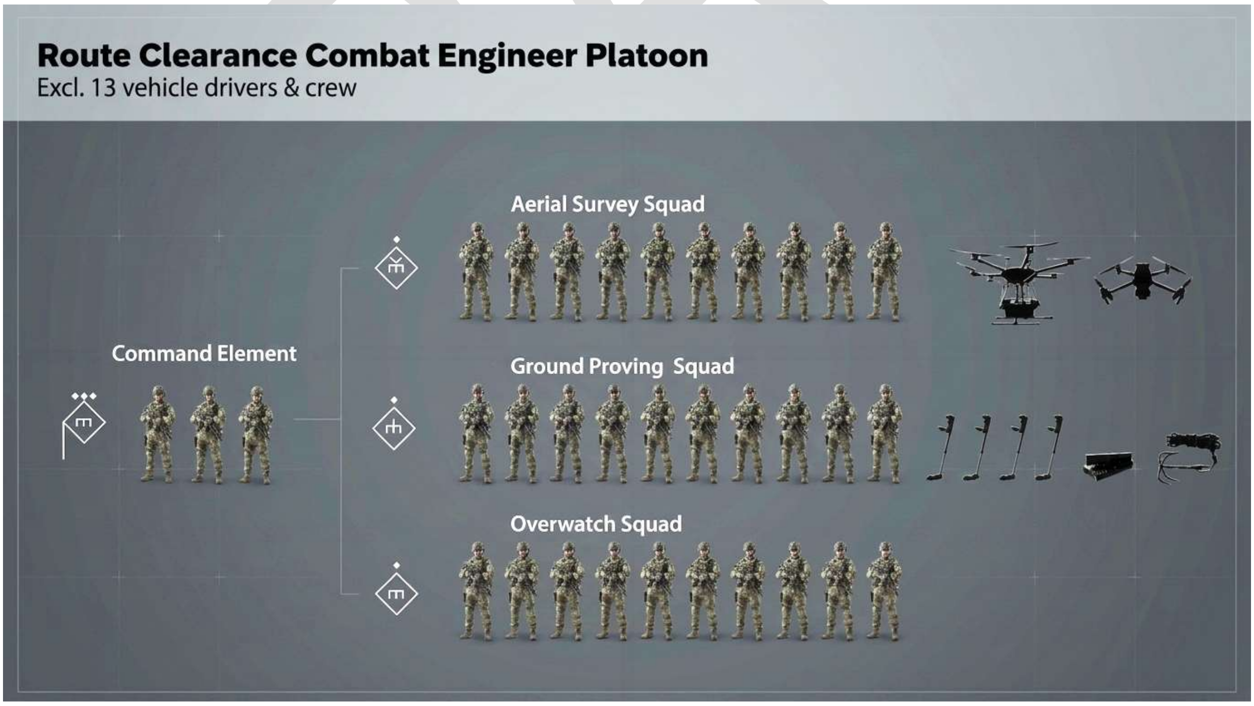
5.65 This breakdown gives us a structure of three squads of ten soldiers and a command element of three, comprising a Platoon Commander, a Platoon Sergeant and an SNCO Orderly. See Figure 5.5.

5.66 Each Squad has an SNCO, a JCNO and eight Sappers.

5.67 Olvanan doctrine dictates that vehicle drivers and crew in Combat Engineer formations have the same skills as the specific expertise they are supporting. However, we will exclude vehicle drivers and crew from delivering the Combat Engineer effect.

5.68 The action is conducted while all elements of the Combat Engineer platoon less drivers and vehicle crew are dismounted. The sequence is illustrated in Figure 5.7.

Figure 5.5 Route Clearance Combat Engineer Platoon



5.69 Aerial Survey squad which conducts the initial check and hazard identification.

5.70 Aerial Survey squad employs two types of UAS:

a. A visible light, LIDAR & IR (VLI) sensor equipped UAS to assess the nature of the potential IEDs in the route.

b. A GPR equipped Hexacopter.

5.71 Aerial Survey squad commences its survey task by executing the launch drill. It then uses the drone to survey a short stretch of route using all sensors from both drones to detect any suspicious or out of place objects.

5.72 The second squad is the Ground Proving squad, which conducts the detailed assessment, threat identification & reduction.

5.73 The third squad is Overwatch squad. It moves behind Ground Proving squad once it has cleared the route. Squad members take a defensive position, covering both sides of the route, in anticipation of any threats that may strike the Ground Proving Squad.

5.74 Overwatch Squad remains in place until the segment of path has been dragged for tripwires, searched, and mines have been sympathetically detonated.

5.75 Ground Proving squad steps off once the Aerial Survey squad has radioed them with the GPS co-ordinates of suspicious locations. Aerial Survey squad marks and describes any suspicious detections on the platoon's shared digital map. This appears on all the squad handheld battlefield computers.

5.76 Ground proving Squad is task organised as follows

a. Four members are the Detection team. See Figure 5.6.

b. Four members are the Reduction team.

c. The Command element comprising the Squad leader and the Second in command.

5.77 The Ground proving squad has the task of finding and eliminating mines along the indicated path, using detectors. The Ground proving squad is equipped with the following Engineer equipment and accessories, in addition to their individual weapons, ammunition and squad & platoon communications sets.

a. Grappling hooks secured with ropes or alternatively, the Olvanan equivalent of the US Launched Grapnel Hook [LGH] and line

b. Hand-held Mine Detectors with dual electromagnetic sensor and ground penetrating radar detection heads

c. Mine markers

d. Mine prodders

e. Explosive charges and accessories

Figure 5.6 – Olvanan detection team conducting road sweep

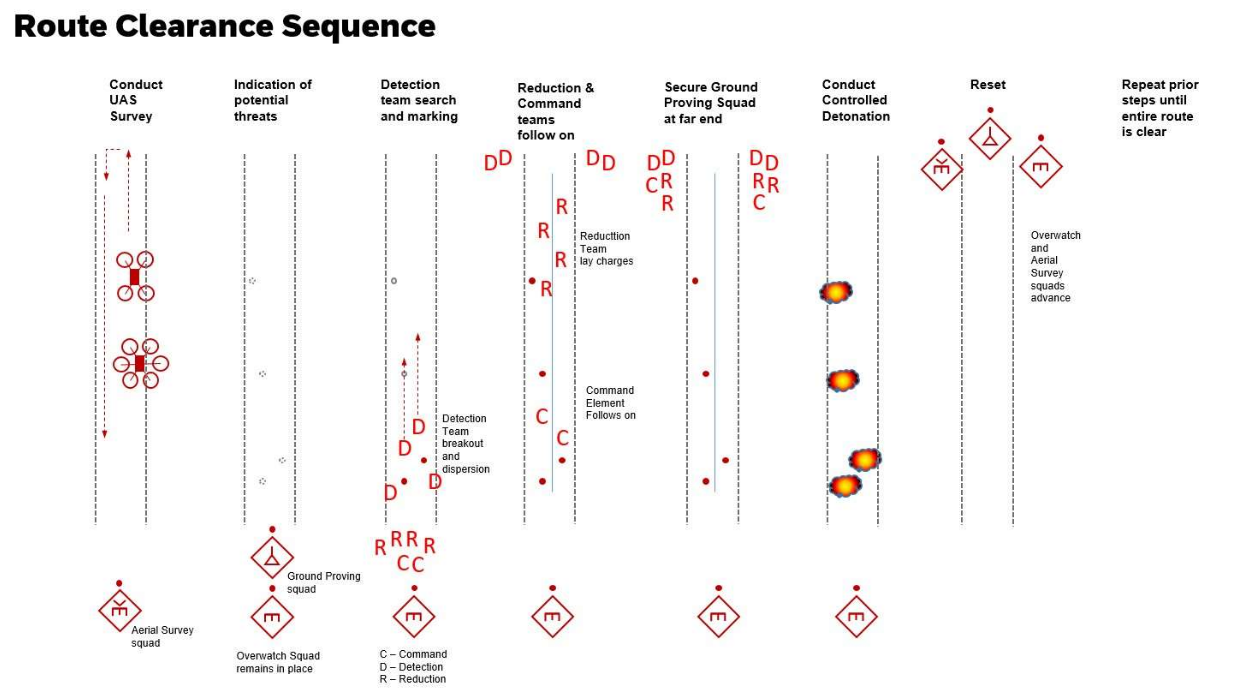
5.78 The four soldiers in the Detection team are arranged in a ‘finger four’ arrangement. Two members of the detection team are positioned either side of the centre of the indicated lane, spaced a metre apart across the path width and 2-3 metres along the length of the path. Two members of the detection team are positioned toward the edges of the indicated path and are 5 metres rearwards of the first two.

5.79 The two lead elements of the Detection team first move to the start point and towards the centre of the path and deploy tied off grappling or rifle projected grapnel hooks down the path.

5.80 They assume a prone position lying to one side, in order to minimise their exposure to potential tripwire actuated detonations, as well as to manually drag in their grapnel/ grappling hook. They then drag them back towards themselves, in order to pull up command or trip wires.

5.81 They then move apart and repeat the procedure to cover the remainder of the path width.

Figure 5.7 Route Clearance sequence



5.82 Each element in the Detection team has to cover a frontage/ path width of approximately 1.1 metres to ensure a complete 4.5 m lane width. They are careful to ensure that their individual paths within the lane have some degree of overlap, so as not to miss any potential mine within the boundary between individual search paths.

5.83 The Detection team sweeps the path in search of mines. Upon detection of a find, the location is marked with a mine marker, and the Detection team member continues to advance to search the next section of their individual path. This continues for a section of between 100-200 m.

5.84 They break track and search an area approximately 5-20 m off the route, on both sides of the route, in which to temporarily halt. Two of the Detection team soldiers are positioned on each side of the route in the searched area. They radio the platoon commander.

5.85 The Platoon Commander orders the Reduction team to advance along the route and emplaces prepared charges at each mine marker location, until each mine marker has been replaced with charges. For each half of the width of the route, one soldier places the charges, and one and one man carries a dual line main along the centre, and tying each charge to the dual line main. There are four soldiers in total.

5.86 Once they have emplaced the charges along the section of searched route, they split off and join the Detection team, two Reduction team soldier on each side of the road. They then radio the Platoon Commander.

5.87 The Platoon Commander then advises the Action Element commander that the section of route is prepared for a detonation. The Action Element commander ensures that all his call signs are adequately protected and gives the firing order to the Platoon Commander, who relays it to the Reduction team.

5.88 One member of the Reduction team sets off the initiation device, and withdraws to the off-route secure area.

5.89 Once the detonation has been completed, the Reduction team radios the Platoon Commander, who then orders Overwatch squad to advance and marry up with Reduction squad.

5.90 Steps 5.71, 5.75, 5.79 to 5.89 are repeated until the route is cleared.

5.91 This process continues, in a ‘bumping forward’ sequence of Survey and Prove until the entire route is cleared, as shown in Figure 5.7.

5.92 The most likely devices to be encountered are anti-vehicle IEDs and anti-personnel IEDs. Anti-vehicle IEDs are likely to have higher net explosive quantity charges than anti-personnel IEDs. Therefore, if a Detector team member encounters an anti-vehicle IED, it is likely to inflict fatal wounds, and if they encounter an anti-personnel IED, they are likely to lose one or more limbs.

5.93 When casualties are inflicted as a result of this procedure, the immediate actions are applied as follows:

a. If the casualty is fatal, the body is moved to one side of the route, by the nearest soldier, who uses the proven ground to reach the casualty. If the ground is unproven, the soldier uses his detector and prodder to find a safe path to the fatality. The task continues.

b. If the casualty has survived, they apply self-aid as best they can, given the nature of their injury and their state of mind.

c. The nearest team member searches a path using their detector, or uses the proven path of the casualty’s footsteps, to reach them, being careful to stay behind the casualty, relative to the direction of advance.

d. The nearest member then applies first aid using the Olvanan equivalent of DRSABCD, and tourniquets the limb. They then prepare a roll-out, dragged litter and secure the casualty to be dragged back towards the start of the search lane.

e. A length of rope is attached to the litter, and cast back to the remainder of the Detection squad, located at the start of the lane, using proven ground. They drag the casualty back, stabilise the casualty, complete documentation, call in a CASEVAC, and prepare the casualty for back loading to a casualty collection point for further treatment.

Section 5-4. Obstacle breaching

5.94 Upon encountering or anticipating an obstacle, the Action element Commander will notify the Combat Engineer Commander of the obstacle.

5.95 The Combat Engineer formation Commander will instruct his Combat Engineer Platoon Commander to conduct a UAS overflight of the obstacle. This will establish the type, nature and complexity of the obstacle. This is conducted by the UAS equipped Squad.

5.96 The UAS overflight will also survey whether there is a potential bypass route available for exploitation. However, if enemy forces have sited and emplaced obstacles according to their own principles, it will be very unlikely that there is a viable bypass route.

5.97 The UAS overflight will be conducted, and an assessment made by the Combat Engineer formation Commander as to how the obstacle will be breached, and which of the various elements in the formation will be executing the obstacle crossing.

5.98 Bridging will be discussed in a separate chapter.

5.99 For non-bridge obstacle breaching, upon order from the Combat Engineer Breaching commander, a squad of Combat Engineers conducts the Route Clearance sequence in order to reach the obstacle.

5.100 Once a safe path has been established, it is marked at its edges with lane markers.

5.101 Overwatch is provided by a second Combat Engineer Squad

5.102 Combat Engineers will be tasked to either use Plant, Demolitions, Power and Hand tools or any combination of these to create a path through the obstacles, depending entirely on the nature of the obstacle. A well designed complex obstacle will incorporate varying individual types of obstacles.

5.103 The potential for the enemy to have mines combined with the obstacles is ever present. All obstacles are assumed to incorporate anti-personnel and or anti-vehicle mines.

5.104 Combat Engineer formations are functionally organised as described previously. Larger formations have the following functional units

a. A Mine Warfare/ Countermine element

b. A Bridging element

c. An Assault Crossing element

d. A Reconnaissance element

e. A Combat Engineer element

5.105 Smaller formations do not have an assault crossing element.

5.106 This will require time, manpower and materiel to make them trafficable, and will significantly reduce the pace of Olvanan advance.

5.107 The job of creating a passage through the obstacle is co-ordinated by the Platoon Commanders of the functional units. For example, in the breaching of an abatis, the Combat Engineer Platoon Commander will co-ordinate his troops' movements and activities to synchronise with the Plant operators from the Construction Engineer Platoon, so that once the trees have been cut to manageable size using demolitions, Plant can then be used to drag and push the reduced length timber out of the way.

5.108 In the case of filling in road craters, fill is required. The task of locating a suitable fill source falls to the Engineer Reconnaissance element to locate. The Engineer Reconnaissance element also calculate the amount of fill required and the logistics to get it from the source to the fill site. Upon confirmation, a bulldozer, a dump truck, and a mounted squad of Engineers or Infantry for security are dispatched to the source, upon approval from the Construction Engineer Platoon Commander.

Table 5.1 Summarised obstacle breaching methods

Obstacle (a)	Primary breaching method (b)	Secondary breaching method (c)	Remarks (d)	Engineer element (e)
1. Destroyed bridge	Bridge span	Alternate crossing route	Requires bridging equipment	Bridging (Br)
2. Road crater	Plant, earth	Hand tools and stores		Construction (Co)
3. Mined charge	Plant			Co
4. Falling block	Demolitions, Plant			Combat Eng (CE), Co
5. Abatis	Demolitions, Plant	Demolitions, Manual	Time consuming and complex	CE, Co
6. Low wire entanglement	Demolitions		Bangalore Torpedo (BT)	CE
7. Barbed wire obstacle fence	Demolitions		BT	CE
8. Concertina wire	Demolitions		BT or PLC	CE
9. Brush entanglement	Demolitions		BT	CE
10. Knife rest	Demolitions		BT	CE
11. Cellular pattern fences	Demolitions		BT or PLC	CE
12. Concrete solids	Demolitions		Satchel charges	CE
13. Metal frame objects	Demolitions		Demolition blocks (DB)	CE
14. Log cribs	Demolitions		DB	CE
15. Log hurdles	Demolitions		DB	CE
16. Ditches	Plant, earth	Bridge spans		Co
17. Beam posts	Demolitions	Plant	Cutting charges	CE/ Co
18. Filled vehicle hulks	Demolitions, Plant	Demolitions, ABV/MUMCV	DB	CE, Co/ Mine Warfare (MW)
19. Horned scullies	Demolitions		DB	CE
20. Scaffolding	Demolitions		DB	CE
21. Booby traps	Demolitions		DB	CE
22. Mines	Demolitions		DB	CE
23. Minefield	Demolitions ABV/ MUMCV			MW

Submerged Obstacle Clearance

5.109 As previously mentioned, it is less challenging to clear a submerged obstacle during low tide, however Olvanan Combat Engineers are trained to conduct this high risk activity at high tide. The Action Element commander has the authorisation to make the decision as to when the task is to be conducted.

5.110 For this purpose, the Combat Engineer Platoon is configured in the following manner (illustrated in Figure 5.8)

5.111 Two Lane Clearance Squads. Each squad consist of:

a. Platoon SNCO

b. CE Divers – 6 personnel

c. Assault Boat Crew – 4 personnel

d. Enabled with Rigid Hull Inflatable Boats (RHIB) similar to a 10-man Zodiac – 2 units

5.112 One Overwatch squad consisting of:

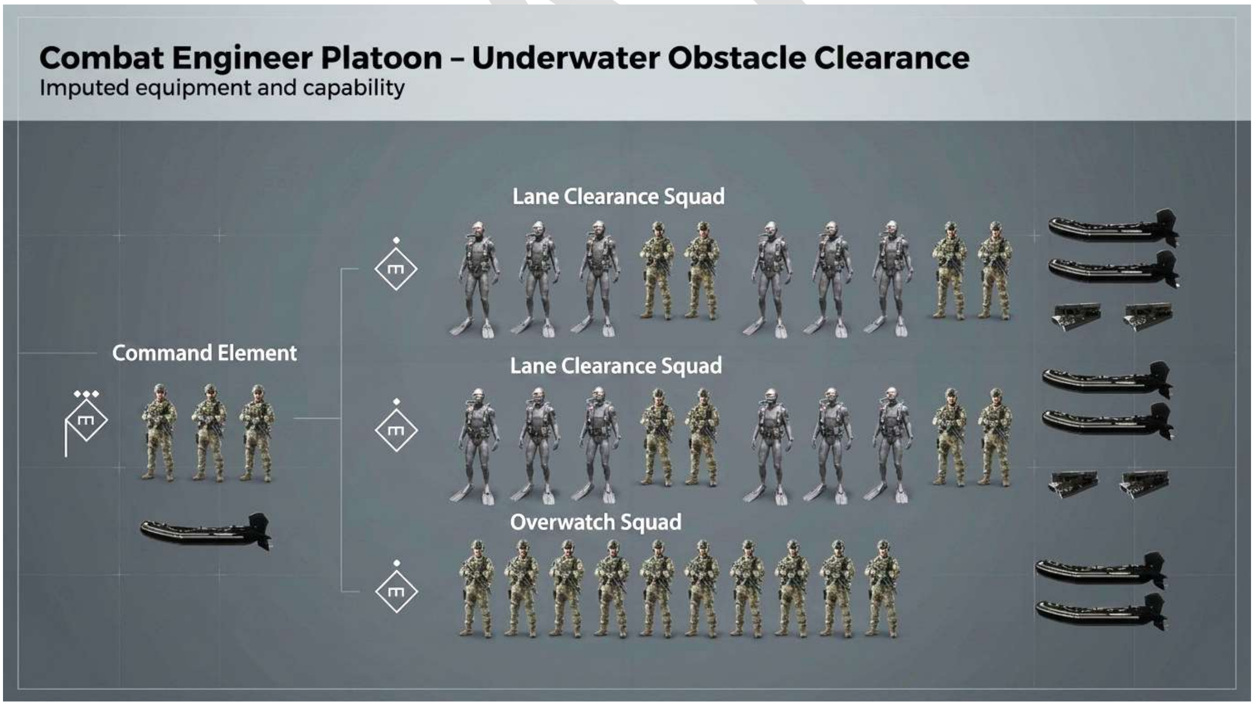
a. Platoon Commander

b. Combat Engineers – 10 personnel

c. Enabled with RHIB – 2 units

5.113 If sufficient resources are available, the command element may be afforded a separate RHIB.

Figure 5.8 Underwater High Tide Obstacle Clearance Platoon



Low tide obstacle clearance

5.114 At low tide, the obstacles should be clearly visible, unless the enemy has additional submerged obstacles that are submerged during low tide.

5.115 The following procedure takes place for obstacles that are visible during low tide.

5.116 Likely and actual enemy positions beyond the obstacle belt have been identified from reconnaissance. They are allocated designated artillery fire targets. Fires from offshore [naval gunnery, guided missiles, air-to-surface fires] are used to subdue the enemy.

5.117 This is immediately followed by masking using smoke fires. Smoke is employed for the duration of the breach, and for the initial landing of forces.

5.118 Overwatch is provided from the marine/ amphibious platforms on the water advancing towards the shoreline. Additional overwatch is provided from a combination of small UAS used in a RISTA role, and gunnery from surface vessels located offshore.

5.119 Engineers approach using assault boats, dismounting at the low tide watermark of the beach. They have pre-prepared cutting and satchel charges, which are placed on the obstacles.

5.120 Their aim is to clear a lane through the obstacles along which amphibious/ motorised vehicles can traverse.

5.121 They rapidly place charges on the obstacles, moving forward on a bearing through the obstacle belt. A dual line main is laid out as they advance. The explosives are tied in to the dual line main. A radio-controlled remote firing mechanism is then placed on to the firing circuit.

5.122 The breaching party move to a position that is 50-80 metres perpendicular to the axis of the breach lane, at the end of the obstacle belt. The breaching team initiates the charges and creates a lane through the obstacle belt.

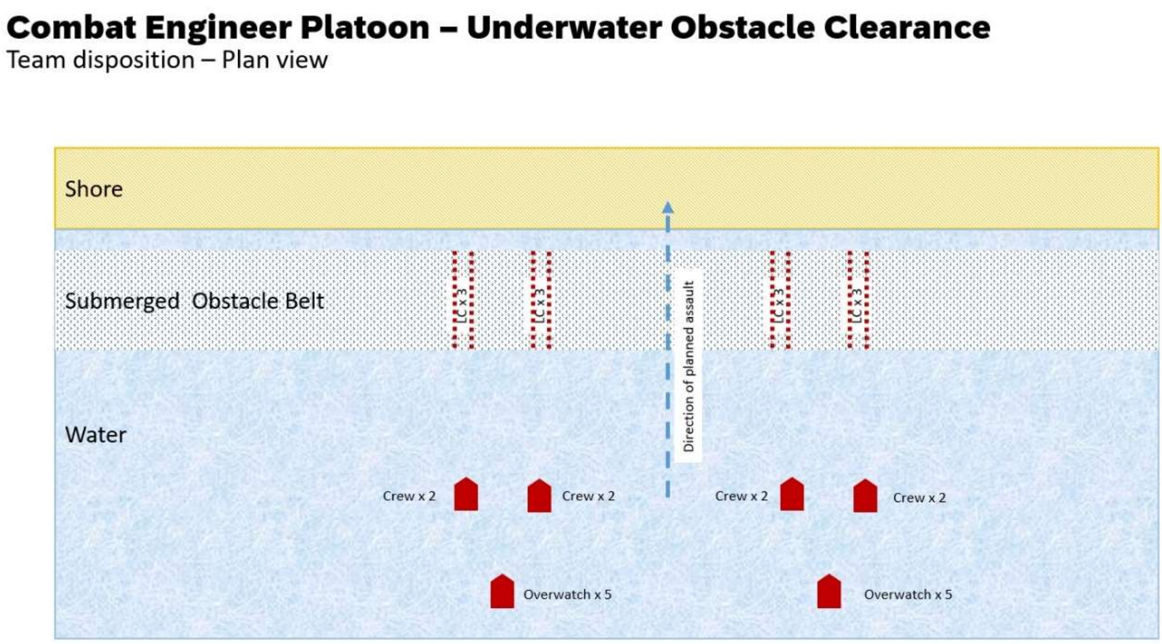
5.123 This is followed up by landing the Assault Breaching Vehicle armed with the GBP-127 projected line charge unit, which is deployed to create a lane through the anticipated mines on the beach.

High tide obstacle clearance

5.124 the following procedure takes place.

5.125 High tide obstacle breaching takes place at night, under cover of darkness. They approach with minimal noise, keeping the revolutions on their outboard motors low.

Figure 5.9 Obstacle clearance platoon - Plan view of disposition



5.126 Combat Engineers on Assault boats, with SCUBA gear and equipped for underwater demolitions. Infiltrate to near the shoreline. Two assault boats per squad are used to ferry the demolition placement team, the boat crew and their demolition supplies.

5.127 Divers are tethered to the Assault boat while placing charges, for two reasons:

a. In order to provide a convenient return path for the diver between the target and the boat

b. In the event of an accident or a fatality, to pull the diver back into the assault boat

5.128 Underwater explosive charges require specialist explosives and accessories to withstand permeation of water into the firing circuit and charges. Olvanan research and development efforts have resulted in demolitions that can operate reliably and consistently with up to 48 hrs of complete submergence.

5.129 Each squad is allocated to the clearance of one lane through the underwater obstacles. The placement team uses SCUBA gear and illumination to locate the obstacles. They record 10 digit GPS locations to identify the precise location of the obstacles they place charges onto, and communicate these to the Platoon Commander.

5.130 This information is uploaded into the Olvanan battlefield maps, so that all elements in the Action element force know the locations of the lanes through the obstacles.

5.131 This is a critical and necessary part of the task. It is extremely difficult to mark a safe lane. The effect of demolitions and the effect of tides and waves on the shoreline sands are almost certain to move lane markers.

5.132 Demolition charges are placed onto targets such that the direction of the shockwave is outwards from the lane. The intent is to have the explosion move the remains of the target clear of the lane leaving a cleared axis of intended advance.

5.133 The Demolition placement team select the obstacles to be eliminated and place charges on them. This is a time consuming and hazardous task.

5.134 It is time consuming for the following reasons:

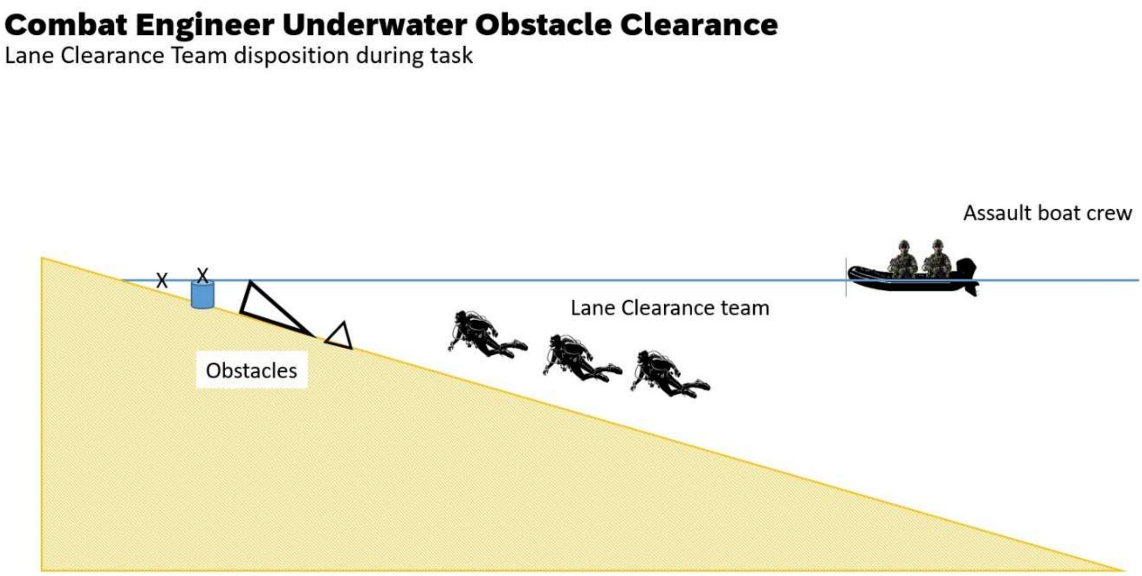
a. Each individual obstacle must have multiple charges placed on it. This is to ensure that the structural elements are cut, and collapse. This applies to timber, metal, composite and reinforced concrete obstacles.

b. Charges need to be positively secured to the targets in order to not be moved by the action of tides, wave and currents.

c. The bulk/ mass of obstacles, for example, of concrete obstacles, is reduced in size to become passable by vehicles.

d. The firing circuit is positioned carefully, and anchored to the shoreline floor so as to minimise disturbance, disruption and movement with the tides and currents while it remains in place before initiation.

Figure 5.10 Disposition of Underwater Obstacle Lane Clearance Team



5.135 It is a hazardous procedure given the following factors:

a. Poor illumination underwater, reducing visibility for obstacle identification and charge placement

b. Potentially good illumination on the surface, enabling visual identification by the enemy

c. Obstacles are deliberately designed to snag, trap and drown the assaulting combatants

d. Inshore under currents

e. The changing tide

f. The presence of marine predators, and

g. The threat of detection by a vigilant enemy.

5.136 Once the charges are placed, and tied in to a line main, the firing circuit is attached. A low visibility buoy with neutral buoyancy is left in place, anchored to the sea floor. Attached to it is a remote firing mechanism, which is left activated. This can safely remain in place for 48 hrs.

5.137 Almost the entirety of the firing circuit is non-electrical and has dual initiation points. The only electrical element is the igniter, which is an electric match, used to fire the fuse. The fuse is a fuel-oxidiser mixture which is sealed to be waterproof. The sealed mixture can burn underwater within the enclosed exterior layer. This is attached to the high explosive train, which is also sealed and waterproofed so it can propagate a shockwave underwater.

5.138 The firing circuit is actuated by a radio signal. The squad that placed the charges is also the firing party, and there is one firing party per obstacle lane.

5.139 The Olvanan teams board their Assault Boats, ensuring every member of their team is accounted for, and withdraw to a safe distance.

5.140 Upon order from the Platoon commander, who is ultimately under the command of the Action Element commander, the firing party initiates the obstacle lane clearance charges and clear the lanes, which can then be used by a landing/ assault force.

Amphibious Assault without preparatory obstacle reduction

5.141 While the OPA attempts to reduce the majority of obstacles in shaping and preparatory operations, it is not always possible. There are going to be instances where particularly Amphibious and Marine brigades are likely to have to conduct assault landings on unreduced, uncleared landing points.

5.142 In these circumstances, to minimise losses and casualties resulting from high tide obstacles, forces will conduct the assault at periods of low tide, in order to permit the waterline to recede to expose mechanical and rupturing obstacles. While this is the intent, there will doubtlessly be losses and casualties.

5.143 This manner of breaching will employ amphibious Engineer IFVs equipped with projected line charges, followed by landing craft launched [ramp door open and contacting the shore surface] releasing MUMCVs to rapidly plough the lanes detonated under the line of blast of the projected line charges.

5.144 This method gives follow on amphibious assault forces proven paths to cross the shoreline and advance the assault off the shoreline and inland.

5.145 In terms of losses of Engineer assets in such an assault, this will be critical to the Brigade's manoeuvre in subsequent inland operations. The Brigade Commander may anticipate such losses and request combat power from the Group Army's Engineer formation.

5.146 The use of heavy suppressive and preparatory fires on known and highly likely adversary fire and weapons positions, particularly from naval fires, guided missile strikes and air strikes is used as a mitigating factor.

Section 5-5. Bridging: The tactical problem and available systems

5.147 The success of bridging is reliant on several factors. These are:

a. The quality of Engineer Reconnaissance and Brigade intelligence assets

b. The span to be crossed

c. The elevation of the span to be crossed – the distance between the bottom of the gap and the ground line where the bridge road surface is to be laid.

d. The nature of the gap – for example, whether it is a ravine with a precipitous drop, a wet gap with a watercourse below, or a dry gap.

e. The span the available bridging systems can cross

f. The soil conditions at the near and far banks

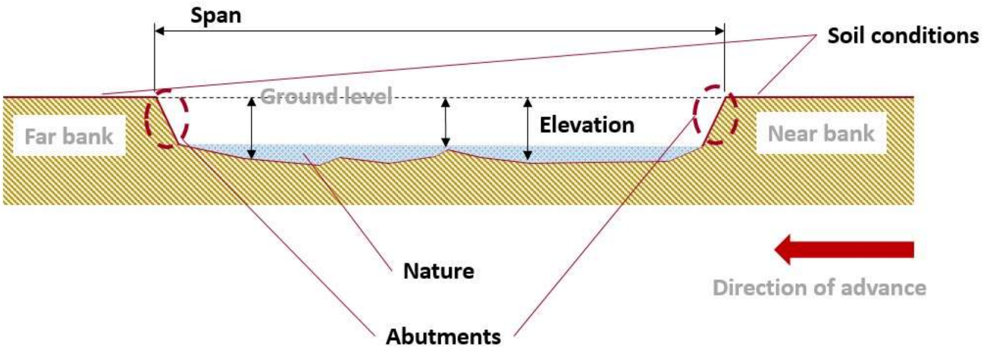
g. The conditions of the abutments at the near and far banks. Considerations (b), (c), (d), (f) and (g) above are illustrated in Figure 5.11.

h. The enemy's preparation of

(1) booby traps, IEDs and/or obstacles on both/ either the crossing

(2) defenses in the vicinity of the crossing including surveillance, concealed/ open fighting positions, indirect fires.

Figure 5.11 Typical bridging measurement & considerations



5.148 Not all gaps can be traversed given the limitations of bridging systems. This makes it critical that Combat Engineer reconnaissance efforts identify alternative routes, or crossing points that can be traversed, as well as assessing the impact of the alternative courses of action on the overall battle plan, timing and use of available resources.

5.149 There are a number of rapidly deployable bridging assets, including

a. AVLB

b. Modular Heavy Bridging System

c. Rapid Emplaced Bridging System

5.150 An example of an Olvanan AVLB is the GQL-410 (shown in Figure 5.12), which consists of a ZTZ-96 Light Tank chassis with a mechanically deployed 24 m bridge span which can be emplaced in minutes, and has a maximum load capacity of 55 tons.

Figure 5.12 GQL-410 AVLB At manoeuvre and deploying

Images: T2COM Worldwide Equipment Guide, en.topwar.ru

5.151 An example of an Olvanan Modular Heavy Bridging system is the GQL-111. This is illustrated in Figure 5.13. It consists of a truck carried and launched scissor-type bridge. One segment can span a gap of 15m. It has the capacity to carry 50 tons tracked and 13 tons wheeled vehicles.

5.152 The Combat Engineer Bridging element is equipped with five segments of the GQL-111, enabling a span of 75 metres, wet or dry gap. The system is constrained in that the elevation of the bridge road surface above the footing is a maximum of 5.5 metres. One span can be deployed in under 10 minutes, and five spans take 45 – 60 minutes to deploy.

5.153 The Rapid Emplaced Bridging System is a truck-mounted, Dozer deployed 23 m span scissor-type bridge span that can be used to traverse wet and dry gaps as well as craters.

Deception

5.154 Deception is not always an option, especially during the conduct of a bridging task. Effective bridging deception may require the positioning of decoys at alternative crossing points, while the real crossing takes place.

5.155 Alternatively, an electromagnetic signature replicating the movement of Engineer assets can be part of an Electronic Warfare deception.

5.156 In order to be executed successfully, it requires considerable time to construct and position authentic decoys, that will provide realistic visual and IR signatures. Such a tactic would most likely not be used during a tactical or assault crossing conducted by elements of a Brigade Action Element. It is likely to be part of a broader, higher echelon plan, and will be allocated Engineer Brigade assets to prepare.

Assault crossing – single span procedure

5.157 Note:

a. the widest single span that can be crossed using the GQL-410 is 20 m with the bridge requiring approximately 2 metres at both near and far banks, for support.

b. the widest single span that can be crossed using the GQL-111 is 15 metres, and up to 5 m elevation. Five GQL-111s are part of the Brigade Engineer Support element, hence a maximum span of 75m can be crossed.

5.158 The Action Element commander halts the formation. The formation takes up a defensive posture.

5.159 A task organised reconnaissance element advance to the crossing site, on order from the Action Element commander. The reconnaissance element comprises:

a. the Combat Engineer Reconnaissance Platoon commander

b. his Senior Sergeant,

c. a Reconnaissance squad equipped with a sUAS fitted with electro-optical and GPR sensors

d. the Assault Bridging Platoon Commander

e. his Senior Sergeant

5.160 Being in the same location at the same time gives the Reconnaissance and the Assault Crossing command elements literally an on-the-ground, first hand assessment of the tactical situation, and the problem to be solved.

5.161 Upon selecting a suitable concealed location out of direct view of potential observation by the enemy, the Reconnaissance squad deploy the sUAS and conduct a survey of:

a. Near bank and near bank approach soil conditions

b. Far bank and far bank egress path soil conditions

c. A grid sweep of an area 600 x 600 m in the vicinity of the far bank landing site.

5.162 Once the sUAS overflight has been conducted, the Reconnaissance squad commander conveys a standardised report to the Combat Engineer Reconnaissance Platoon commander and the Assault Bridging Platoon commander.

5.163 The two Platoon commanders assess whether the gap can be crossed, and what platform is to be used to conduct the crossing, and what supporting fires are required to Subdue and Mask actual and suspected enemy positions prior to and during the Bridging and Crossing phases of the task.

5.164 This is reported back to their respective elements, and to the Action Element commander, who is then able to task his fire elements. It is his decision as to which units will be used to provide the effects. The potential choices are mortars and/or SP artillery.

5.165 The timings and sequence of movement are then planned and committed to by the Assault Bridging Platoon commander in conference with his Senior Sergeant, enabling the Platoon Commander to task the platoon. In this case, a GSL-410 is required, and is brought forward.

5.166 On his command, the Subdue bombardment commences. Strikes on enemy actual and suspected enemy locations ensure that the enemy has higher priority concerns than observation. This initiates the deployment of the GSL-410. It lays down the bridge, and withdraws from the lane that it has created. This takes minutes.

5.167 The Subdue fires cease and immediately the Masking fires commence, laying smokescreens. Note: if wind direction is unfavourable for Olvanan forces – that is, if the target locations for the projected smoke blows such that it obscures unfavourably for the Olvanan crossing forces, it will be called off on order by the Assault Bridging Platoon commander.

5.168 Once the bridge has been laid, the Action Element Commander orders the commencement of the crossing by a Strike element – typically a platoon of (Mechanised/ Motorised/ Armoured) infantry, to neutralise any remaining threats on the far side.

5.169 The Strike element secures the far bank, and the remainder of the Action Element crosses the bridge to the far side, and continues its march.

5.170 The Bridge is recovered by the Assault Bridging Platoon's GSL-410, and reconstitutes with the remainder of the Engineer formation.

Assault Crossing – Multiple span procedure

5.171 The Reconnaissance Squad employs the sUAS to measure the span required, and a four man Reconnaissance element to measure the elevation of the bridge over firmly packed Earth. If this elevation is more than 5 metres, the span cannot be crossed. This includes the manoeuvre of the Reconnaissance element into dry gaps using abseiling rope and harnesses, as well as into streams and waterways using Zodiac watercraft and snorkelling equipment.

5.172 This informs the Reconnaissance Platoon Commander of the number of 15 metre spans of GQL-111 bridge required.

5.173 When the Subdue fires have ceased, the Mask fires commence. Masking fires continue for the duration of the bridge laying procedure. Note: if wind direction is unfavourable for Olvanan forces – that is, if the target locations for the projected smoke blows such that it obscures unfavourably for the Olvanan crossing forces, it will be called off on order by the Bridging Platoon commander.

Figure 5.13 – GQL-111 bridge laying across a dry gap demonstration

5.174 The required number of GQL-111 bridge sections are brought forward. The first vehicle lays out the first scissor bridge span and deploys it, It is anchored into the near bank. It moves off the path, and the next vehicle lays the next section and moves off the path. This continues until the gap has been spanned. This spanning procedure takes 40-60 minutes to complete.

5.175 Given this relatively long duration, there is an increased probability for the Bridging Platoon and the Action Element to come under enemy fire.

5.176 The Strike element crosses the bridge and secures the far bank. Once secured, the remainder of the Action Element crosses the bridge to the far side, and continues its march.

5.177 The individual spans elements of the bridge are individually recovered from the bank at the initial approach side.

5.178 The only exception to recovery is that if the CAB Commander has ordered for the spans to remain in place for follow-on forces to advance. If this is the case, these GQL-111 bridge spans cannot be used in subsequent gap crossings. The Engineer drivers for the GQL-111 trucks remain at the initial approach side with their vehicles, in a tactical posture, until such time as they are ordered to collapse the bridge and continue in the direction of advance and re-join their parent Engineer formation.

Section 5-6. Inland waterway crossing

Pontoon Crossing - Ferry

5.179 This action requires the far bank to be secured by a combination of fires, clearance and occupation by advance forces.

5.180 This is conducted as a non-tactical action. It is an action where vehicles and troops are taken across slow flowing inland waterways while not exposed to direct fires. Vehicles and troops are transported by large, slow moving, exposed and unconcealable amphibious vehicles that fold out to provide surface area.

5.181 In addition, there are limited numbers of amphibious ferry craft within the Combat Engineer formation supporting the Action Element, thus vehicles would have to be moved individually – one per amphibious ferry, multiplied by the twice the duration of the crossing, to account for the return journey of the ferry to the point of launching.

5.182 Attempting to conduct the movement of a sizable Action Element as a tactical action using this means will expose the formation to direct fires, and would result in the Action Element being destroyed or otherwise be rendered as combat ineffective.

5.183 It would also risk the loss of Engineer assets and the death of the specialist operators themselves. Once eliminated, the capability cannot be replaced.

5.184 This is a time and fuel resource intensive task, and the consumption of both is predicated on the size of the formation that is to be ferried across the waterway. The logistical considerations are part of the responsibility of the Bridging Platoon Commander.

5.185 A task organised reconnaissance element advance to the crossing site, comprising:

a. the Combat Engineer Platoon commander

b. his Senior Sergeant,

c. a Reconnaissance squad equipped with a sUAS fitted with electro-optical and GPR sensors

d. Zodiac style RHIBs

e. the Bridging Platoon Commander

f. his Senior Sergeant

5.186 The Reconnaissance squad and the Bridging Platoon Senior Sergeant conduct an aerial and physical survey of the launching and potential landing sites for the ferry craft, using the sUAS and the RHIB. This is a time consuming task, as they have pro-forma checklists to complete to ensure completeness of collecting the relevant information such as soil properties, topographic features at landing sites and stream velocities.

5.187 This information is radioed back to the Bridging and Combat Engineer Reconnaissance Platoon commanders, who then use it to designate the far bank landing site.

5.188 Once this is determined, the ferrying process begins, using the GZM-003 or GZQ-411 ferry to board, secure vehicles and troops and cross the waterway.

5.189 The ferry moves troops and vehicles across the waterway and returns to its launching point to collect the next packet of vehicles and troops. This process continues until the Action Element has been transported across the waterway.

5.190 Upon transporting the last vehicle and troop packet in the Action Element to the landing site, the ferries collapse their folding decks and resume their position in the order of march.

Ribbon Bridge Crossing considerations

5.191 When a Ribbon Bridge Crossing is to be attempted as a tactical action, the following considerations must be assessed by the Action Element commander:

a. The necessity to execute this action: Conducting a reconnaissance of the launch and landing sites, Assessing for enemy threat, deploying a ribbon bridge, conducting the crossing, securing the landing site are time, resource consuming tasks which leave the Action Element exposed. They also expose the Bridging formation to prolonged duration of coming under enemy fires.

b. Duration of fire support. The duration of Masking fires would be substantial. A smokescreen would have to be maintained such that it obscured ground/ surface based enemy sightlines to the water crossing path. The request for such fires would originate from the efforts of the Engineer Reconnaissance element and be directed to the Action Element formation commander.

c. The alternative courses of action available. The tactical necessity of conducting the river crossing must be evaluated against the possibility of conducting a crossing at an alternative location, where, for example, there may be a fording point, which would permit the crossing to take place without the need to deploy the ribbon bridge.

5.192 Public demonstrations of Ribbon Bridge crossing have been widely reported, such as being able to build a bridge spanning 1,120 m in a matter of approximately thirty minutes under peacetime conditions. This does not include the time for the conduct of a reconnaissance prior to the spanning, securing the far bank, driving the force elements across the span and finally recovering the bridge at the far bank.

5.193 Prior to conducting the crossing, a combined Engineer Reconnaissance element is deployed to assess conditions at the near bank launch site, the far bank landing site, and the vicinity of the landing site to determine soil conditions and assess the enemy threat picture. The Engineer Reconnaissance element comprises the following:

a. the Combat Engineer Platoon commander

b. his Senior Sergeant,

c. a Reconnaissance squad equipped with a sUAS fitted with electro-optical and GPR sensors

d. Zodiac style RHIBs

e. the Bridging Platoon Commander

f. his Senior Sergeant

5.194 The Reconnaissance squad and the Bridging Platoon Senior Sergeant conduct an aerial and physical survey of the launching and potential landing sites for the ferry craft, using the sUAS and the RHIB. This is a time consuming task, as they have pro-forma checklists to complete to ensure completeness of collecting the relevant information such as soil properties, topographic features at landing sites and stream velocities.

5.195 Prior to the deployment of the Ribbon Bridge, Subdue fires would be executed by the Brigade's organic fires elements. This would immediately be followed on by Masking fires. In addition to this, the Bridge Propulsion Boats would be equipped to inject additives into their engine exhaust to create a smokescreen while deployed on the water surface.

5.196 The first element to cross the bridge is a Platoon of Mechanised/ Motorised infantry. Its task is to Secure the far bank of the crossing and the vicinity of the landing site. This unit will be tied in to the Action Element's indirect fire support, to call in fires on their command.

5.197 Components of a Ribbon Bridge are as follows.

a. Bridge Propulsion Boats

b. Bridge Propulsion Boat transport vehicles. Each truck carries two BPBs.

c. Floating deck sections, each of which has a mass of 7,200 kg (15,874 lb)

d. Floating deck section transport vehicles – the XC2200 6x6 . Each truck carries one Floating deck section. Three Floating deck sections when connected span a 25 m segment.

5.198 Note: A considerable number of vehicles will be required to transport the Ribbon Bridge components. Each 100 metre span of Ribbon Bridge will require 12 trucks carrying Floating deck sections, and 2 trucks for Bridge Propulsion Boat transport.

5.199 Thus for the example 1,120 m span of bridge, 168 vehicles (144 x XC2200 and 24 x Bridge Propulsion Boat transports) would be required. At a spacing of 20 m between vehicles, this formation would stretch over approximately 5 km (3 miles).

Ribbon Bridge Crossing Procedure

5.200 Two Bridge Propulsion Boats are brought forward and launched from the near bank. One acts as a "collector" which is used to build a 25 metre segment. The other as a "controller" unit to keep the launched Floating Deck Section under positive control and manoeuvre it into position.

5.201 Three trucks carrying one Floating deck section each are brought forward.

5.202 Each Floating deck section is carried by an XC2200 truck, manoeuvred into position on the near bank and released into the water.

5.203 Each Floating deck section captured and is brought under positive control by a Bridge Propulsion Boat before the next Floating section is launched.

5.204 The "collector" boat is positioned so that it faces upstream. This is to enable forward thrust, maintaining its position as the current pushes towards it, preventing the assembled Ribbon Bridge segments from being carried off with the current.

5.205 Each Floating deck section is manoeuvred by a Bridge Propulsion Boat and pinned together to ensure that it does not separate while floating. Each segment requires at least one and ideally two Combat Engineer/s to pin the Floating deck section to the next.

5.206 Each three sections are tied together using steel wire rope by the second Bridge Propulsion Boat.

5.207 The first 25 m segment is pushed forward from the near bank to the far bank, so that the structure moves forward from the near bank to the far bank in a caterpillar fashion.

5.208 Another Bridge Propulsion Boat is brought forward, followed by another three Trucks carrying Floating deck sections and the procedure is repeated, until the span of waterway is spanned by the completed ribbon bridge. Each 25 m segment is pinned to the prior 25 m segment.

5.209 If sufficient river foreshores are available, the process described in paragraph 5.208 can be executed by multiple Bridge Propulsion Boats trucks and Floating deck section Trucks, simultaneously. This will speed up the rate at which the river can be spanned and crossed.

5.210 Each Bridge Propulsion boat rotates its position as the "collector", and the "controller".

5.211 The proliferation of the number of trucks requires the unladen trucks to return to the end of the vehicle formation of the Action Element. They will be the last vehicles to cross the ribbon bridge.

5.212 The Action Element vehicle formation crosses the ribbon bridge and advances leaving a gap for the Bridge Propulsion Boat carriers and the Floating deck section trucks at the rear.

5.213 The recovery process is the reverse of the launch process, at the far bank. A "controller" Bridge Propulsion Boat works with the far bank segment to recover unpinned Floating deck sections and return it to the awaiting Floating deck section trucks. Each 25 m segment is dismantled into its three Floating deck sections and each Floating deck section is recovered individually by an awaiting recovery truck.

Figure 5.14 Ribbon Bridge Construction sequence

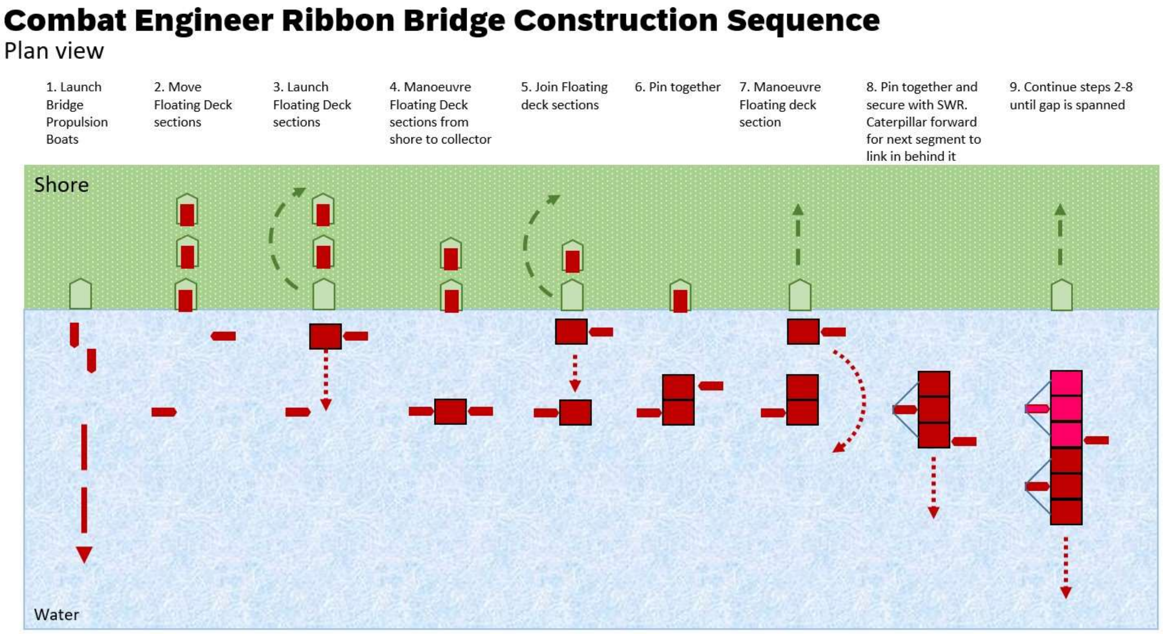


Figure 5.15 Completed Ribbon Bridge

Image: T2COM Worldwide Equipment Guide

Section 5-7. Beach Mobility Support

5.214 This task enables the movement of non-amphibious, follow-on vehicles that have moved off surface landing craft, crossed the short distance in the surf zone on wet sand, and are in a temporary halt on the beach surface of loose, dry sand. These vehicles can be any wheeled or tracked vehicles that do not have the design or adaptations required to enable amphibious operation.

5.215 This task is necessary as a both wet and dry beach surfaces are non-ideal for the movement of heavy vehicles that are primarily designed for use on level or lightly graded, sealed roads or cleared, stable, dirt tracks.

5.216 This task is conducted after the initial amphibious assault has taken place, and the beach head has been secured, enemy defences have been neutralised and enemy forces have been effectively displaced, neutralised, or destroyed. It is a non-tactical task.

5.217 While this a non-tactical task, the imperative of urgency is not lost. Any accumulation and aggregation of largely static vehicles presents the enemy with a target. Logistics vehicles and their contained supplies represent a significant systems warfare target for the enemy. Striking and destroying these would disable or significantly hamper the ability of OPA force to continue the assault. Therefore the task of Beach Mobility Support has a high priority.

5.218 One or multiple lanes are created to enable the rapid movement of vehicles off the beach, depending on the physical limitations resulting from the terrain.

5.219 This task is typically conducted by the Engineer Brigade at the same echelon as the Combined Arms Brigade, and is the responsibility of the Beach Mobility Support Detachment.

5.220 A Beach Mobility Support Detachment (see Figure 5.16) is a task-organised, Platoon sized element that comprises:

a. 2 x Bulldozers to grade and level a path from the loosely packed sandy areas to firm ground or roads, as well as to cut through embankments.

b. 1 x Front End Loader to move the spoil from the source to a spoil dump,

c. 1 x Fascine. Fascines provide a means to lay a durable “road” surface over the loosely packed sand, to enable traction for heavy vehicles,

d. A supply of fascine/ road surface as these will be degraded, incurring wear and tear from heavy usage,

e. 2 x Recovery vehicles, in anticipation of freeing up Beach Mobility vehicles that inadvertently become bogged during the task, as well as recovering follow-on vehicles that may become bogged between disembarking their landing craft and reaching the beach.

Figure 5.16 Beach Mobility Support Detachment

5.221 Constant use of the route between the beach and the formed road will incur degradation, requiring repair and replacement of the fascine material (typically loosely packed timber, pierced steel plate or other suitable material).

5.222 The Beach Mobility Support Detachment continues to exist as a task organised formation until all follow-on vehicular assets have been lodged ashore, and have been driven to an existing formed road or dirt track, permitting their forward journey.

5.223 Upon completion of the task, the assets return to their parent organisations.

Section 5-8. Road construction

5.224 This task provides the supported force with the ability to execute a manoeuvre. Road construction is categorised as a non-tactical manoeuvre support action. It is carried out at the behest of Group Army, and uses the Engineer Brigade at its disposal.

5.225 Depending on the extent of the road required, that is, the distance to be paved, the task can potentially take several years to complete.

5.226 Road construction requires the following process steps to be completed:

a. Road planning and design, This takes into consideration the following factors.

(1) Purpose

(2) Load carriage requirements

(3) Type of road required

(4) Expected traffic volumes

(5) Surrounding geographic and environmental conditions

(6) Appreciation of terrain and features along the path such as river crossings, lakes, rock outcrops, valleys, mountains

(7) Planning for construction of bridges, tunnels, elevated sections of road, drains, culverts

(8) Development of blueprints.

b. Logistical support planning.

(1) Construction materiel requirements, types and estimated quantities of materiel

(2) Plant, equipment, maintenance, repairs and overhaul requirement

(3) Fuel and lubricant requirement

(4) Manpower requirement, including housing, food, water, health and living services support.

c. Surveying.

(1) On-the-ground conditions and topology along the most pragmatic path.

d. Removal of obstacles.

(1) Cut and fill planning

(2) Siting of cut spoil/ fill dump sites

e. Grading.

(1) Levelling the road

(2) Smoothing the gradient

(3) Ensuring drainage.

f. Build-up of the road surface.

(1) Sub base laying

(2) Base laying

(3) Surface laying.

Chapter 6
Urban Manoeuvre

Section 6-1. Urban Manoeuvre Support

6.1 Since the beginning of the 21st century, large scale combat operations have taken place primarily in built up areas. However, there appear to be exceptions in the current global climate, where certain conflicts have reverted to static trench warfare.

6.2 Olvanan military planners have paid close attention to the combat operations western military forces during the early 2000s. In these cases, assaulting forces literally went from house-to-house, using dismounted infantry to secure towns and cities. Defenders used unconventional tactics, and ubiquitously employed improvised explosive devices ranging from 3-5 litre yellow plastic oil containers packed with ammonium nitrate and fuel oil, up to entire houses packed with explosives. These were designed to lure in and eliminate platoons of assaulting troops, and exacted heavy casualties on the assaulting western forces.

6.3 Urban environments pose a distinct set of complex military problems for an assaulting force. These include:

a. Straight roads and laneways provide for long sightlines and fire lanes, giving defenders ample time to strike and fall back, delaying the advance of an assaulting force.

b. Multi-storey buildings provide defenders the advantages of elevation and concealment, and are complicated to search and secure.

c. Corners make for potentially lethal blind spots for assaulting forces.

d. Staircases present an obstacle, and a potentially lethal passage for dismounted assaulting troops.

e. Walls are ever present and afford defenders a degree of protection from blast.

f. Underground services tunnels as well as deliberately constructed tunnels provide escape routes and connections between potential ambush locations.

g. Buildings attenuate and shield radio waves, thereby degrading the effectiveness of communications and telemetry systems.

h. The presence of both combatants and non-combatants mingled together presents a dilemma for assaulting forces.

i. Large armoured vehicles such as IFVs and main battle tanks may find it difficult to manoeuvre and bring to bear their weapons systems in confined roadways, and are readily canalised into blind alleys where they can be boxed-in, disabled by hand-thrown incendiary devices, and the occupants lured out to be engaged as dismounted infantry.

j. Surveillance and strike by reconnaissance and first person view drones is ever present, by day and night.

6.4 This makes attaining military objectives in an urban environment a task that is likely to result in unacceptably high levels of casualties. Recognising this, Olvanan military planners have opted to employ high levels of automation and special purpose (exquisite) assets such as infrared/ thermal sensors, electro-optical systems, unmanned ground vehicles, surveillance drones, robotic dogs, urban demolition techniques, as well as a cohort of specially skilled Combat Engineers who support conventional dismounted Infantry in the assault.

6.5 The basis of this form of warfare is to systematically eliminate the defenders' advantages, and return the initiative to the assaulting forces, in order to defeat the larger system or the supporting system that defenders are protecting.

6.6 As an example, an insurgent force may be using multiple locations to support a makeshift command centre with a nearby communications station, observation posts, a nearby weapons cache and several squads of fighters located in the vicinity. In order to neutralise the command element, every target within the supporting network would need to be eliminated either simultaneously, or in such rapid succession so as it would be incapable of mounting a counter-offensive.

6.7 The ability to conduct an effective strike is facilitated by extensive and long-term reconnaissance, and supported with accurate intelligence analysis. This will identify locations, observation posts, dispositions, armament, troop strengths and concentrations, response times, defensive postures, morale, capability assessments, terrain, avenues of approach, extent of quick reaction forces and other critical information to inform the urban breaching Commander.

6.8 Olvanan Peoples Army has formed the multi-role Asymmetric Warfare Experimental Brigade. One of its duties is to conduct urban warfare. Within the Bridge, there are two specialist Combat Engineer formations:

a. Enclosure Path Opening Battalion, which acts in support of dismounted infantry elements and

b. Enclosed Terrain Pioneer Battalion, which can operate in two mutually exclusive roles:

(1) Act as an Action Element, tasked by the Action Element Commander where it conducts both breaching and assault using cyberdogs, or can

(2) Act in support of a dismounted infantry element, where it conducts breaching and reconnaissance, to inform the supported Infantry element to effectively conduct the assault.

6.9 The Enclosure Path Opening Battalion enables the manoeuvre of OPA formations on enclosed terrain by rapidly mechanically or explosively clearing or opening new routes. Alongside obscuration, this is one of the key novel capabilities that provides the Olvanans alternative manoeuvre options across urban terrain. This permits assaulting forces to not use predictable/ targetable paths in order to achieve its objective.

6.10 The Enclosure Path Opening Battalion consists of [9]

a. Four path opening companies, each with five platoons as follows:

(1) Two Explosive Corridor Platoons conduct successive explosive breaches to clear IEDs and suppress defenders along urban routes. Each platoon comprises a heavy infantry fighting vehicle (HIFV) acting as the command and control element, two optionally crewed explosive mine breaching vehicles, a multi-barrel rocket launcher (MBRL) equipped armoured personnel carrier (APC) with a dozer blade, as well as a resupply truck.

(2) Two Enclosure Tunnelling Platoons provide the means to push routes through buildings. They similarly are equipped with a control vehicle, two combat engineer vehicles (CEV) and one optionally crewed armoured recovery vehicle (ARV).

(3) One Gap Platoon, which provides the means for Olvanan forces to avoid predictable defiles. This platoon is equipped with a bridge layer, a control vehicle to command the two optionally crewed APCs modified to deliver fascines [10].

[9] From LN 7.2.2 Olvanan Urban Doctrine and Tactics -Enclosure Warfare.

[10] A *fascine* is a bundle of rods or plastic pipes bound together, used in construction or military operations for filling in marshy ground or other obstacles and for strengthening the sides of embankments, ditches, or trenches.

Figure 6.1 VN-17 Heavy Infantry Fighting Vehicle with fascine

b. A Sapping Opening company, consisting of

(1) Four mechanical sapping platoons

(a) Each platoon has four sections with two interior-wall-breaching engineering platforms which are an Olvanan adaption of the German Rheinmettal produced Weisel armoured vehicle. This provides the capability for creating 'mouseholes' – which are breaches through buildings, without collapsing the building itself.

c. A Bulldozer platoon (with transporter trucks and trailers) and

d. A Logistic Supply company which not only provides the bulk explosives resupply but also fascines and scaffolding in quantity.

6.11 The Enclosed Terrain Pioneer battalion provides the following capabilities [ibid]:

a. Conduct of reconnaissance, search and assault in subterranean environments

b. Conduct of urban close reconnaissance using specialist equipment and remote sensors

c. Provides pathfinding, assault breaching and demolition support

d. Deploy and employ specialist munitions, sensors and devices

e. Assault dog and search dog teams.

6.12 The Enclosed Terrain Pioneer battalion consists of

a. Four Enclosure Pioneer companies, each with three platoons as follows:

(1) One Penetration platoon that consists of four squads, each of which operate a small UGV designed to remotely interrogate intact/ collapsed structures.

(2) One Reconnaissance platoon consisting of four squads, each squad is equipped with an four armoured UGVs and four tethered drones. Penetration Platoon focuses on subterranean and deep interior operations.

(3) One Explosive Breach and Strike platoon, which provides the specialist offensive support for urban breaching. It is equipped with a tripod-mounted 107mm or 130mm recoilless rocket launcher for breaching heavy fortified walls, and short-range projected line charge launcher.

(4) Two Vertical Access squads equipped with a 6x6 truck fitted with a boom ladder as well as ladders and scaling equipment, to provide access to multi-storey buildings.

Figure 6.2 HW-18 Unmanned Ground Vehicle

Image: T2COM Worldwide Equipment Guide

b. Four Combat Dog companies, each comprising

(1) Four Assault Dog platoons, with three squads per platoon, with twelve cyberdogs per squad. (Total 144 cyberdogs in a company)

(2) Four Search Dog platoons, with three squads per platoon, with twelve biological dogs per squad. (Total 144 biological dogs in a company).

Figure 6.3 Olvanan Assault Cyberdog

6.13 Using a the same tactical start state, we will illustrate the employment of the Combat Engineer elements of the Asymmetric Warfare Experimental Brigade in the following Urban warfare use cases:

a. Enclosure Path Opening Element in support of Mechanised infantry

b. Enclosed Terrain Pioneer Element as Action Element

c. Enclosed Terrain Pioneer Element in support of Mechanised infantry.

6.14 Note – these are not templated methods of employment, but serve as illustrative possible solutions to a common tactical problem set, that indicate how Olvanan Peoples Army units approach combat in urban environments.

6.15 Annex A – Urban Breaching Tactical Start State sets a hypothetical problem to be solved using the specialist elements in the manner indicated in paragraph 6.13 a, b and c above.

6.16 Different tactical start states and circumstances would result in different approaches. There is no “universal” or “one approach fits all” solution, rather there are principles, manoeuvres, supporting elements and tools that can be applied.

6.17 The action is supported with the following external supporting elements:

a. A platoon of sUAS acting as surveillance over all the suspected target locations and one UAS with overview of all locations.

b. A platoon of PLL-05 120 mm mortars as indirect fire support, which is available on call by each of the platoons acting in the role of the Action element. The limitation is that the mortar platoon can only provide effective fires to one platoon’s call at a time.

Enclosure Path Opening in support of Mechanised infantry

6.18 In this instance, lead element is the Mechanised Infantry Company, supported by the Enclosure Path Opening Combat Engineer formation.

6.19 Upon considering the tactical situation, the Mechanised Infantry Company commander has determined the Insurgent Logistic squad’s location and its weapons cache as the primary target to be destroyed. This will prevent the weapons being put into circulation. He evaluates that the remaining Insurgent groups in the town can be destroyed as they attempt to withdraw.

6.20 He sites his forces as follows:

a. A Mechanised Infantry Platoon is situated at the northern entrance to the town.

b. A second Mechanised Infantry Platoon is situated at the southwest entrance to the town. These act as cut-off groups, designed to engage insurgent elements attempting to exfiltrate.

c. The third Mechanised Infantry Platoon is the Action element.

d. A Combat Engineer Enclosure Path Opening formation.

6.21 The Action element platoon and the Enclosure Path Opening formation are tasked to approach from the north of the town.

6.22 The Action Element platoon’s Platoon commander will be leading the assault has elected to use the suburban roads to the north-west of the town, and limit mouseholing through buildings at points close to the target location.

6.23 The Enclosure Path Opening Element is led by the Enclosure Path Opening Platoon commander. He conducts an assessment of the task, with the support and experience of his Platoon sergeant.

6.24 The Enclosure Path Opening Platoon commander’s analysis of the task and the route selected by the Action Element Platoon Commander leads him to the following findings, in order to achieve the result.

a. The entire actual path to be taken is reconnoitred by a reconnaissance drone.

   (1) The route has residential buildings which use timber structural frames and timber fascia.

   (2) The buildings selected for mouseholing are assessed, so that the when external and internal walls are mouseholed to create a path, buildings do not collapse and permit the passage of all vehicles.

   (3) There are no storm water channels along the actual path to be taken, hence there is no need for fascines.

b. He elects to use a task organised formation consisting of:

   (1) One Enclosure Tunnelling squad with a ZBL-08 CEV, and

(2) A Sapping Opening squad with its Wiesel armoured demolition vehicle, and one optionally crewed explosive vehicle.

6.25 This combines mechanical and discretionary explosive demolition capability, providing considerable versatility, and with the exception of the use of demolitions, a potentially low noise signature approach.

6.26 He has requested a fire mission at a pre-designated target location. The purpose is to lay a smokescreen in the vicinity of the suspected Insurgent Logistics squad and weapons cache. The intent is to obscure visibility for the defending enemy force. The smoke fire mission is to be initiated on his command.

6.27 The order of march for the Action and Supporting elements is as follows, proceeding from the front to the rear:

a. The Enclosure Path Opening element consisting of

(1) The ZBL-08 CEV

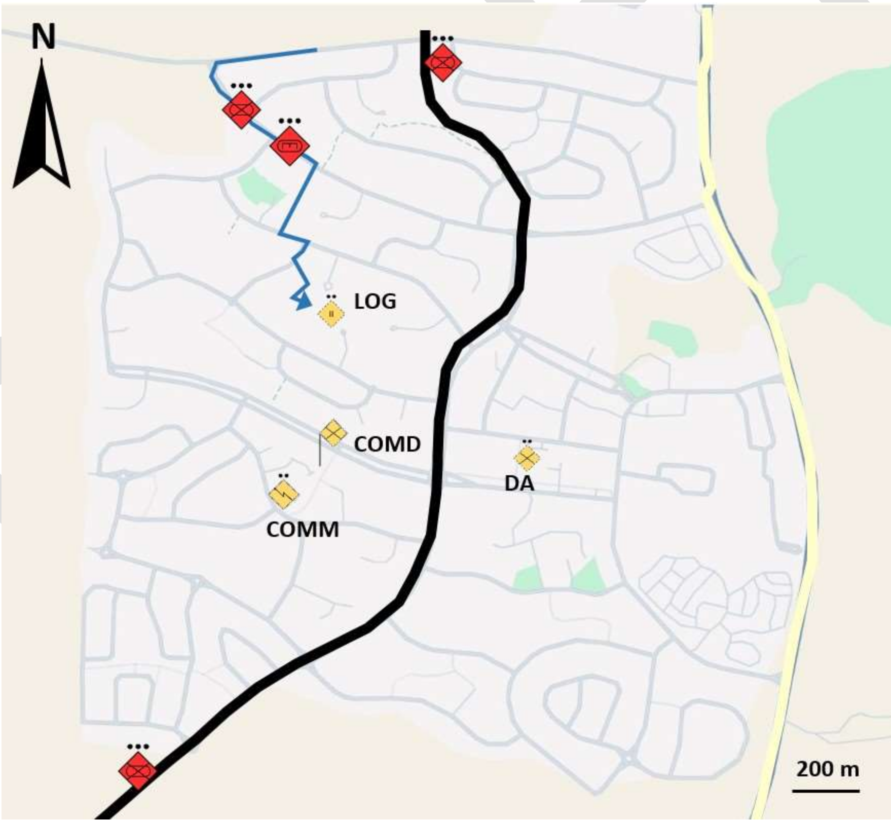
(2) The Wiesel Armoured Vehicle

(3) The Optionally crewed explosive vehicle

(4) The VN-17 HIFV

b. The Mechanised Infantry Platoon consisting of three ZBL-08 IFV.

Figure 6.4 Illustrative use of Enclosure Path Opening in support of Mechanised infantry



Enclosed Terrain Pioneer as Action Element

6.28 In this instance, the task remains the same, however it is now assigned by the Mechanised Infantry Company commander to the Enclosure Terrain Pioneer Platoon commander. The Enclosure Terrain Pioneer Company Commander has been given the discretion to come up with a plan to achieve the objective.

6.29 His analysis leads him to approach the task with simultaneous strikes on the three outlying sites where the Insurgents are suspected of being located – the northern site where the Insurgent Logistics squad is suspected, the western site where the Insurgent Communications squad is suspected and the eastern location where the Insurgent Direct Action squad is suspected.

6.30 The suspected Insurgent Command team will not be targeted, as there are insufficient Explosive Breach and Strike personnel to assault all four sites.

6.31 This Enclosure Terrain Pioneer Company commander is taking advantage of the consideration that his vehicles can traverse the terrain surrounding the town. He is not relying on formed roads to infiltrate into the town, and is instead entering the town from multiple points simultaneously along its periphery.

6.32 His approach makes use of a task organised formation comprising:

a. Three Penetration sections and

b. Three Assault Dog platoons.

6.33 These will be paired so that there is a Penetration section to provide the ability to forge a path, and the Assault Dog Platoon with its cyberdogs to execute the assault on the Insurgent locations and neutralise the threat.

6.34 He has requested the following support, in order to anticipate the possibility of one or more of the squads avoiding the dispersed assault from the west and the east:

a. One Platoon of Mechanised Infantry sited at the northern end of the MSR

b. One Platoon of Mechanised Infantry sited at the south western end of the MSR.

6.35 The order of march is towards the outlying three suspected Insurgent locations is:

a. The Penetration section in its EQ-2102, with a UGV

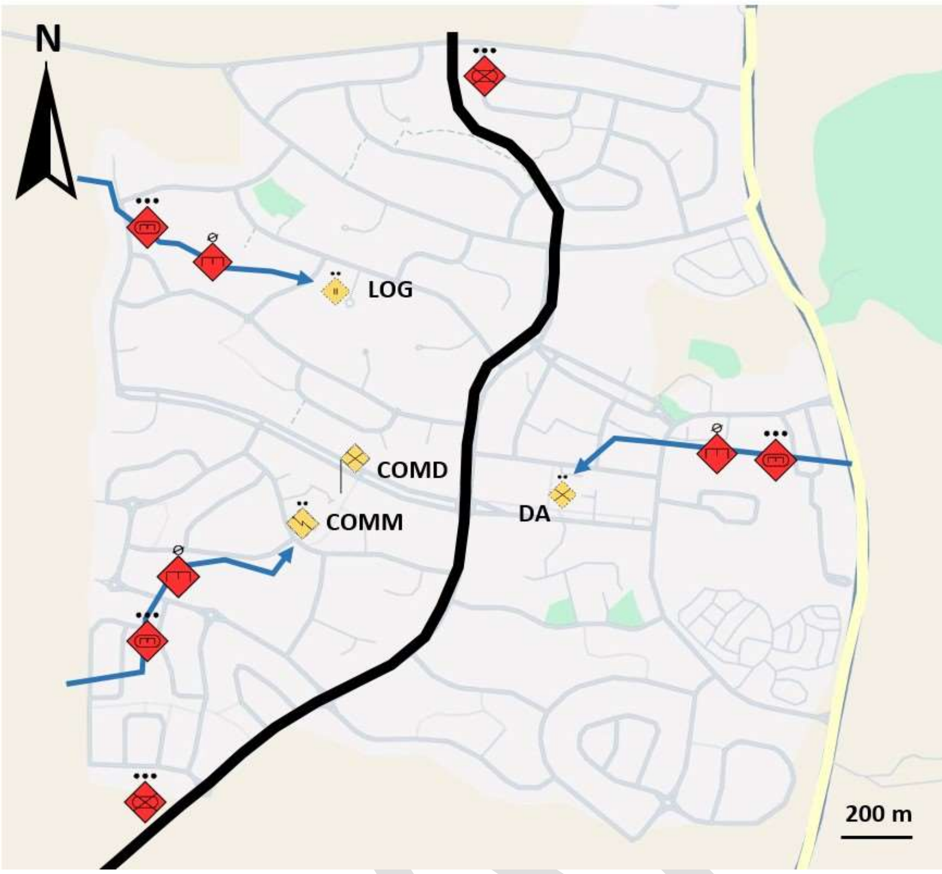
b. The Assault Dog Platoon with EQ-2102s and trailers for the cyberdogs

c. The Enclosed Terrain Pioneer Company Commander will be taking part in the assault on the Direct Action Squad to the East in the VN-17 HIFV.

6.36 He has not assigned a strike element to target the suspected Insurgent Command squad, and anticipates that this element will withdraw along the MSR, where it is highly likely to be engaged by a Mechanised Infantry platoon.

6.37 As this assault applies mechanical breaching, it will be a low noise signature action. Consequently, there is a low probability that the insurgents will be aware that their locations may be compromised and under imminent attack.

Figure 6.5 Illustrative use of Enclosure Terrain Pioneers as Action Element



Enclosed Terrain Pioneer Element in support of Mechanised infantry

6.38 In this instance, the lead element is the Mechanised Infantry Company supported by the Enclosed Terrain Pioneer Company. The Mechanised Infantry Company Commander has the lead in developing the tactics to achieve the mission.

6.39 His analysis leads him to approach the task using two identical Strike elements to strike two locations each, advancing northward from the south.

6.40 Each Strike elements comprises:

a. A Mechanised Infantry platoon and

b. A Penetration Combat Engineer section, equipped with an optionally crewed ground vehicle, capable of mouseholing all types of buildings.

6.41 The order of march is:

a. Penetration section at the front, to mousehole through buildings,

b. Mechanised Infantry Platoon to deliver the conclusively overwhelming strike.

6.42 One Strike element will be used to target the suspected Insurgent Direct Action and Logistics squad locations, and the other to target the suspected Insurgent Communications and Command squad locations.

6.43 The Mechanised Infantry Company commander is taking advantage of the consideration that his vehicles can traverse the terrain surrounding the town. In his plan, the assault will commence off route of the MSR, and weave non-linear paths to reach the target locations.

6.44 The Mechanised Infantry Company commander relies on the route reconnaissance conducted by the Penetration Combat Engineer Platoon commander along the precise routes to be taken. This informs him of the construction materials in the buildings along the route, and where to mousehole them, without having them collapse over the vehicle formations that follow.

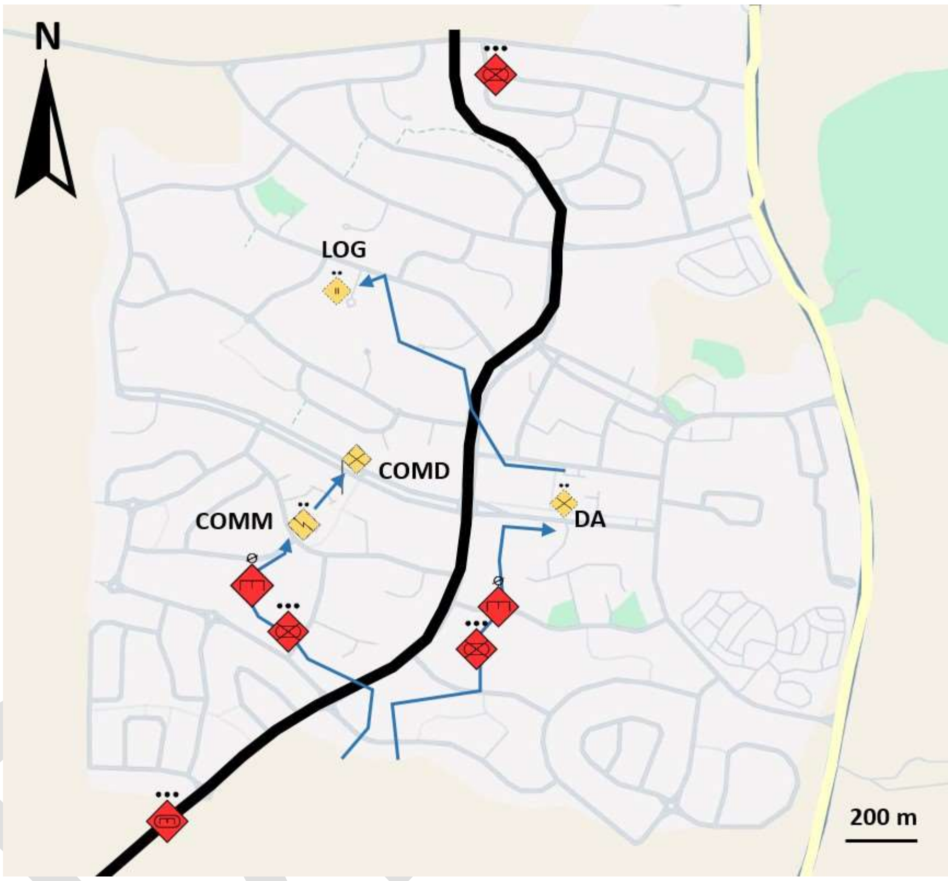
6.45 He has also elected to site his third Mechanised Infantry platoon to the north of the town, in order to act as a cut-off force.

6.46 His plan is to execute strikes on the two southernmost suspected locations simultaneously.

6.47 This approach uses mechanical means of demolition of obstacles along the route. There will be no tell-tale sound of explosive demolitions.

6.48 The Olvanan Commander anticipates that once the first pair of suspected sites are assaulted by the Mechanised Infantry platoons, there will be communications between the struck sites and the remaining sites to alert them of impending assaults, compelling the two remaining suspected locations to withdraw.

Figure 6.6 Illustrative use of Enclosed Terrain Pioneer Element in support of Mechanised infantry



Chapter 7
Counter-manoeuvre Support

Section 7-1. Considerations for Counter-manoeuvre support

7.1 Counter-manoeuvre support tasks are generally conducted:

a. Temporally in advance of enemy manoeuvre through the target geographical area

b. Over a geographical area

(1) That is one where the battle has yet to occur and

(2) That Olvanan commanders have assessed as either a likely avenue of approach or key terrain.

c. At scale. These are works that cover broad areas, potentially where concealment is not possible

d. At a deliberate pace. Construction of defenses, emplacement of obstacles and mines is time consuming.

e. Requiring specific resources. For example, obstacles may require consumable construction and barrier materials (NATO and US Class IV) such as timber, concrete (sand, cement, water), fixings, wire etc.

f. With a defensive posture being adopted, and

g. As a military task.

7.2 On the contemporary battlefield, the illusion of 'being safe' from enemy fires has been radically revised, with the use of aerial observation and long-range precision fires.

7.3 The presence of all types of UAS from HALE, MALE and sUAS means that if a force element can be detected, it can be targeted. As demonstrated in the current European conflict zone, sensor-to-shooter time [the time taken between a target being detected to the time fires are brought to bear on the target] is in the order of minutes.

7.4 In order to partially counter these threats, Combat Engineer elements engaged in counter-manoeuvre support tasks require counter-UAS support, which can be provided by Electronic Warfare elements and also by specifically formed anti-UAS elements. The threat of detection and being engaged while on task is ever present.

Section 7-2. Mine warfare

Methods of mine laying

7.5 There are two broad means by which minefield can be laid:

a. Engineer

b. Artillery

Engineer

7.6 Minefields are rapidly emplaced using either the GBL-130 tracked or the GBL-132 wheeled platforms that both employ either a 4x24 or a 6x36 rocket tube based mine launcher, for a total of either 96 or 216 rocket tubes. Rocket launch tubes are also referred to as canisters.

7.7 Engineer formations that support motorised CABs employ the GBL-132, equipped with the 4x24 configuration. All other CABs employ the GBL-130 with the 6x36 tube configuration.

Figure 7.1 GBL-130 Tracked Minelayer

Image: T2 COM Worldwide Equipment Guide

7.8 The ammunition types and capacity are shown in the table below.

Table 6.1 – Magazine capacity and types of mines GBL-130/132 – 6 x 36 tube launcher

Designation	Type	Mines per tube	Total Mines	Remarks
GBL-240	Anti vehicle	5	1,080	GLD-224 mine
GBL-241	Anti personnel	15	3,240	GLD-125 mine
GBL-242	Anti personnel	45	9,720	GLD-115 mine

Table 6.2 – Magazine capacity and types of mines GBL-130/132 – 4 x 24 tube launcher

Designation	Type	Mines per tube	Total Mines	Remarks
GBL-240	Anti vehicle	5	480	GLD-224 mine
GBL-241	Anti personnel	15	1,440	GLD-125 mine
GBL-242	Anti personnel	45	4,320	GLD-115 mine

Data: Tabulated from T2COM Worldwide Equipment Guide

a. A 4x24 tube system dispenses one tube every 10 metres for a maximum length of 960 m, and a 6x36 tube system dispenses one tube every 10 metres for a maximum minefield length of 2,160 m.

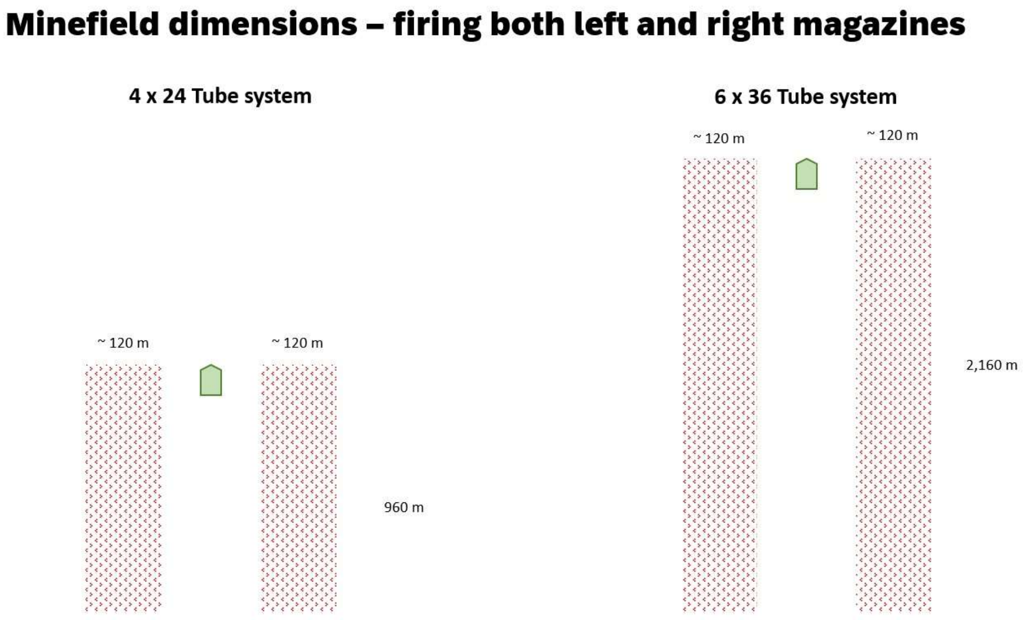
b. The launch tubes project the mines 20-150 m from the vehicle.

c. Mines are programmable for self-destruction from 1-272 hrs [up to 11 d 8 hr].

d. Reloading time for a launch vehicle is 18 minutes, with a resupply truck.

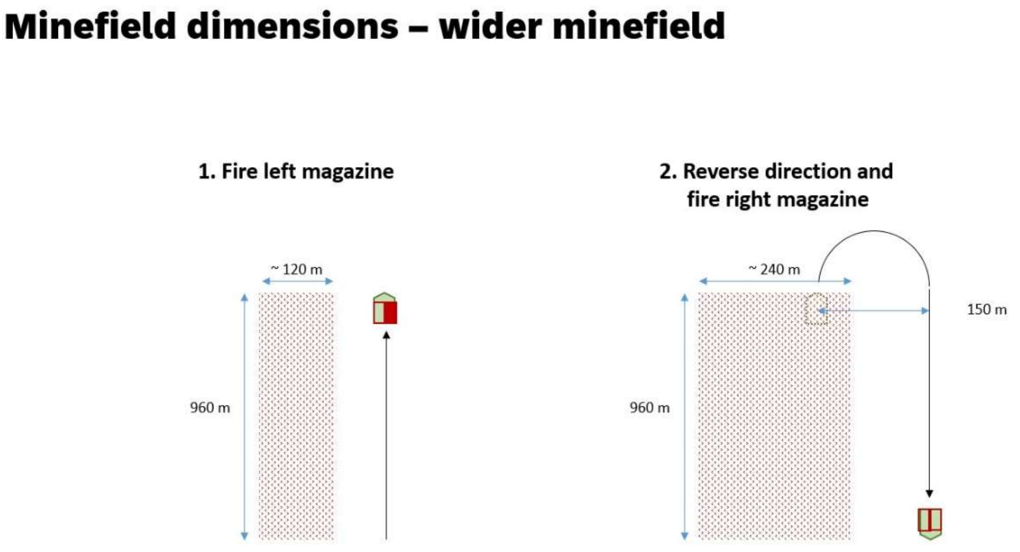
e. Maximum minefield sizes possible from one complete ammunition expenditure are shown in the diagram below.

Figure 7.2 Minefield coverage – left and right magazines fired in axis of advance



f. Note that a wider minefield can be achieved by having the vehicle launch advance and fire all its tubes from the left side of the vehicle, record the location and direction at which the left side magazine is expended, then have it move across orthogonally 150 metres, make a U-turn and move back along the original axis, firing the tubes from the right side of the vehicle. Refer to the diagram below.

Figure 7.3 Laying a wider minefield



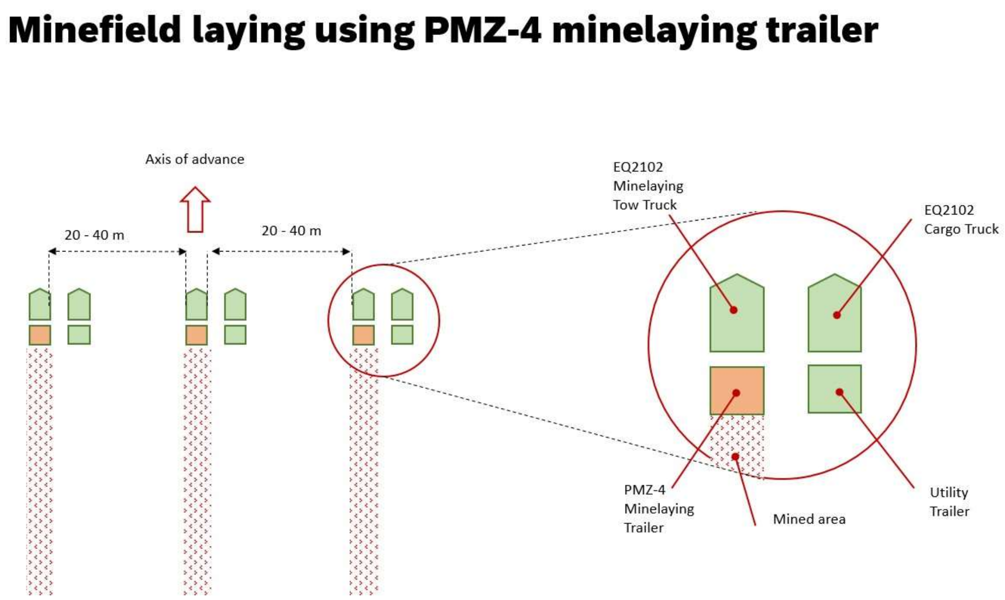
7.9 Minefields can also be laid using PMZ-4 mine laying trailers towed by EQ2102 6x6 cargo trucks. The PMZ-4 is the Olvanan produced copy of the Donovian mine trailer. Essentially, it ploughs a trench, emplaces a mine within the trench and covers the mine over with the displaced earth. The mines are loaded into the trailer manually, and the cargo truck towing it can carry up to 300 anti-tank mines.

7.10 Laying a minefield using mine laying trailers typically employs three EQ2102 trucks with PMZ-4 trailers driving on parallel paths, 20 to 40 meters apart with each minelayer laying a straight-line row. Mines in different rows are staggered with the distance between mines depending on whether the mines are pressure-initiated or full-width attack. Depending on the extent of the minefield required, these may be accompanied by the supporting vehicles – another EQ2102 cargo truck and trailer, carrying additional mines.

Figure 7.4 PMZ-4 Mine laying trailer

Image: T2COM Worldwide Equipment Guide

Figure 7.5 Laying a minefield using towed minelayer



Artillery/ Aerial

7.11 Anti-vehicle, anti-personnel and mixed minefields can also be laid using rocket artillery. In such cases, there is co-ordination between the Combat Engineer formation that is tasked with laying the minefield, and the artillery element that will deliver the effect. This sits within the Olvanan principle of integrating all available combat power in order to achieve a battlefield effect.

7.12 Conventional and 122mm rocket artillery (see Figure 7.6 for an illustration of a 122 mm MLRS truck) can be used to project minefields into the path of an advancing or retreating enemy. Depending on the specific type of 122mm scatterable mine munition used,

Figure 7.6 – 122 mm PHL-81 MLRS

Image: Wikimedia Commons

a. Anti-personnel minefields can be projected to distances of 6 -15 km measuring up to 720x600 m per 40 rocket salvo,

b. Anti-vehicle minefields can be projected to 3 - 7 km measuring 650x400m per 40 rocket salvo. Figure 7.7 is a schematic illustration of an anti-vehicle mine-laying rocket.

7.13 This ability to lay projected minefields at a distance, exceeds the distance to which Engineer equipment can lay minefields.

7.14 Each round of 122 mm scatterable mine rocket artillery can deliver 128 anti-personnel mines or 6 anti-vehicle mines.

7.15 Type 84 Anti-vehicle mines have the following characteristics:

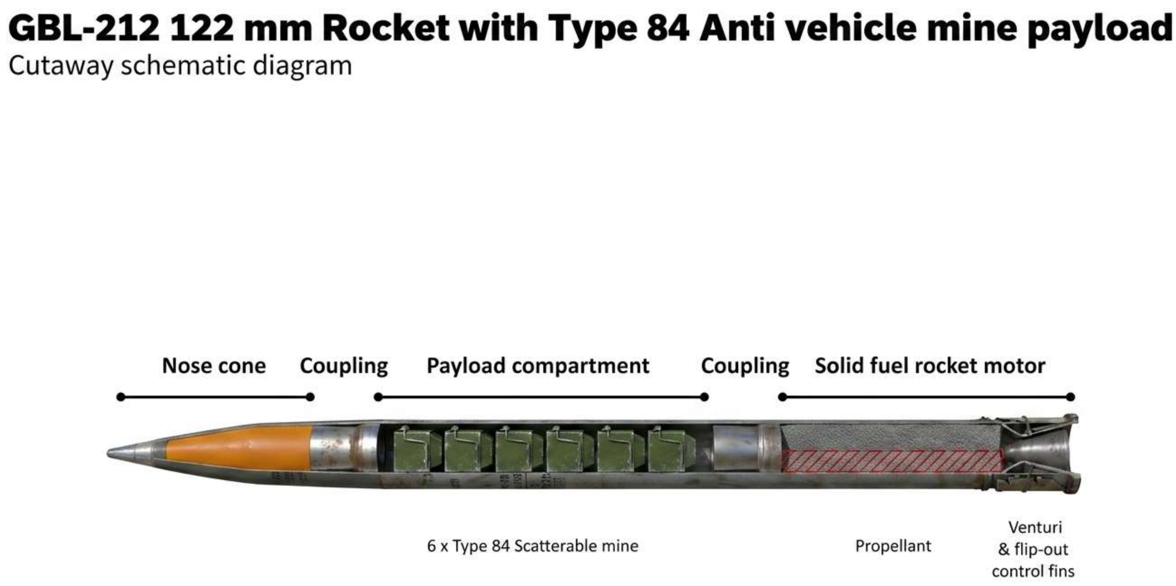
a. All models are able to penetrate 110 mm of rolled homogeneous armour, using an explosively formed penetrator.

b. Model GLD-220 disarms after 72 hrs upon drainage of battery

c. Model GLD-220 can be programmed to self-destruct at one period of 4.5, 13.6, 22.8, 36.4, or 72 hours

d. Model GLD-221 has a tilt-rod fuze and does not self-destruct.

Figure 7.7 GBL-212 122mm Rocket cutaway



7.16 Olvana actively produces and exports surface launched and aerially delivered munitions[11].

Minefield laying

7.17 Minefields are generally laid prior to the battle front moving through the area where it is laid.

7.18 Minefields are generally laid for the following reasons:

a. Defense for a static location or a position that is occupied for a brief period

b. In order to block, disrupt, fix or turn enemy advance

c. In order to impede or slow the rate of advance or retreat of the enemy

d. As a nuisance to frustrate enemy movement by delay and expending the enemy's resources.

7.19 The order to lay a minefield is given by the Action element Commander – that is, the formation commander to whom the Combat Engineer element reports. The Action element Commander will indicate to the Combat Engineer Commander:

a. the vicinity or location where the minefield is to be placed

b. the coverage required

c. whether or not additional engineer works are required, if the mines are part of an integrated set of obstacles

d. its purpose – what the intended enemy composition is likely to be – vehicles, personnel, multi-purpose

e. its completion deadline

f. its duration – in order to programme a self-destruction time.

7.20 The Combat Engineer Commander then tasks the Combat Engineer Mine Warfare Platoon commander or Combat Engineer Mine Warfare Company commander with the execution of the task.

7.21 The Combat Engineer Mine Warfare Company/Platoon commander then briefs his elements (Platoons/ Squads) on the task specifics, allocating sub-sectors or segments of the overall coverage area and site-specific details such as terrain and soil conditions, and which assets are to be employed for the task – whether GBL-130, GBL-132, the PMZ-4 or a combination are required.

[11] https://www.hrw.org/sites/default/files/related_material/ClusterFactSheet_Asia.pdf

7.22 In terrain where vehicular mine laying assets cannot be employed such as in jungle terrain, creeks and potential fording points or as defense against a beach assault above the high tide mark, mines are laid manually using hand tools.

7.23 If the extent of the minefield required is beyond the capability of the Mine Warfare element within the Combat Engineer support element, the Combat Engineer element commander may request additional support from the Engineer Brigade. This is because the Mine Warfare element supporting Armoured, Amphibious and Marine brigades is limited to a Mine Warfare platoon.

7.24 Note that field artillery scatterable mines can be laid in the path of retreating enemy formations in order to slow them down in order to engage in order to supress, attrite, neutralise or destroy the formation.

Section 7-3. Obstacle emplacement

7.25 A list of typical obstacles is presented in Table 5.1 Summarised obstacle breaching methods in column (a).

7.26 Note that obstacle belts typically combine one or more types of obstacles, in order to achieve the Manoeuvre Element Commander's intent.

7.27 There are three considerations for obstacle emplacement, driven by the purpose of the obstacles. These are:

a. Planning

b. Construction

c. Emplacement.

7.28 Planning

a. Is predicated on the Manoeuvre Element Commander's intent and requirements. He will give the order for the construction of obstacles to his Combat Engineer support Element Commander.

   (1) His planning/ requirement will have taken into consideration that the obstacle will not impede his own force and Olvanan/ partner forces' manoeuvre, but will significantly affect that of the enemy.

   (2) He will specify

      (a) the target/s of the obstacles

      (b) what he needs the obstacles to achieve

      (c) the coverage – the area over which the obstacle/s are to be placed

      (d) its alignment or direction

      (e) the exact geographical co-ordinates of its limits, and

      (f) when it is to be prepared by.

   (3) He may suggest which obstacles he requires, but also equally take into consideration suggestions from his Combat Engineer support Element Commander.

b. Once the order has been given to the Combat Engineer support Element Commander, the order is relayed to the Combat Engineer Platoon Commander.

c. The Combat Engineer Platoon Commander and his senior Sergeant will then

   (1) Conduct a physical reconnaissance of the location stated by the Manoeuvre Element Commander. The reconnaissance will be conducted jointly by the Combat Engineer Platoon Commander with the support of a Combat Engineer Reconnaissance squad, tasked by the Combat Engineer Reconnaissance Platoon Commander. This is necessary to provide insight and context for the emplacement considerations listed in paragraph 7.30 b.

   (2) Conduct an assessment of the types and numbers of obstacles required to achieve the Manoeuvre Element Commander's intent. This will take into consideration the effect required on enemy manoeuvre, the terrain and the weather conditions.

(a) Effects on enemy manoeuvre: Block, fix, turn, disrupt.

(b) Terrain effect on enemy manoeuvre: Observation and fields of fire, Cover and concealment, natural obstacles, key and decisive terrain.

(c) Weather: effect of rain, fog, snow etc. on path trafficablity and visibility

(3) Determine which obstacles can be prepared in advance and which need to be raised/ developed on site

(4) Plan the logistical requirements – manpower, materiel and machinery, including transport assets required to move and/or conduct earthworks to/at the location.

(5) Brief/ deliver orders to the soldiers for the construction and emplacement.

7.29 Construction

a. Certain obstacles can be constructed in advance and transported to the emplacement site. Preparation in advance minimises Combat Engineers from needlessly prolonged exposure to the enemy's detection systems.

b. Obstacles such as abatis, barbed wire fences, craters, ditches, low wire entanglement among others, cannot be prepared in advance and must be developed on-site.

c. Where possible, pre-prepared obstacles are constructed at or near a rear area security location, close to a Logistical Support Detachment. This reduces the strain on the logistical support unit in terms of ferrying construction materials to the Engineer Support element.

d. Obstacle construction efforts are led by the undifferentiated Combat Engineer platoon within the Engineer Battalion or Company. Depending on the scale of the task [number of items required to be constructed, timeframe and coverage], the availability of additional Combat Engineers from within the formation and the priority of competing concurrent tasking, Combat Engineers can be drawn from other sub-units such as Assault Crossing, Bridge Construction, to contribute to the labour effort. This is with the proviso that these other specialist Engineer sub-units are not tasked with other missions.

e. If the labour effort required to prepare these obstacles exceeds the available labour within the Engineer support element, the Platoon Commander will raise a request for additional manpower through his chain of command.

f. Those obstacles that cannot be pre-prepared are materiel resource planned. For example (Note: this is not an exhaustive listing of potential obstacles that cannot be prepared in advance):

(1) If a double apron fence spanning 1,000 m is required, the construction supplies and tools for the task are loaded on vehicles, in preparation for raising the fence at the required location. Similarly, if other wire or timber obstacles are required, the appropriate quantity of construction supplies are loaded.

(2) If an anti-tank trench or ditch is required, the plant, machinery and specific fittings required to dig the trench is loaded on a HET trailer, ready for transport. Supporting vehicles are loaded with sufficient fuel to power the plant for the duration of the task.

(3) Cratering charges, mined charges and falling blocks may require plant to dig boreholes and will require demolitions stores and accessories.

(4) Abatis may require chainsaws for tree felling as well as metal stakes, barbed wire and explosives.

7.30 Emplacement

a. The final step is to move the pre-prepared obstacles to the location to the emplacement site, then emplace and/ or raise them.

b. Where possible, obstacles should be emplaced to integrate with natural or man-made non-military obstacles:

(1) Poorly trafficable terrain such as waterlogged fields that will be untrafficable by all vehicles, and extremely slow going for dismounted troops

(2) Steep terrain which will not permit vehicles to pass

(3) Rocky or sandy and heavily uneven terrain

(4) Heavily vegetated terrain such as forests, rainforests and jungle

(5) Other vegetation such as hedgerows

(6) Building, ruins of buildings and rubble

(7) Long stretches of continuous walls

(8) Railway lines

(9) Locations where the terrain is contaminated with UXO and/ or CBRN residues

(10) Water delivery systems such as pipelines, drainage ditches and irrigation channels

(11) The complete absence or lack of a clear and obvious bypass route.

c. There is insufficient data to estimate the rate at which OPA Combat Engineers emplace obstacles, however:

(1) It is likely to be conducted at rates comparable to and achievable by Western military forces.

(2) Rates of emplacement may be affected by the following factors:

(a) *Mechanisation*. Machine-assisted means may accelerate progress. Mechanisation includes the use of trucks with integral cranes, special purpose trucks designed to lay wire obstacles, augers, bulldozers, excavators, trench diggers for cutting, drilling earthworks, dump trucks for transporting earth and so on.

(b) *Weather*. Extreme heat, precipitation (such as rain and snow) and wind may slow down progress.

(c) *Night operations*. Darkness may also slow down progress.

(3) Note that emplacement tasks are likely to be carried out while the battle is physically and temporally distant. There is the ever present threat of surveillance, observation and targeting.

Chapter 8
Physical protection

Section 8-1. Overview

8.1 Large scale combat operations (LSCO) in the early 21st century have come full circle from static trench warfare in the early 20th century, through to manoeuvre warfare in World War 2, back to static trench warfare, taking into consideration evidence from recent conflicts.

8.2 Having seen how events are unfolding in this example of LSCO, Olvanan military planners retain a degree of flexibility in how LSCO are likely to be conducted. There are two broad approaches:

a. In a dynamic situation, survivability is predicated on rapid manoeuvre and not being tied to a fixed physical location for prolonged periods.

b. In a more static situation, survivability is predicated on significantly lower levels of manoeuvre, unless it is directed at gaining enemy occupied territory. Thus, physical protection from indirect fires plays a significant role.

8.3 The emphasis on mobility of Olvanan combat operations is evident. The consequent selection of military hardware, such as self-propelled artillery, rocket artillery, and the near absence of dismounted infantry would indicate that for the most part, the manoeuvre elements used in Olvanan combat operations are geared to advance into contact rather than remain in place to defend.

8.4 Rear area groups that move infrequently or remain static such as logistics hubs, field hospitals, airfields and fuel storage areas are likely to require physical protection works.

8.5 In addition, the advances in electronic warfare and counter battery radar systems in the ability to locate artillery units and apply effective fires within minutes of being unmasked, there is little value in constructing, for example, defensive positions for artillery pieces.

8.6 Olvanan physical protection measures rely on the following principles.

a. Survivability. Structures will be designed to withstand fragmentation from high explosive munitions. Direct hits from gun launched artillery greater than 120 mm to underground structures are likely to be fatal to the occupants.

b. Standardised design. This means that for structures that require a physical framework to support the load, parts are either pre-fabricated or modular, enabling rapid deployment of protective measures.

c. Control of emissions and signatures. When in operation, certain structures may radiate visual, thermal and electromagnetic cues that can be used for targeting. This can be masked by visual camouflage, thermal and physical dispersion.

Section 8-2. Underground structures

8.7 Types of structures include but are not limited to:

a. Shelter – Personnel

b. Shelter – Field kitchen

c. Shelter – Field hospital

8.8 These are Olvanan variations on the ISO 20 ft. (6.06 m) and 40 ft. (12.19 m) containers, that are truck transportable. The internal fittings and fixtures are integral and vary depending on the purpose. They link together like building blocks, and are welded together to be watertight. They can only be employed where tactical conditions permit and where there are established high quality serviceable roads between the point of origin of the modules (typically a sea point of debarkation (SPOD)) and their destination.

8.9 They are modular and pre-fabricated to deliver the appropriate utility. They all have standardised entry/ exit modules that permit ingress and egress of personnel and casualties on litters/ gurneys as appropriate. The modular and purpose-built design eliminates the need to custom build each structure, each time one is required.

8.10 Such modules are available commercially in the western hemisphere. These have been purchased by Olvana and upgraded to suit the specific needs. These modules can also be surface-mounted when the risk assessment of strike has been assessed as minimal.

8.11 For example, field hospital will comprise the following modules:

a. Operating room module

b. ICU module

c. Recovery room module

d. Diagnostic equipment module

e. Laundry and toilet module

f. Corridor modules.

8.12 In the rare instances where Olvanan Combat Engineers are required to construct underground structures without using modified ISO containers, their training enables their them to employ timber construction, excavation earthworks and related skills, in order to do so. Mechanisation of excavation and pre-fabrication of structural frameworks will greatly reduce the time required to complete construction.

8.13 Key process stages for their installation are:

a. Planning

b. Reconnaissance

c. Preparation & road move

d. Earthworks

e. Emplacement

f. Services connection

g. Camouflage.

8.14 *Planning*. Once the need for the specific type of structure has been established, [kitchen, personnel, hospital], the capacity requirement has to be assessed. For example, is the personnel shelter for use as a Command Post, or as a location to provide protection for troops during a mortar attack, or whether a field hospital is required to treat a platoon's or a company's worth of casualties, or whether the field kitchen is a dine-in facility suitable for a company at a time, or a production-only kitchen with no dine-in facility.

8.15 *Reconnaissance*. This is conducted on behalf of the Combat Engineer support element Commander by the Combat Engineer Reconnaissance Commander and his Senior Sergeant, accompanied by a squad of Combat Engineer Reconnaissance troops. The site where the structure/s are required is physically reconnoitred and assessed, for laying out the work site, road approaches and actual construction required.

8.16 *Preparation*. Once the type and capacity of the structure has been assessed and finalised, the Combat Engineer support element Commander conducts a materiel planning assessment, assisted by his Senior Sergeant and the published heuristics guide. These will indicate the items of plant required, construction bills of material, daily water requirements, power requirements for construction and ongoing operations. It will also indicate the transport/ lift requirement to move the materiel from its storage location to where it is needed. This is then requisitioned from the Logistics Support element, and loaded onto trucks. It is then moved to the location where it is to be installed. The location is organised and laid out in a deliberate and organised site with areas for C2, administration, plant parking, stores area, tools, petrol, oils and lubrication stores, power generation, and other equipment.

Figure 8.1 Preparatory excavation works using plant

8.17 *Earthworks*. This stage situates and marks out the excavation plan on the ground, and spoil dump sites. The top layer of vegetation is preserved as best as possible, in order to provide concealment for the finished installation, however this is not always possible. Plant is brought to the specific location and commences excavation, and spoil is moved to the designated location for later use.

8.18 *Emplacement*. This consists of either dropping in the ISO container modules or anchoring in the pre-fabricated timber frames, corrugated iron sheets and revetment. This stage also includes the installation of all utilities and services such as electrical power, data, plumbing and ventilation. Once this is completed, the structures, be they ISO based containers or the timber frame based, these are covered over with 1000-1200 mm of compacted earth, including the access paths, with the exception of a small opening to permit access. Note that each module will have an emergency access, in order to prevent a bottleneck in the event of having to evacuate the structure rapidly. The top layer of vegetation is used to cover over the finished structure.

8.19 *Services* are connected to enable the ongoing operation of these facilities.

a. Where there are services required, such as heating, cooling, electrical power, data cabling, water and wastewater, the plumbing and conduit are sited around 300-450 mm below the surface, and buried. These are marked out on the completed site construction map, in order for subsequent repair/ fault remediation.

b. Vents for air and heating are piped considerably distant to the emplacement site and are placed through diffusers before being vented to the atmosphere.

c. Wastewater tanks are installed in tank farms, also at a distance from the emplacement.

Figure 8.2 Surface laid ISO container based hospital

8.20 *Camouflage, cover, concealment & deception*. Where appropriate, the site is camouflaged using camouflage netting. Once the worksite is collapsed and the construction elements withdraw, the site is remediated as effectively as possible. It is then ready for occupation and use by the element that is to operate within it.

8.21 Note that the ongoing operation of the installed protective structure is the responsibility of the element that operates it. The requirements of potable water production, wastewater management, use of consumables, power requirements, waste management and so on remain with the unit operating it, such as the Command element, the Hospital unit or the Catering element.

Section 8-3. Fighting positions

8.22 Note: The responsibility for siting, building, obtaining construction materials, considerations for weather including drainage and water flow diversion, as well as maintaining these positions is under the aegis of the Unit Commander that requires the positions to be developed. Olvanan Combat Engineers are able to assist non-Engineer units to develop fighting positions, using plant and machinery to facilitate and hasten the procedure. They will also provide a degree of guidance and recommendations as to the positioning and drainage considerations.

8.23 We will examine two types of defensive positions:

a. Squad delay battle positions. These are positions for pairs and teams of soldiers to position themselves and to provide effective fires in a directional sense. For these positions, the locations are not tied in together.

b. Squad defense battle positions. These positions are the building blocks for the positioning of larger formations from platoon and above, in defense of a specific location, such as a forward operating base. In this position, the individual locations are tied in together.

8.24 Note: Where the water table prevents excavation to form fighting positions, such positions are built from the ground up, using the same construction patterns shown for excavated positions.

Squad delay battle positions

8.25 There are two types of Squad delay battle positions. See Figure 8.3 for a simplified top view of Squad delay battle positions.

a. “Tee”, for pairs of soldiers. See Figures 8.4 & 8.5 for indicative layout and approximate dimensions. Note: Overhead protection is illustrated schematically as a block. Actual overhead protection will be compacted earth supported by a timber frame and corrugated iron sheeting.

b. “Broken F” for teams of soldiers. See Figures 8.6 for indicative layout. Overhead protection has not been illustrated for clarity, but applies as for “Tee” position. In addition, a structure that provides 300mm of overhead protection is constructed to protect heavy weapons users from blast and fragmentation. This can be fabricated using either timber frame, corrugated iron and compacted earth, or timber frame, corrugated iron and sandbags.

Figure 8.3 Top view of Squad delay battle positions

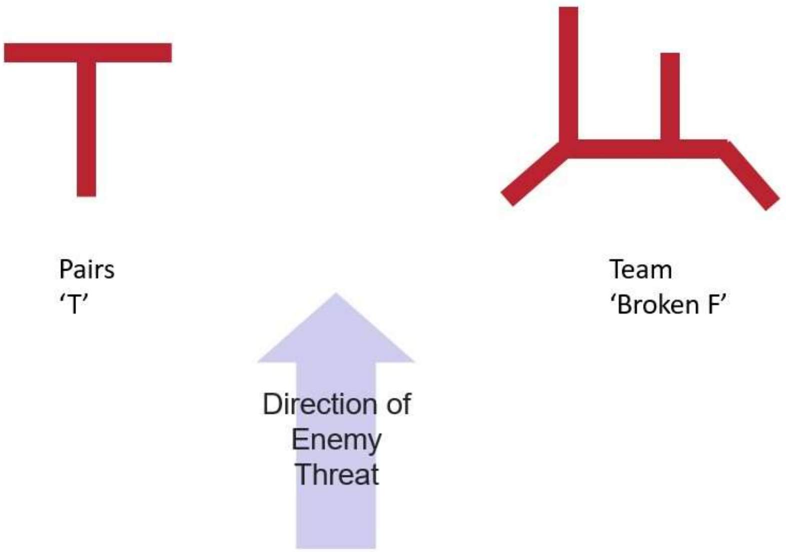


Figure 8.4 Tee Squad Delay battle position schematic layout

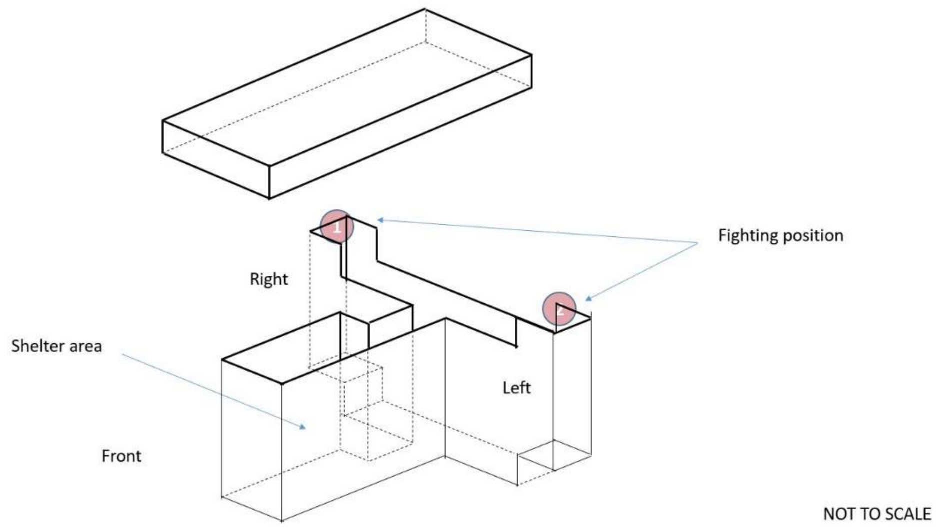


Figure 8.5 Tee Squad delay battle position approximate dimensions

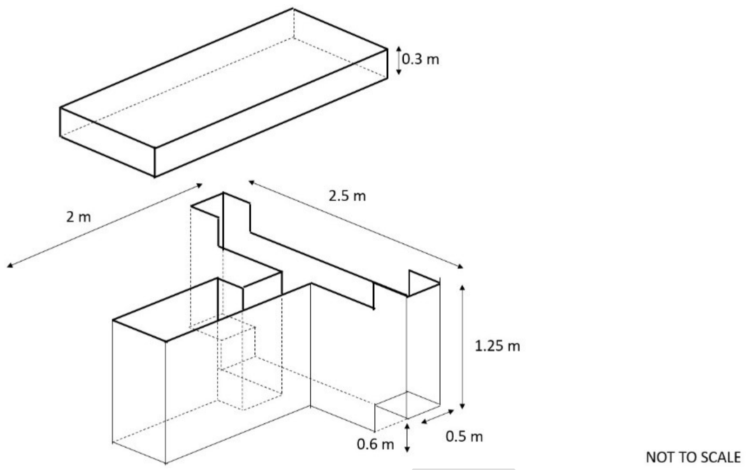
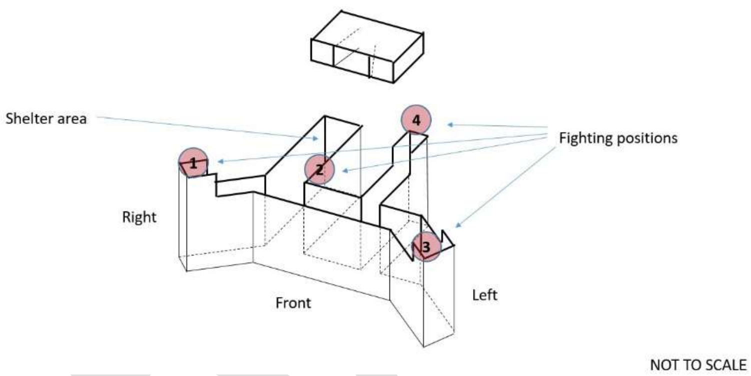


Figure 8.6 Broken F Squad Delay Battle position schematic layout



8.26 Sequence of construction is as follows.

a. The siting of each position is designated by the Action Element Platoon Commander responsible for the location. Ideally, this will include considerations for runoff from rainfall.

b. The site is marked out on the ground to confirm the siting plan, and is either approved or modified by the Platoon Commander.

c. If appropriate, camouflage netting is placed over the construction site to obscure the works from overhead observation.

d. If there is surface vegetation that can serve as camouflage, such as turf or natural grasses over the area, these are carefully removed in a layer, and placed aside for later re-use.

e. Excavation commences, cutting the shape to the approximate dimensions using an excavator. The spoil is removed from the site. This cuts the fighting positions and the shelter area. There may be some use of hand tools to finish the cut-in trenches to the final dimensions.

f. If the Combat Engineers assessed the soil in the cut-in trench as being unstable, that is, not able to support its weight without risk of collapsing, the trench is revetted. The reventment is constructed using corrugated iron, iron pickets and wire.

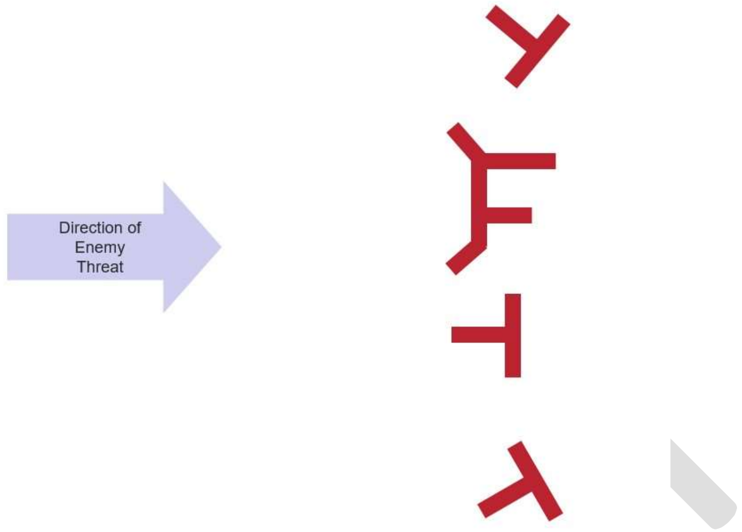
g. Next, the overhead protection area is excavated to a depth of 300 mm, and a framework of timber beams and corrugated iron sheeting is laid over the top.

h. Earth is compacted over this structural framework.

i. The turf/ natural grass layer is replaced. Fire positions are improved by the addition of berms and weapon support areas.

j. The camouflage netting is removed. The positions are ready for occupation by the Action Element.

Figure 8.7 Squad delay battle positions tied in together



Section defense battle positions

8.27 A typical section defense battle position is constructed when there is a limited time to develop a delay battle position. A typical section defense battle position is illustrated in Figure 8.8. These can be sited in multiples to form a Platoon defensive position as illustrated in Figure 8.12.

8.28 Note: Where the water table prevents excavation to form fighting positions, such positions are built from the ground up, using the same construction patterns shown for excavated positions.

Figure 8.8 Section defense battle position – plan view

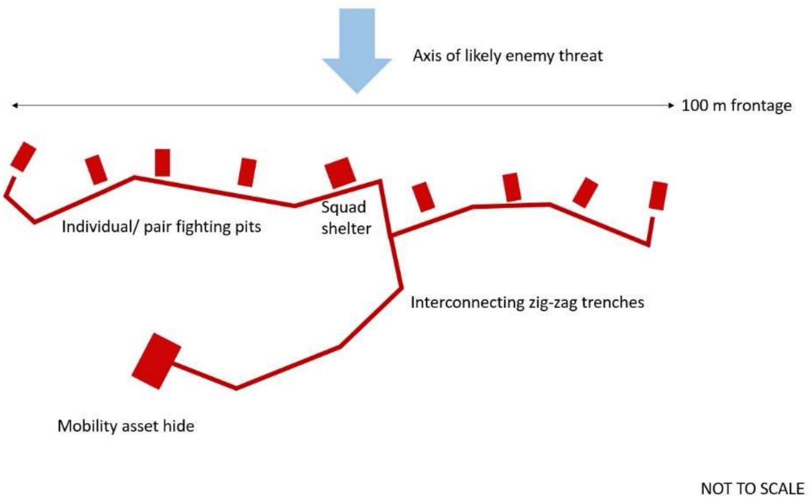


Figure 8.9 Simplified construction sequence – initial marking of site

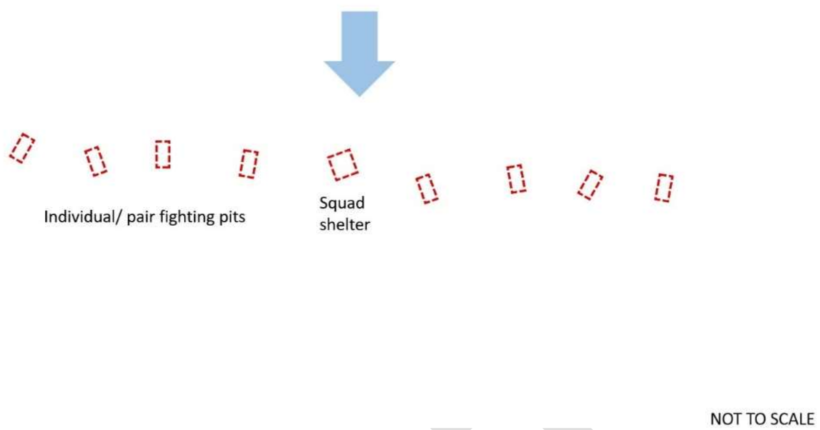


Figure 8.10 Simplified construction sequence – positions

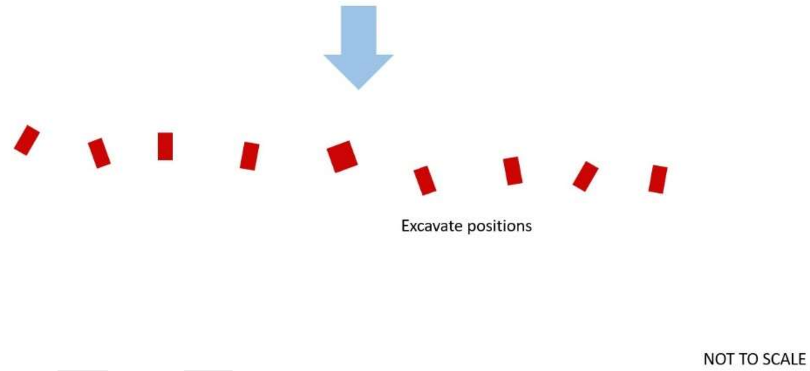


Figure 8.11 Simplified construction sequence – communications trenches and vehicle hide

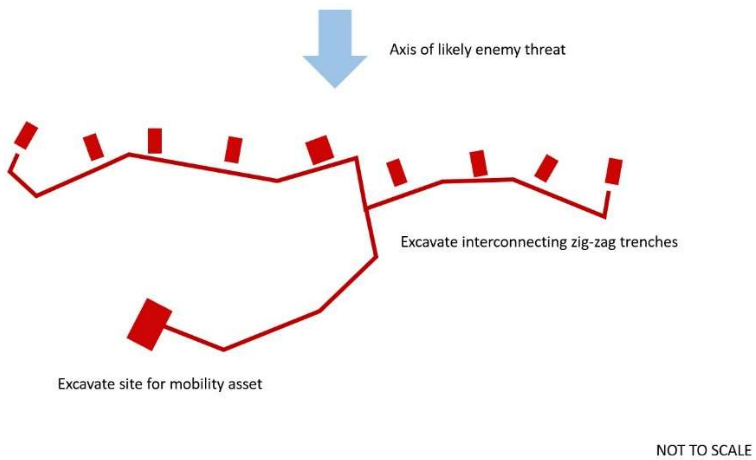


Figure 8.12 Multiple Squad Defensive positions arrayed for Platoon Defense

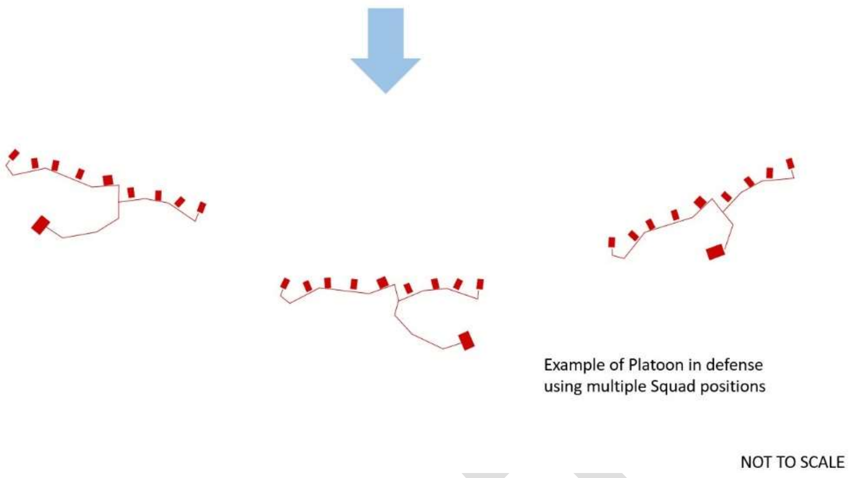
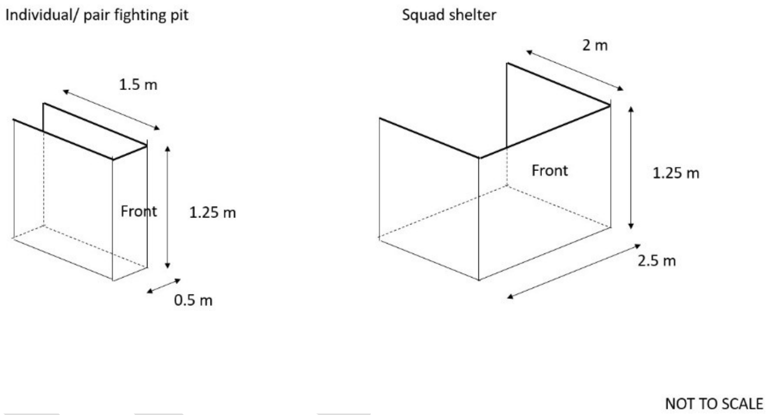


Figure 8.13 Elements of a Squad Defense



8.29 Sequence of construction is as follows.

a. The siting of each position is designated by the Action Element Platoon Commander responsible for the location. Ideally, this will include considerations for runoff from rainfall.

b. The site is marked out on the ground to confirm the siting plan, and is either approved or modified by the Platoon Commander. See Figure 8.9.

c. If appropriate, camouflage netting is placed over the construction site to obscure the works from overhead observation.

d. If there is surface vegetation that can serve as camouflage, such as turf or natural grasses over the area, these are carefully removed in a layer, and placed aside for later re-use.

e. Excavation commences, cutting the fighting positions and squad shelter into the ground. This is a mechanised task conducted using a trench digger, an excavator and if required, a dump truck. See Figure 8.10.

f. This is followed by cutting a zig-zag communications trench, measuring 1.25m depth by 0.5 m wide, as well as a cutting for the squad mobility asset. The cutting and excavation for the mobility asset is cut in from ground level to enable the vehicle to drive in, disembark troops and crew, and to embark and withdraw rapidly should the situation require. See Figure 8.11.

g. If the Combat Engineers assess the soil in the cut-in trench as being unstable, that is, not able to support its weight without risk of collapsing, the trench is revetted. The reventment is constructed using corrugated iron, iron pickets and wire.

h. Next, if overhead protection is required, a framework of timber beams and corrugated iron sheeting is laid over the top of the positions and covered over with sand filled sandbags to a thickness of 400 mm. This is typically completed for the Squad shelter area, and at the Platoon Commander's direction for individual/ pairs positions.

i. Earth is compacted over this structural framework.

j. Some of the spoil is used to create berms to the front of the positions.

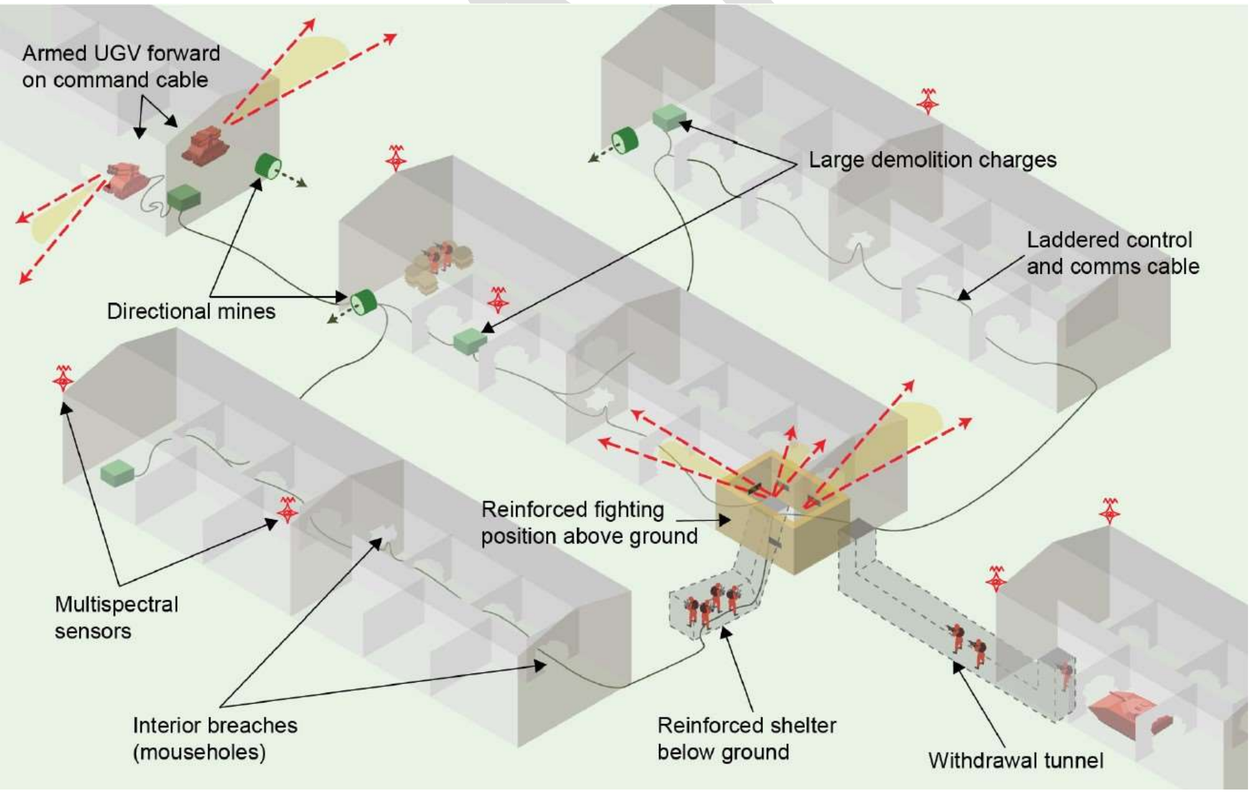
k. The turf/ natural grass layer is replaced.

l. The camouflage netting is removed. The positions are ready for occupation by the Action Element. The fighting positions and the Squad shelter area dimensions are shown in Figure 8.13.

Urban fighting positions

8.30 Reflecting Olvanan emphasis on protection and survival, the heart of an urban defensive position is a reinforced below ground shelter. An example layout is shown in Figure 8.14. This consideration leads to the development of reinforced fighting positions above ground. While it may have arcs of small arms fire beyond the building, it is primarily sited for concealment and to enable the use of small arms to engage assaulting troops within the building. A withdrawal tunnel is also developed to connect to a building to the rear, where the section AFV is concealed and where, as the battle develops, the driver and gunner may be sited for vehicle security and to provide defensive fire from within the building.

Figure 8.14 Urban defensive position



8.31 During defensive routine, most soldiers remain below ground, from where they can observe the area on their personal monitors which are connected to the sensors around the buildings. A pair of sentries occupy a carefully concealed OP/listening post at the forward end of the building concealing the section position until the enemy close on the position or a bombardment commences. This primary building as well as the adjacent buildings are all prepared with mouse holes so that soldiers can move quickly within while remaining concealed, as well as prepared tunnels enabling rapid and concealed access to the buildings.

8.32 The use of sensors positioned around and within buildings is key to the Olvanan concept of the fused-masked defence and the cueing of artillery and guided munitions (which may include small loitering munitions launched from within the position itself). This reliance on sensors allows the defenders to minimise exposure and the risk of detection, to reduce and delay electromagnetic radiation from the defensive position Olvanans will link their sensors, remote weapon systems, command fired mines and demolition charges with a laddered (duplicated) system of cabling.

8.33 Additional considerations for defensive positions in an urban combat environment can be found in Lnote 7.2.2 Olvanan Urban Doctrine and Tactics - Enclosure Warfare.

Fighting vehicle positions

8.34 Fighting vehicles such as main battle tanks, AFVs, IFVs and systems that can apply cannon, gun, machinegun and short-range missile direct fire weapons have their hulls afforded protection by natural, purpose built or excavated compacted earth embankments. This is in order to ensure their weapon systems are able bring their firepower to bear on enemy targets, and simultaneously providing protection against fratricide, when firing overhead of friendly positions' lines.

8.35 Forward slopes, level ground and natural mounds or berms are ideal situations and permit the cutting of positions. Reverse slopes are less ideal, however, a solution can be achieved. Note: Vehicle commanders will advise the Combat Engineer elements as to the needs of the site for their arcs, and elevation/ declination in order to traverse the weapon systems.

8.36 The positions should always be designed such that approaches enable easy and swift occupation and withdrawal.

8.37 Examples of fighting vehicle positions are illustrated below in figures 8.15 – 8.18. Illustrations show primary weapon facing towards the enemy.

Figure 8.15 Fighting vehicle defensive position – Level ground

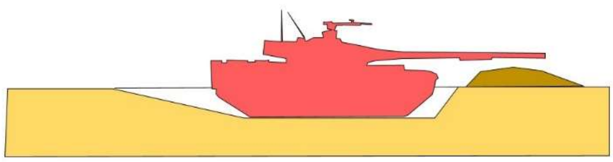


Figure 8.16 Fighting vehicle defensive position – Slope

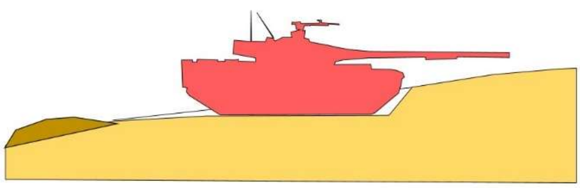


Figure 8.17 Fighting vehicle defensive position – Natural berm

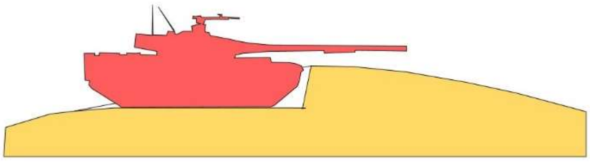
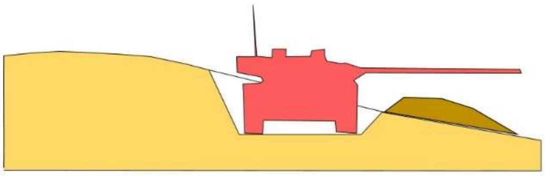


Figure 8.18 Fighting vehicle defensive position – Reverse slope



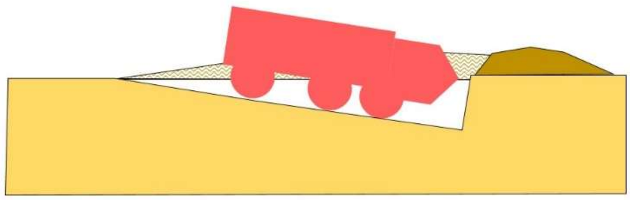
Support vehicle positions

8.38 Support vehicles are typically lightly armoured in order to resist small calibre small arms fire, but are not resistant to heavy calibre support weapons, such as 12.7 mm HMG fire. Therefore, these vehicles require different levels of protection, which is afforded by digging different types of positions with raised parapets constructed from compacted spoil built up at the front and sides. This is in order to protect the crew cabin from heavy calibre support weapons fire.

8.39 In order to minimise the surface area exposed to possible enemy fires, support vehicles are aligned to have the front facing the likely direction of enemy fires. This does not guarantee survivability, but it minimises the chances of successful engagement. Note, that while this may afford a degree of protection from direct fires, it does not provide any protection from indirect fires with explosive munitions such as artillery or mortars.

8.40 An example of a support vehicle position is shown in Figure 8.19.

Figure 8.19 Support vehicle position in level ground



8.41 Sequence of construction

a. The siting of each position is designated by the Action Element Platoon Commander responsible for the location.

b. The site is marked out on the ground to confirm the siting plan, and is either approved or modified by the Platoon Commander.

c. Vehicle dimensions vary considerably between 6 – 10 metres in length from a 6x6/ 8x8 truck to a Main Battle Tank, and 3.5 m wide. Cuttings will typically accommodate the full length and add two metres to the width of the vehicle in order to provide room to manoeuvre and dismount vehicles with side-opening doors.

d. Excavation commences, cutting positions into the ground. This is a mechanised task conducted using bulldozers, excavators and if required, dump trucks to relocate the spoil.

e. Some of the spoil is used to build up the parapets, which are then compacted.

8.42 The plant required to complete this task is found in the Road Bridge Construction Platoon in the Brigade's Combat Engineer Battalion. The plant required for the task is as follows:

a. Excavators to make the cuttings into soil and rock,

b. Bulldozers to grade and level surfaces,

c. Front-end loaders to lift and carry the spoil and

d. Dump trucks to relocate the spoil.

8.43 Typical construction rates range from 2 to 5 hours to excavate an individual vehicle fighting position depending on the nature of the soil and the size of the vehicle. Hard packed soil is slower to excavate and loose packed soil is easier to excavate. Approximate excavation rates are shown in Table 8.1.

Table 8.1 – Estimated hull down excavation times for individual vehicles[12]

	Excavation rate m^3/ hr		
	20	**23**	**27**
Vehicle type	**Time (hrs)**	**Time (hrs)**	**Time (hrs)**
EQ-2102 Cgo Trk	3.99	3.47	2.96
EQ-2050 4x4 Veh	2.50	2.17	1.85
CSK-141 4x4 Veh	3.13	2.72	2.32
ZBD-04 ARV	3.85	3.34	2.85
XC2200 Trk	4.97	4.33	3.68
ZTZ 96 MBT	3.10	2.69	2.30
ZBL-09 8x8 IFV	3.33	2.89	2.46
PLL-09 SP Mtr	4.04	3.52	2.99
VN-17 AFV	3.68	3.20	2.73

12 Derived from the volume of the vehicle plus 1.5 m width on both sides for manoeuvre & disembarkation, fractional excavation in order for weapon systems to be elevated above ground level. Excludes time for grading of approach path.

8.44 General notes on excavation for all types of protective structures.

a. The planning excavation rate is approximately 20-27 cubic metres of spoil per hour per machine.

b. Soil types and the ratio of soil to rock within the earth will affect excavation rates. For example, if there is solid rock just below the soil, additional plant such as pneumatic drills/ jackhammers will be required to break it up to the required depth.

c. Extreme nature of underlying geology such as bedrock may require borehole charges, which Combat Engineers are capable of developing, and are equipped for.

d. These factors will slow the rate of excavation works.

Fortifications and Blast-resistant structures

8.45 Modern munitions are essentially advanced engineering, physics and materials science applied to technology that has existed since the mid seventeenth century – when the timed fuse was added to explosive filled cannonballs. A modern M795 155 mm HE artillery shell is representative of a global standard artillery munition and its destructive capability. It has a mass of 46 kg and a terminal velocity of hundreds of metres per second. It is fitted with a precision timed fuse, enabling the projectile to airburst, detonate on impact, or detonate milliseconds after impact. Such projectiles are designed for long range, precision and lethality, and are highly effective against both vehicles, structures and personnel.

8.46 Fortifications are built on the basis of:

a. Providing protection against multiple direct strikes of the munitions anticipated to be used against the position.

b. Providing a physical and psychological barrier between the defending force and potential attackers.

c. The probability of being struck, the likely frequency of being struck and the severity of the strikes,

d. The consequence of damage, injury or death of the protected personnel and assets within the structure,

e. Incorporating the built up static defenses with the active defense measures to counter and deter strikes on the location/s, such as RISTA, HUMINT, military-civil liaison in the area of operations, early warning systems, active patrolling, overwatch and sentries.

8.47 As a consequence, the following measures are typically implemented when laying out a fortified position such as an extensive multi-formation depot:

a. Long, uninterrupted sight lines on approaches to the position in order to counter direct fire weapon systems,

b. External walls of sufficient thickness to withstand direct artillery/ tank/ assault gun fire,

c. Above ground structures such as personnel quarters, mess, vehicle shelters are protected with compacted earth/ sandbags,

d. Critical infrastructure such as fuel storage, power generation, communications operations equipment is sited in underground facilities [Note: receiver/ transmitter arrays will not function if sited underground]

8.48 If there is minimal chance of the site receiving indirect fires, there is no need to develop overhead protection. Otherwise, overhead protection is developed to provide the appropriate level of physical protection from the anticipated systems that are likely to be used to strike the location, such as mortars, conventional or rocket artillery, drones and bombs.

8.49 External fortification walls are typically fabricated from pre-formed, folding steel-wire 'baskets', of a fixed standardised sizes. These are lined with geotextiles, sited, pinned together, and filled with a mixture of crushed rock and sand. These are raised using plant such as excavators, bulldozers with bucket attachments and dump trucks. This is the approximate equivalent of the commercially available western 'Hesco' ® system. This enables rapid emplacement of semi-permanent to permanent fortifications. They are raised rapidly, afford good protection but are effectively single use and need adequate drainage. The limitations are that these require both plant and manpower emplace.

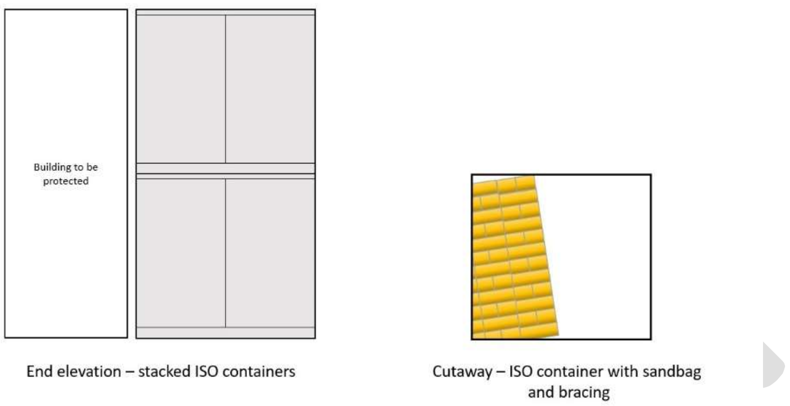
8.50 Where existing buildings require blast protection, OPA Combat Engineers rely extensively on standardised ISO 20 ft. and 40 ft. containers, that can be readily emplaced to afford low-rise structures physical protection against strikes from direct fires small arms, anti-armour weapons and overpressure from high explosive detonations near the structure.

8.51 ISO containers used in this manner are modified in two ways as shown in Figure 8.18:

a. Several courses of sandbags are laid inside the container, so as to cover the side of container wall closest to the structure to be protected.

b. Where the container is to be stacked such that a similar ISO container is placed atop, it is fitted with timber bracing frames in order to withstand the load.

Figure 8.20 ISO containers used for fortification



8.52 Where buildings are single storey and ISO containers are not available, OPA Combat Engineers use compacted earth bund blast walls, which are readily emplaced using a combination of plant and manpower.

8.53 Windows and doors are difficult to provide protection against blast overpressure, without resorting to heavy and expensive solutions. Blast-proof doors require structural integrity of the building, reinforced door frames, hinges, locks and the door itself to be substantially thick. Blast-proof windows require substantially thick reinforced laminated glass. These are all achievable though not always pragmatic, available or appropriate. Injuries from blast overpressure when near doors or windows can be minimised using safety drills such as positioning personnel away from these structures while the facility is under siege.

8.54 If the structure is expected to be besieged by shaped charge weapons, wire mesh screens can be raised to actuate the charges, and provide stand-off distance to nullify the effects.

8.55 Rather than dictate fixed formats of fortified structures and emplacements, the Olvanan approach is to standardise methods of physical protection, starting from the foundations and building upwards:

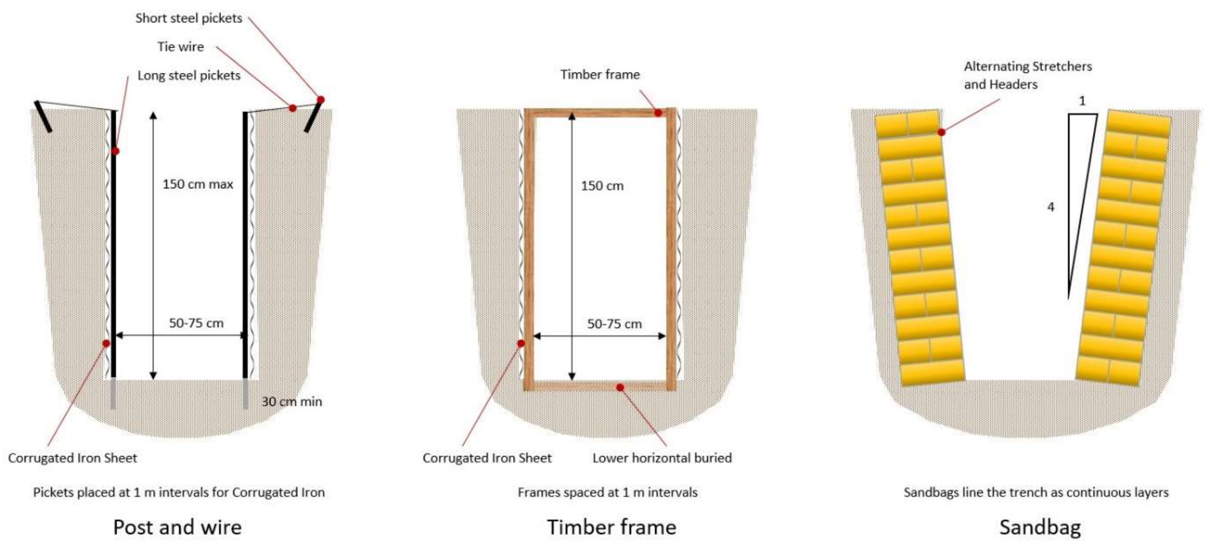
a. Structural integrity of trench and enclosure walls. This prevents wall collapsing under their own weight, and provides a stable base for overhead load bearing. This can be achieved by using one of three possible means of revetment, also illustrated in Figure 8.21:

(1) Post and wire, using corrugated iron

(2) Timber frame and corrugated iron

(3) Sandbag.

Figure 8.21 Methods of revetment schematic end elevations



b. A load bearing structure. This can safely drive its load through the trench or enclosure walls, in order to support the mass of the overhead protection. All trenches and underground enclosures that are wider than trench width (50 – 75 cm) will require supporting trusses in order to both withstand the load of the protective layer and not collapse under the overhead load. Load bearing structures are formed using corrugated iron and one of either:

(1) Structural timber or

(2) Steel.

c. Protective layer. The use of materials to provide the protection against the penetration and shock of explosive munitions. The minimum protective layer is 75 cm of compacted earth. The protective layer can be constructed by using of one or more of the following materials:

(1) Pre-cast or in-situ casting of reinforced concrete slabs

(2) Crushed rock/ gravel

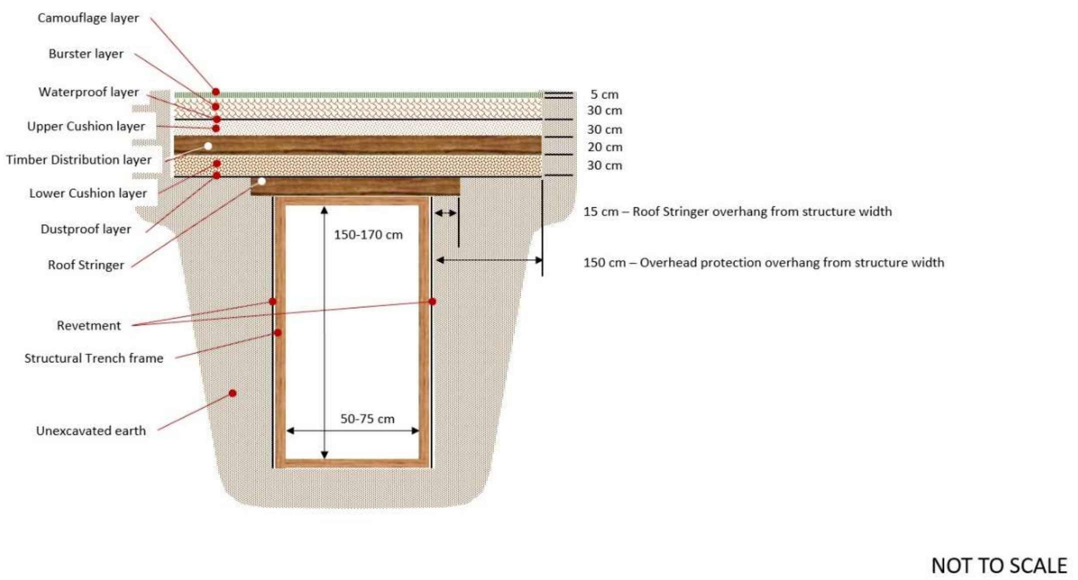
(3) Loose/ compacted earth and or sand

(4) Timber

(5) Water or dust repellent/ screening material

(6) Sand filled sandbags.

Figure 8.22 Overhead protection cutaway end elevation schematic diagram



8.56 Figure 8.22 shows a cutaway cross section of overhead protection against conventional high explosive ordnance. The layers, working from the top down are as follows:

a. A camouflage layer, consisting of a 5 cm thick layer of grass and light surface vegetation.

b. A burster layer consisting of 30 cm of stones, designed to provide a hard striking surface in order to positively detonate impact fuzes.

c. A waterproof layer of tar paper or canvas, to prevent water from penetrating into lower layers.

d. A cushioning layer of 30 cm of untamped earth, to dissipate and spread the shockwave. Neither gravel nor stone is used, as this increases the likelihood of secondary fragmentation.

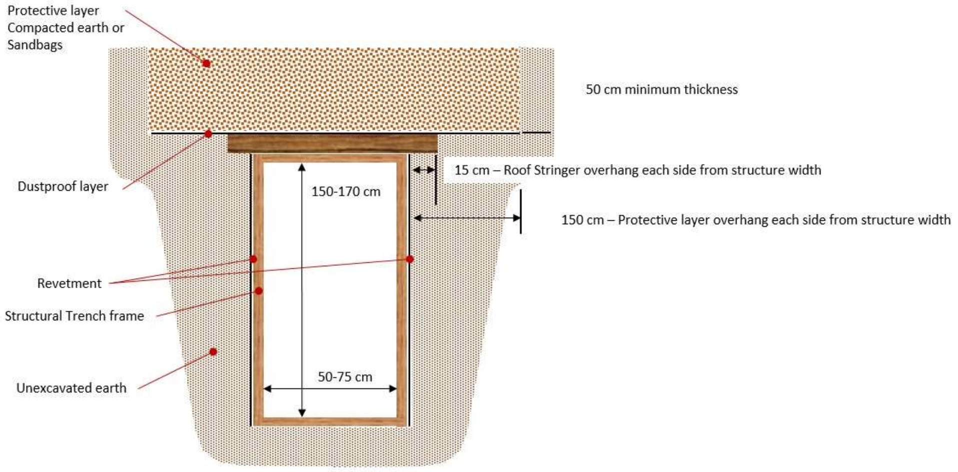
e. A distribution layer consisting of 20 cm diameter timbers. This layer rests on the unexcavated earth, and transmits part of the load into the earth. Layers b, c, d and e extend to a minimum of 1.5 metres beyond the width of the underlying structure [trench or enclosure)

f. A second cushioning layer of 30 cm of untamped earth, to dissipate and spread the shockwave. Neither gravel nor stone is used, as this increases the likelihood of secondary fragmentation. This extends to an overhang equal to the load-bearing stringers.

g. A dustproof layer to prevent dust and dirt falling on occupants and equipment.

h. Below the dustproof layer, there are 30 cm diameter timbers, spaced at 60 cm intervals to carry the load.

Figure 8.23 Overhead protection against CBRN threat



NOT TO SCALE

8.57 Figure 8.23 shows a schematic cross section of the protective layer against radiological threat, particularly high energy gamma radiation. A minimum layer of 50 cm of compacted earth attenuates the energy from the radiation.

8.58 The mass of compacted earth is supported by a timber log stringer roof. This design is not designed to prevent destruction as a result of the significantly higher blast overpressure resulting from the detonation of a thermo/nuclear device, compared to conventional high explosives.

8.59 Alpha and Beta radiation emitters, biological agents and finely dispersed chemical solids, liquids and vapours but not actual gases are easily protected against, provided such particles carried as dusts, aerosols and mists are excluded from the shelter.

8.60 Note that unless the shelter has been fitted with air filtration systems, screened entrances, and decontamination and detection protocols are in place to prevent the entry of contaminants, (chemical, biological and radiological) there is the possibility that these may enter the protected area.

Section 8-4. Camouflage, concealment, cover and deception (C3D)

8.61 The primary C3D capability resides in the Group Army Engineer Brigade, which has a complete C3D Battalion. The C3D Battalion has the task of delivering C3D effects to both Group Army and to subordinate elements.

8.62 Camouflage and concealment are practised as routine by all combat formations as part of their operating procedure. Where the camouflage and concealment capability of a particular formation cannot be met internally, the request is raised and put to the Group Army Engineer Brigade for its support, using elements of the C3D Battalion.

8.63 Cover is developed on order from the formation commander whose formation requires the cover. The effect be delivered within the Combined Arms Brigade, using the Combat Engineer element within the brigade. Where the cover development capability of the requesting formation cannot be met internally, the request is raised and put to the Group Army Engineer Brigade for its support, using elements of the C3D Battalion.

8.64 The task of generating items for Deception is delivered by requests to Group Army Engineer Brigade, as this has the potential to be one of the most resource-intensive tasks for the C3D Battalion. This also aligns with Brigade level deception tactics.

8.65 Note that Deception in this context excludes the use of feints. To be clear, a feint is a legitimate deceptive manoeuvre tactic, however it makes use of actual assets and troops, to draw enemy forces away and dilute the enemy's combat power.

8.66 Camouflage in the military context has two functions:

a. To make objects indistinguishable from the background they are located in.

b. To break up the regular shape of a form in order to be unrecognisable.

8.67 Once a camouflage plan has been developed, the execution of the camouflage plan requires sufficient:

a. Materiel to provide for the construction of a covering layer for fixed or static mobility assets, such as fabric/ netting, reclaimed excavation spoil, structural materials such as timber or metal and fixings.

b. Time to enable construction of suspensory and structural frameworks over which to layer the camouflage material

c. Manpower and

d. Mechanisation to enable the task to be achieved.

8.68 Concealment is the masking or dispersion of a signature so as to be indistinguishable from either background or clutter. The typical non-visual signatures that need to be concealed in the modern battlefield are:

a. Thermal/ infrared and

b. Electromagnetic.

8.69 Some degree of thermal/ infrared concealment is possible by the use of:

a. Dispersion of equipment and personnel into smaller concentrations leading to smaller 'hotspots',

b. Thermal blankets/ insulators that absorb, attenuate and re-radiate thermal energy in a weaker and more diffuse form, so as not to appear warmer than ambient or surrounding temperatures,

c. Insulation placed around heat-generating equipment – however this is likely to lead to inefficient operation of the equipment, as it needs to remain within operating temperatures and not overheat

d. Siting heat generating equipment distally from concentrations of personnel

e. Use of heat exchange mechanisms to cool hot gases such as by burying exhaust vents from electrical generators underground through ducting and venting exhaust gases through diffusers to disperse cooled gases at remote locations.

8.70 Concealment of electromagnetic and radio emissions will not always be possible in a battlefield that is increasingly reliant on telecommunications, telemetry, computation power and electrical power generation and usage. There are limited means of achieving this including:

a. Locating receiver/ transmitters at a distance from the operating sites where there are concentrations of personnel

b. Disguising receiver/ transmitters as other items

c. Limiting communications traffic to short duration bursts, to reduce the possibility of detection by electronic warfare elements.

8.71 Cover has been previously examined as the provision of physical protection to combatants and facilities, from the impact of ordnance. This effect can also be provided by all Combat Engineer elements that have access to earthmoving plant and equipment, with the proviso that such units are not tasked with executing the unit's primary task in support of the Brigade Commander's imperative.

8.72 Deception or misdirection in the military context is the use of fake or dummy equipment to dupe an enemy into believing something which is false, in order to either:

a. Deplete limited resources such as fuel and ammunition in the destruction of dummy forces.

b. Draw adversary combat forces away from Olvanan combat formations while Olvanan combat formations manoeuvre to their objective locations.

c. Disguise the combat manoeuvre assets and/or supplies so that they are not targeted. For example, disguising the external body of a ZBL-09 IFV to appear as a Shannxi 8x8 cargo truck.

8.73 Olvanan local militia forces also play an important role in deception and camouflage support for regular OPA units. The militia fields camouflage protection teams, which deploy decoys, provide camouflage support, and help execute displays, demonstrations, and ruses. These teams can also hide targets and frustrate enemy reconnaissance and targeting efforts by creating large smoke screens, which inhibit laser-guided weapons, and using balloons, which confuse enemy radar by deploying chaff.

8.74 Tasking militia units with deception and camouflage support has also helped the OPA to utilise civilian skills and commercial technologies. Camouflage protection teams draw members from high-tech industry within simulation technology. Such technologies help camouflage important targets such as oil depots, power plants, and bridges.

8.75 Other means of deception deployed on a domestic basis include disguising military cargo trains as civilian passenger trains.

8.76 On expeditionary operations, there is scope for deploying entire formations of fake troops drawn from OPA local militia, equipped with identical vehicles and weapon systems, to spurious locations on the battlefield in order to mask the actual Action element's movement.

Figure 8.24 – Example of an inflatable tank decoy

8.77 The OPA may place old and obsolete equipment in the open to distract enemy reconnaissance efforts, while real equipment is camouflaged and hidden in areas that are harder to observe, such as mountainous terrain and forests.

8.78 The OPA may use inflatable decoys to provide a visual indication of vehicle concentrations.

8.79 Decoys can be coated in materials that mimic armour plate, and also have plumbing to permit the flow of hot water through the decoy to simulate actual operating surface temperatures in order to spoof imaging and sensors commonly used in UAS.

Deception using EW

8.80 External to OPA Combat Engineers in C3D formations, the OPA also uses Electronic Warfare to provide deceptive signatures. For example, an EW unit can project the signature of an Engineer bridging formation at a spurious but plausible crossing point, while a physical OPA Combat Engineer Bridging unit is conducting an actual tactical crossing.

8.81 The use of EW for deception can be further examined in LNote 7.2.8 Olvanan Tactical Employment of Electronic Warfare.

Glossary

The source for approved Defence terms, definitions and abbreviations is the Australian Defence Glossary (ADG), available on the Defence Protected Network at http://adg.dpe.protected.mil.au/.

Term Definition

Abbreviations

Term	Definition
C3D	Camouflage, cover, concealment and deception
CA	Combined arms
CAB	Combined arms brigade
CAC	Combined arms company
CBRN	Chemical, biological, radiological and nuclear
CBRND	Chemical, biological, radiological and nuclear defense
CBT ENGR	Combat Engineer
CSS	Combat support services
DATE	Decisive Action Training Environment
DATE-IP	Decisive Action Training Environment Indo-Pacific
EM	Electromagnetic
EW	Electronic warfare
HET	Heavy equipment transport
IR	Infrared
MALE	Medium altitude long endurance
MUMCV	Multifunction unmanned mine clearance vehicle
OPA	Olvanan Peoples Army
ORBAT	Order of battle
RISTA	Reconnaissance, intelligence, surveillance and target acquisition
SPF	Special purpose forces
UAS	Unmanned [or uncrewed] Aerial System
UGV	Unmanned ground vehicle

Annex A

Tactical start state - Urban Breaching

1. An Olvanan formation has been tasked to neutralise a dispersed platoon-strength insurgent force, and to either seize or destroy a weapons cache situated in a small town.

2. The town consists of single to three storey buildings.

3. The town is normally occupied by around 3500 residents. The residents have been given 24hr notice to evacuate, and the notification period has lapsed three hours ago. Not all residents have evacuated, approximately one quarter of the population remains within the town.

4. The remaining personnel within the town are deemed combatants upon the lapsing of the notification period.

5. The town has one main supply route (MSR) through it with curves, corners and bends. There are several side streets.

6. There is a well-defined town centre with a business district, shops and markets. This is surrounded by residential districts. The “barrier” between the town and the surrounding region are lines of residential dwellings, the town covers an approximate area of 2.5 km x 4.5 km.

7. The town is surrounded on all sides by lightly vegetated semi-arid landscape which has a covering of hardy shrubs. Sparse unmarked and irregular four-wheel drive paths exist, however a two-wheel drive is almost certainly likely to become immobilised, by either being trapped in loose sand or ditches, struck by outcropping rocks or hardwood tree stumps or other vegetation within 500-800 m of traversal in any direction. Four-wheel drive and armoured military vehicles are able to traverse the terrain. Military support vehicles (4x4, 6x6, 8x8 wheeled trucks) can also travel over this terrain.

8. The terrain within the town is flat to gently sloping. The avenues are lined with low shrubs and some streets are lined with trees to a height of 4-6 m, the roads are paved with bitumen, drainage is good and there are council storm water drainage channels which are marked on local maps.

a. Observation and fields of fire: The main supply route through the town has straight, wide sections which permit long sight lines and provide fire lanes for small arms out to 500 m. Suburban streets are narrower and curve to give maximum straight line visibility of around 200-400 m.

b. Concealment & Cover: Concealment is provided by lines of buildings and low shrubs. There is no cover.

c. Obstacles: Obstacles are stormwater channels which are approximately 2 m wide which are cut through particular paths.

d. Key/ Decisive terrain: N/A

e. Avenues of approach: These lie on the Main Supply route, from the north and from the south-west.

9. Enemy: Intelligence reporting indicates the enemy is an insurgent formation consisting of multiple squads, occupying one site per squad, dispersed across the settlement. The Enemy squads are:

a. A command squad of four personnel,

b. An eight man multi-function direct action squad

c. A eight man communications squad and

d. A eight man logistics squad protecting a cache of mixed small arms, improvised explosive device components and short-range anti-armour weapons and ammunition for same.

10. Description

a. Size: 4-8 man teams totalling 27 personnel

b. Activity: Support to insurgent direct action multifunction cells operating in the surrounding countryside.

c. Location: As described, geographically dispersed by functional group. Intelligence reporting indicates that its estimates are accurate to approx. 100 m for the locations indicated.

d. Uniform: They are known to be dressed in tradesmens' attire - natural leather finish/ tan work boots, tan/khaki/dark trousers, dark collared shirts, reflective orange/ yellow safety jackets and hard hats in order to blend in and pass off as tradesmen, with the civilian populace. All elements of attire appear to be worn-in and shows signs of weathering and staining.

e. Tactics: Guerrilla tactics in line with their smaller numbers, and are proficient in infantry minor tactics, notably ambush and flanking attacks. The squads can concentrate to platoon sized within ten minutes.

f. Equipment:

i. Squads have 1-3 mobility assets (Toyota pick-up trucks, Hyundai sedans and Ford utility vans) depending on the role of the squad. None of these are four wheel drive.

ii. They are armed with a range of small arms (H&K G3, M-16A3, M203 40mm GLA, Carl Gustav M3 recoilless anti-armour and either PKM or MAG-58 sustained fire machineguns which can be mounted on the pick-up trucks).

iii. Communications equipment used is mobile phone.

g. Habits: Blend in with the local population, conduct support tasks to outlying insurgent cells to support extortion/ protection racketeering/ theft of crop harvests and livestock.

h. Intention: Likely to withdraw if engaged by a superior force.

i. Morale: Confident in their capability, and have successfully stayed below the perception of the towns populace as to its actual role and purpose.

11. This formation has:

a. No support from any external elements

b. No quick reaction force available and

c. No access to indirect fire support.

12. Unknowns:

a. Early warning systems or methods

b. Small UAS capability in terms of surveillance and/ or strike

c. Local HUMINT network.

13. If engaged:

a. The Most Likely Course of Action is that the Direct Action Multi-Function squad will create a diversion while the remaining squads exfiltrate the town along the main supply route.

b. the Most Decisive Course of Action is that the Direct Action Multi-Function and Communications squads will concentrate in defensive positions, trapping and striking as many assaulting vehicles as possible, creating an opportunity for the command and logistics squads to exfiltrate with the weapons cache along the main supply route.

14. Weather effects:

a. Temperatures forecast 7 – 21 C

b. Cloud cover 3/8

c. Rain forecast: 5% chance of 0-3 mm

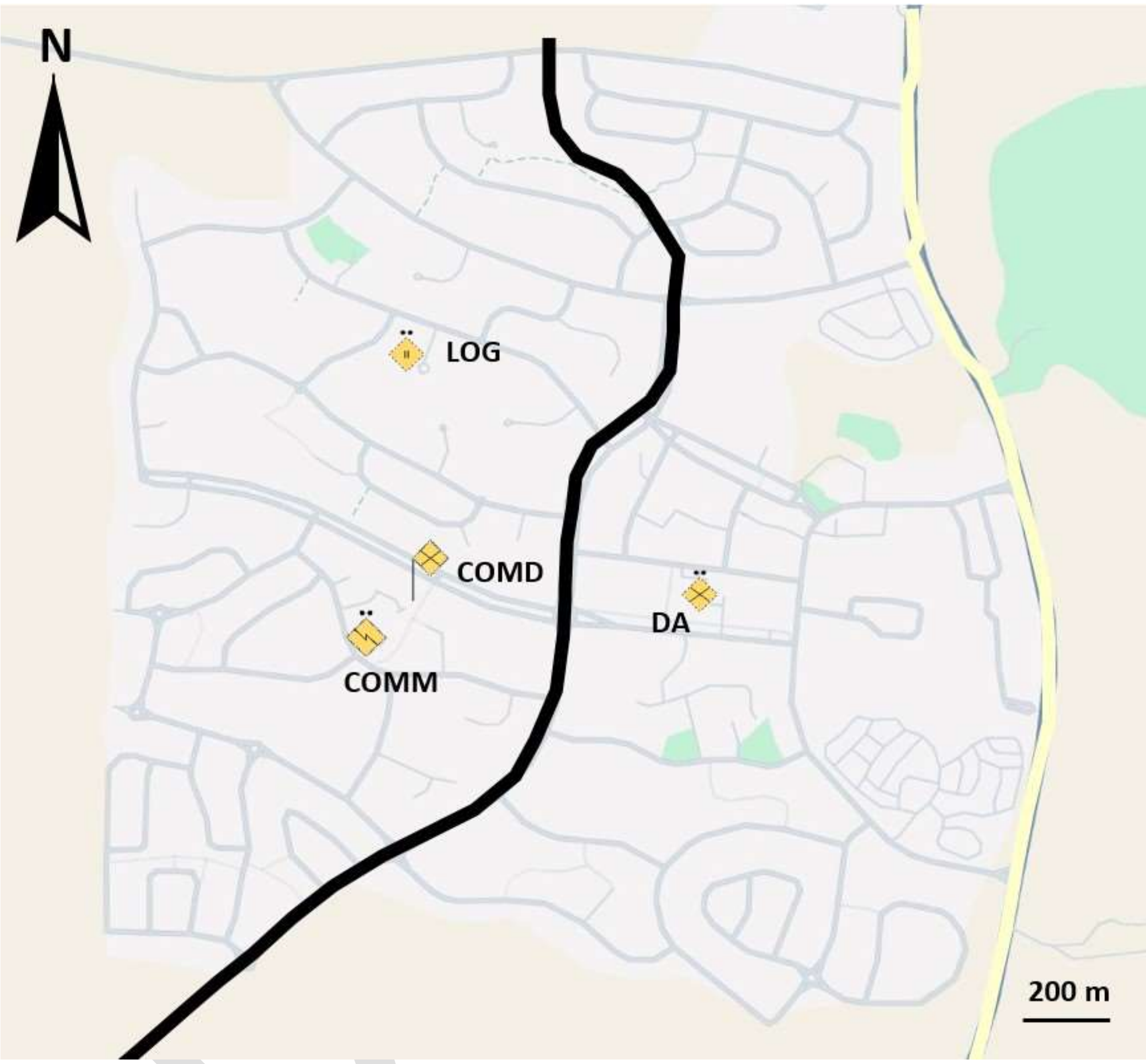
d. Wind: peaking at 15 km/h from NE

e. Humidity: 65%

f. Sunrise/ Sunset 0545/1812

g. Moonrise 20:05, Quarter moon.

Figure 1A-1 Intelligence reporting of enemy disposition



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Annex 2

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