UNITED STATES MARINE CORPS
THE BASIC SCHOOL
MARINE CORPS TRAINING COMMAND
CAMP BARRETT, VIRGINIA 22134-5019

ENGINEERING IN THE OFFENSE AND DEFENSE W3H0003XQ STUDENT HANDOUT

Engineering in the Offense and Defense

Introduction

A key aspect of battlefield victory is the ability to control the enemy by controlling the terrain. Simply “owning” the terrain will not suffice. It must be effectively prepared for offensive and defensive missions and improved as needed to sustain the free movement of friendly forces while impeding that of the enemy. Offensively, Combat Engineers search for and exploit the gaps found in the enemy’s defenses while, defensively, they continuously scrutinize and mitigate what gaps they may discover within their own.

Importance

This class will provide you with the necessary information to effectively employ engineering assets on the battlefield with regards to mobility, counter-mobility, survivability, and general engineering.

In This Lesson

We will discuss the capabilities and fundamentals of combat engineering in both the offensive and defensive roles.

This lesson covers the following topics:

Learning Objectives

Terminal Learning Objectives:
TBS-DEF-2203 Given a unit, a barrier plan, and materials needed to emplace obstacles, direct obstacle emplacement to support the scheme of maneuver.

TBS-OFF-1006 Given a tactical scenario, operations order with engineer support, employ engineers in support of offensive operations to accomplish the mission.

TBS-DEMO-1003 Given an M18A1 Claymore mine and sector of fire, while wearing a fighting load, emplace an M18A1 Claymore mine to cover a sector of fire without endangering friendly personnel or equipment.

Enabling Learning Objectives:
TBS-DEF-2203a Given an evaluation, identify the functional role of engineers in the defense without omission.

TBS-DEF-2203b Given an evaluation, identify obstacle tactical tasks without omission.

TBS-DEF-2203c Given a scenario including organic fires, commanders intent, and supporting direct and indirect fires and obstacles, apply fires and obstacles integration concepts in support of the ground scheme of maneuver.

TBS-DEF-2203d Given an evaluation, identify the steps to produce a barrier plan in sequence without omission.

TBS-DEF-2203e Given a scenario, identify types of wire obstacles without omission.

TBS-DEF-2203fGiven a mission, a commander's intent, and a combat engineer unit in direct support, assign defensive engineer tasking statements to accomplish the mission.

TBS-DEMO-1003a Given an evaluation, identify M18A1 Claymore mine components without omission.

TBS-DEMO-1003b Given a scenario, identify M18A1 Claymore mine initiation methods without omission.

TBS-DEMO-1003c Given a scenario, identify M18A1 Claymore blast area considerations without omission.

TBS-DEMO-1003d Given a scenario describing an emplaced Claymore mine and retained storage pouch, identify steps to recover and repack an M18A1 mine for future employment in sequence without omission.

TBS-DEMO-1003e Given an M18A1 Claymore mine, inspect a M18A1 Claymore mine to ensure it is complete and serviceable.

TBS-DEMO-1003f Given an SL-3 complete M18A1 Claymore mine, test M18A1 Claymore mine firing components to prevent misfire once emplaced.

Learning Objectives

TBS-DEMO-1003g Given a tactical situation including friendly positions, most likely enemy avenue of approach, and an SL-3 complete M18A1 Claymore mine, position an M18A1 Claymore to achieve desired effects on the enemy without endangering friendly personnel or equipment.

TBS-OFF-1001g Given an evaluation, identify capabilities of engineers in the offense to support mission accomplishment.

TBS-OFF-1001h Given an evaluation, identify the four functional areas of combat engineering without error.

TBS-OFF-1006a Given an evaluation, identify capabilities of engineers in the offense without omission.

TBS-OFF-1006b Given an evaluation, identify capabilities of the Bangalore Torpedo without omission.

TBS-OFF-1006c Given an evaluation, identify the characteristics of C-4 without omission.

TBS-OFF-1006d Given an evaluation, identify the characteristics of TNT without omission.

TBS-OFF-1006e Given an evaluation, identify the characteristics of detonation cord without omission.

TBS-OFF-1006f Given an evaluation, define the types of explosive charges without omission.

TBS-OFF-1006g Given a scenario, determine explosive charge preparation to support the scheme of maneuver.(TBS-OFF-1006g)

TBS-OFF-1006h Given an evaluation, identify the steps in non-electrical initiation without omission.

TBS-OFF-1006i Given an evaluation, identify the steps in electrical initiation without omission.

TBS-OFF-1006j Given a scenario, determine demolitions emplacement considerations to support the scheme of maneuver without endangering friendly personnel or equipment.

TBS-OFF-1006k Given a scenario, apply obstacle reduction concepts to support the scheme of maneuver.

Engineers in the Defense

"Everything that is shot or thrown at you or dropped on you in war is most unpleasant but, of all the horrible devices, the most terrifying ... is the landmine." --- Sir William Slim 1959

Engineer assets are generally centralized at the highest command level. Assignment of engineer forces and equipment in general support is desired to provide required technical skills and equipment beyond the capabilities of the supported unit and to ensure coordinated planning and logistics support. However, Engineers have the capability to operate in direct support or as attachments on small unit levels in order to accomplish the mission.

Combat Engineer Employment in the Defense

The primary role of engineers in defensive operations is to:

- Impede the mobility of the enemy.
- Field fortification.
- Provide general engineering tasks to amplify sustainability of supported unit.

Battlefield Functions in the Defense

Engineer battlefield functions in the defense are the same as in other military operations. Engineers perform the following battlefield functions:

- Mobility.
- Counter-Mobility.
- Survivability.
- General engineering.

Mobility

Mobility is a quality or capacity of military forces which permits them to move from place to place while retaining their primary mission. Mobility support assists forces to move rapidly, mass, disperse, and be resupplied. Engineers conduct the following mobility tasks in the defense:

- Prepare counterattack routes clear of obstacles and/or have prepared breaches.
- Prepare combat trails for counterattacks and lateral movement between battle positions.
- Prepare lanes and gaps through obstacle zones and belts.
- Reduce obstacles created by enemy fires and sabotage.

Clear landing zones for resupply and medical evacuations (MEDEVACs).

Engineers in the Defense (Continued)

Counter-Mobility

Counter-mobility is to delay, channel, or stop movement by the enemy in order to destroy its forces directly or indirectly by enhancing the effectiveness of friendly weapon systems.

The primary intent of counter-mobility operations is to deny the enemy's ability to execute his plan by:

- Disrupting his combat formations.
- Interfering with his command and control.
- Creating a vulnerability that friendly forces can exploit.

The secondary intent is to destroy or disable his vehicles. Engineers conduct the following counter mobility tasks in the defense:

- Development of the obstacle plan to support the maneuver commander's concept of operations.
- Assist in the installation and recording of minefields.
- Provide technical assistance and supervise the construction of specific obstacles.

Survivability

A key component of the defense, survivability includes all aspects of protecting personnel, weapons, and supplies. The objective of survivability is to reduce exposure to threat acquisition, targeting and engagement, and the effects of weather and thereby contribute to a successful defense. Depending on the priority of work and engineer assets available, engineers will provide technical assistance or assist in constructing:

- Fortifications
  - Anti-armor and crew-served weapons positions (hot and cold positions).
  - Armored vehicle positions (hull defilade vs. turret defilade).
  - Hardened command posts and combat support positions.
- Protective obstacles.
- Strong-points.
- Camouflage.
- Development of the deception plan.

Engineers in the Defense (Continued)

General Engineering

General engineering encompasses those engineer tasks that establish and maintain the infrastructure required to conduct and sustain military operations.

Engineers also conduct the following general engineering tasks in the defense:

- Maintain and improve lines of communication and main supply routes.
- Construct and repair support facilities.
- Store and dispense fuel and water.
- Construct airfields and aircraft support facilities.

Counter-Mobility Achieved Through Obstacle Construction

An obstacle is any obstruction that stops, delays, or restricts movement or maneuver. The two general categories of obstacles are:

- Existing.
- Reinforcing.

Existing Obstacles

Existing obstacle are those obstacles already present on the battlefield and not placed through military effort. They may be:

- Natural
  - Drainage features.
  - Soil trafficability.
  - Slope and relief.
  - Vegetation.
  - Climate and weather.

- Cultural
  - Cities/towns.
  - Dikes, dams, canals.
  - Drainage ditches, embankments, cuts, and fills.
  - Hedgerows and orchards.
  - Roads and railroads.

Engineers in the Defense (Continued)

The table below lists effectiveness criteria for existing obstacles. For reference purposes only.

Feature	Critical Value		Effect
Drainage (rivers and streams)	Width	>150 m	Major obstacle
	Depth	>1.5 m	
	Velocity	3.7 mps	
Ditch	Width	>2.8 m	Exceeds tank's self-bridging capability
	Depth	>1.5 m	Exceeds tank's ability to step
Dry gap	Width	>18 m	Exceeds most armored vehicle launch bridges (AVLBs)
Ford	Depth	>1.5 m	Cannot be forded without special equipment
Soil	Bearing pressure	<8 psi	Hinders tracked and wheeled vehicle movement
	Soil type and moisture		Affect trafficability
Slope	30 %		Stops most wheeled movement
	45%		Delays most tank movement
	60%		Stops tank movement
Vegetation	Tree diameter	20.5 cm	Stops wheeled vehicles Delays tracked vehicles
	With tree spacing	3 to 5 m	Delays tracked and wheeled vehicles

Notes:

1. Many terrain features can significantly slow cross-country movement even though they may not stop an individual tank. Examples of such features are ditches narrower than 2.5 m, stone walls, trees spaced closer than 25 cm, and slopes less than 45 percent.
2. The combined effect of two or more factors can create a significant obstacle at a lower value. For example, even a slight uphill slope will stop a tank from pushing over trees smaller in diameter than 25 centimeters.

Reinforcing Obstacles Reinforcing obstacles are those obstacles placed on the battlefield through military effort, which are designed to extend or improve the effectiveness of existing obstacles. A reinforcing obstacle must force the enemy to react, thereby influencing his scheme of maneuver (SOM). Reinforcing obstacles are an integral part of the defensive scheme of maneuver (DSOM). The five types of reinforcing obstacles are: constructed, demolitions, mines/minefields, contamination, and expedient.

Engineers in the Defense (Continued)

Reinforcing Obstacles (Continued)

- Constructed: built by Marines and equipment, normally without the use of explosives. Generally, constructed obstacles require extensive manpower, material, equipment, and/or time. Examples include:
  - Log cribs.
  - Hedgehogs.
  - Concrete blocks.
  - Tank ditches.
- Demolitions: created by the detonation of explosives. Examples include:
  - Road craters.
  - Abatis.
  - Landslides.
- Mines/Minefields: the only reinforcing obstacle capable of killing or destroying enemy personnel and equipment.
- Contamination: nuclear or chemical in nature.
- Expedient: The potential of expedient obstacles is unlimited. By their nature, expedient obstacles substitute locally available materials and manpower for a logistical requirement.

Principles of Obstacle Employment

A commander has several options in organizing the defense. He plans his defensive scheme based upon his mission analysis and situational estimate (METT-T). Organizing the defense must be carefully matched to the terrain.

As the principal element in reinforcing the terrain to best complement the maneuver commander's plan, the engineer is responsible for developing the obstacle plan. The use of reinforcing obstacles is the principal method of terrain reinforcement (see following table). Obstacles have three primary purposes:

- Enhance the effectiveness of friendly fires.
- Delay the enemy's advance, upset his timing, disrupt and canalize his formations into designated engagement areas, and delay or destroy follow-on echelons.
- Enhance friendly economy of force measures.

Engineers in the Defense (Continued)

The table below lists examples of existing and reinforcing obstacles. For reference purposes only.

Existing Obstacles		Reinforcing Obstacles
Natural	Cultural	
Drainage Features • Lakes, ponds, rivers, and streams • Swamps, marshes, bogs	• Man-made lakes, ponds, and canals • Paddy fields	Blowing dams or dikes to create flooded areas
Soil and Rock • Soft, slippery ground, cliffs, and outcrops • Boulders	• Soft farmland • Quarries, cuts in rock • Pits and open-pit mines	Craters
Surface Features Slopes, hills, cliffs, and mountains	• Embankments, cuts and fills on roads and railroads • Terraces and dams	Craters, ditches, and cuts on slopes
Vegetation Forests, jungle	Cultivated or seeded forests, orchards, and hedgerows	Abatis
Built-Up Areas	Buildings, towns, fences, and retaining walls	Demolished buildings, rubble, and wire obstacles
Other: War damage, rubble, fires, snow, and ice		• Demolitions • Mines/minefields • Contamination

Engineers in the Defense (Continued)

Employment Principles of Reinforcing Obstacles

"FOCDPIG" Regardless of the type of defense employed by the tactical commander, the seven basic employment principles for reinforcing obstacles are that reinforcing obstacles are:

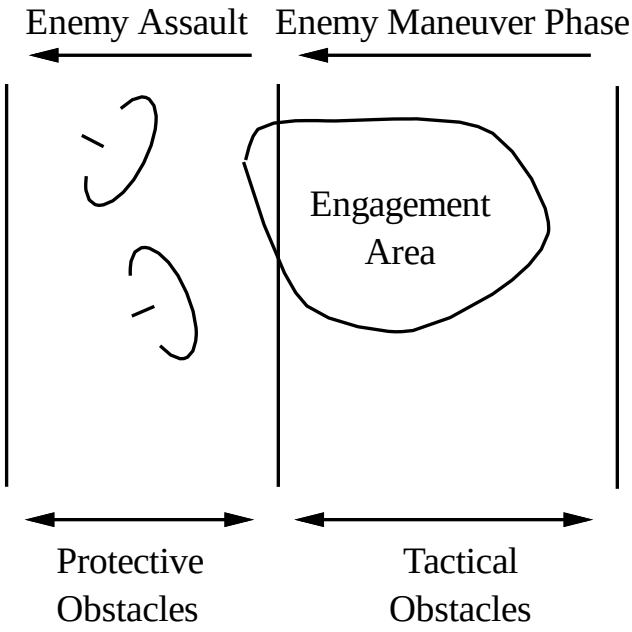
- Covered by **F**ire. The principal purpose of integrating obstacle location with fire is to enhance the effectiveness of these fires. *With rare exceptions, obstacles that are not covered by fire are little more than a nuisance to the enemy.*
- **O**bserved. It is imperative that all reinforcing obstacles are observed in order to maximize the use of available indirect fires on the enemy. In addition, obstacles should be placed in order to maximize the max effective range of various heavy, medium, and light direct fire weapons systems.
- **C**oncealed and employed for surprise. By varying the type, design, and location of the obstacle plan, the enemy's understanding of our defensive scheme is made more difficult.
- Employed in **D**epth. A series of simple obstacles arranged one behind the other along a probable axis of enemy advance is far more effective than one large, elaborate obstacle and forces the enemy to quickly attrite his organic engineering assets.
- **P**rotected by early warning and anti-handling devices. Incorporating these assets into reinforcing obstacles amplify detection of the enemy especially during times of little or no visibility.
- **I**ntegrated with existing and other reinforcing obstacles that cannot be easily bypassed. It must support the maneuver commander's plan. Reinforcing obstacles that do not accomplish one or more of the basic purposes of obstacles are of little value. Reinforcing obstacles must be planned and employed to support the tactical plan
- Non-**G**eometric. By breaking up the outline of the obstacles/defense, the enemy is in the engagement area before he realizes it. This puts the enemy into a dilemma and makes him show his flank or belly.

Engineers in the Defense (Continued)

Obstacle Types

Obstacles are classified as either:

- Protective.
- Tactical.



Obstacle Types by Battlefield Purpose

Protective Obstacles

Protective obstacles are those obstacles employed to protect the defending force from the enemy's final assault; as such, they are key components of survivability operations. Protective obstacles are:

- Close to defensive positions.
- Tied in with the final protective fire (FPF) of the defending unit.
- Emplaced by units normally without the engineers' assistance.

Protective obstacles are normally wire entanglements and/ or hasty protective minefields.

Engineers in the Defense (Continued)

Wire Entanglements

Tactical. Tactical wire entanglements are used to turn, fix, disrupt, or block formations well forward of the final protective line (FPL) to draw the enemy into planned engagement areas. Tactical wire is:

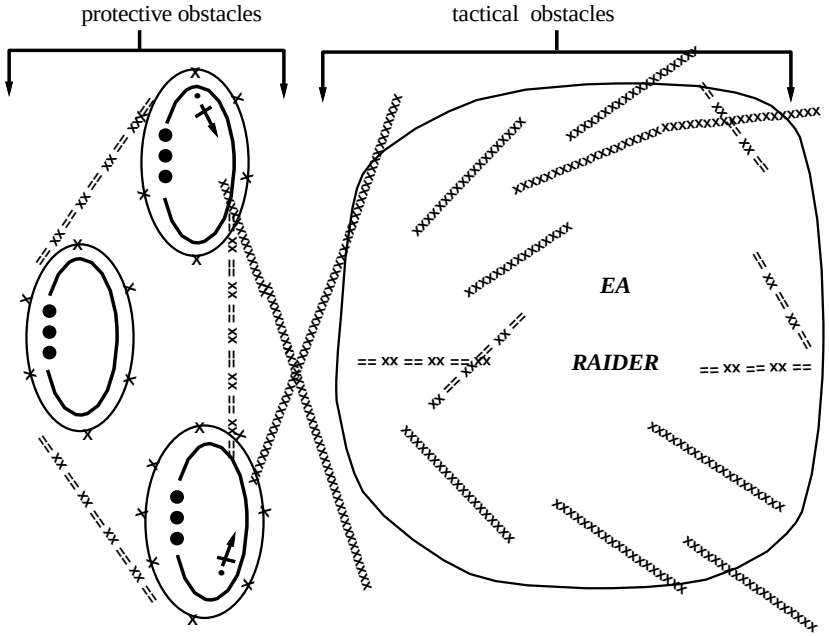
- Also sited parallel to and along the friendly side of the machine gun FPL.
- Used to influence the enemy's SOM.

Tactical entanglements extend across the entire front of a position but are not necessarily continuous.

Protective. Protective wire entanglements are located to prevent surprise assaults from points close to the defensive position. As in the case of all antipersonnel obstacles, protective wire entanglements are close enough to the defensive position for day and night observation but are beyond hand grenade range.

Supplementary. Supplementary wire entanglements in front of the forward edge of the battle position are used to conceal the exact line of the tactical wire. To the rear of the forward positions, supplementary wire is used to enclose the entire defensive position by connecting the protective wire entanglements.

Legend for diagram:
XXXXXXX = Tactical wire
= = XX = = XX = Supplementary wire
~~X X X~~ = Protective wire



Layout of Wire Obstacles in a Defensive Perimeter

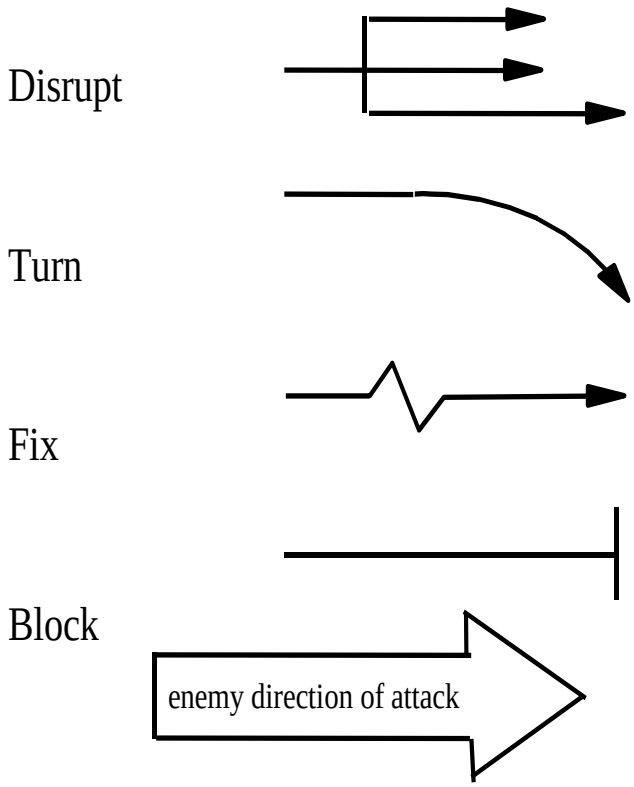
Engineers in the Defense (Continued)

Tactical Obstacles

Tactical obstacles are those obstacles that directly affect the enemy's ability to maneuver in a way that gives the defending force a positional advantage. Tactical obstacles are designed, sited, emplaced, and integrated with fires to produce four specific tactical obstacle effects:

- Disrupt.
- Turn.
- Fix.
- Block.

Each obstacle effect has a specific impact on the enemy's ability to maneuver, mass, and reinforce. Obstacles also increase the enemy's vulnerability to friendly fires. Obstacle effects support the friendly scheme of maneuver by manipulating the enemy in a way that is critical to the commander's intent and scheme of maneuver. The diagram below shows the operational symbols for tactical obstacles.



Operational Symbols for Tactical Obstacles

Engineers in the Defense (Continued)

Disrupt

Disrupt effect:

- Breaks up the enemy's formations
- Causes premature commitment of breach assets
- Interrupts command and control
- Counters the enemy's initiative and synchronization to hinder him from concentrating combat power, causing a piecemeal commitment of attacking units

Turn

A turn effect manipulates the enemy's maneuver in a desired direction:

- First the obstacle must have a subtle orientation to entice the enemy to maneuver rather than breach the obstacle.
- Second, the bypass must be easily detected to entice the enemy to it.

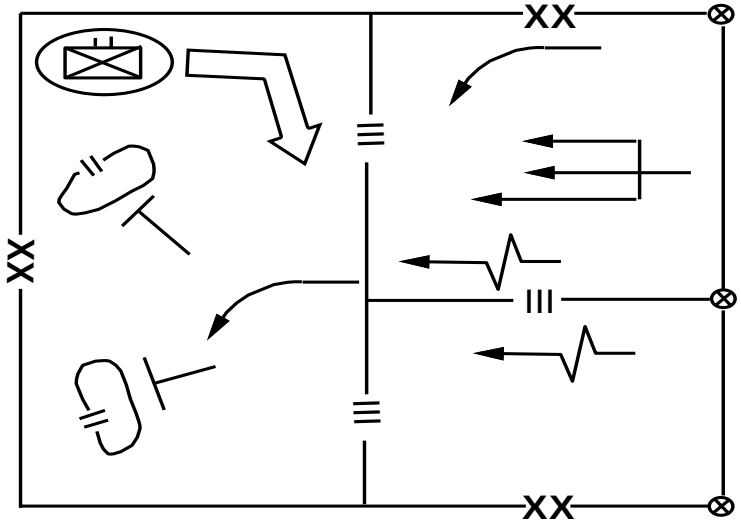
Fix

A fix effect slows the enemy within a specified area so that he can be killed with fires. The term does not mean to stop an enemy advance but rather to give the defender time to acquire, target, and destroy the attacking enemy throughout the depth of an engagement area or avenue of approach.

Block

A block effect is designed to stop an enemy's advance along a specific avenue of approach or allow him to advance at an extremely high cost. Blocking obstacles are complex and integrated with intense fires.

Example of Engagement Area Using Tactical Obstacles



Engineers in the Defense (Continued)

Obstacle Plan

An obstacle plan is a comprehensive, coordinated plan which integrates the use of tactical and protective obstacles to support a scheme of maneuver. The obstacle plan designates the following:

- Obstacle responsibilities.
- General location.
- Directed/reserve obstacles.
- Special instructions.

The obstacle plan is briefed in detail within the combat order.

Obstacle Planning Sequence

1. Conduct the METT-TC, mission analysis.

2. Analyze avenues of approach.

3. Analyze engagement areas, battle positions, and weapons types and locations.

4. Determine desired effects on enemy maneuver (obstacle intent)
   a. Target – enemy size and type
   b. Effect – on enemy scheme of maneuver
   c. Relative location – in relation to friendly maneuver and fire control measures.

5. Determine obstacle locations and types (match obstacle effect to obstacle intent).

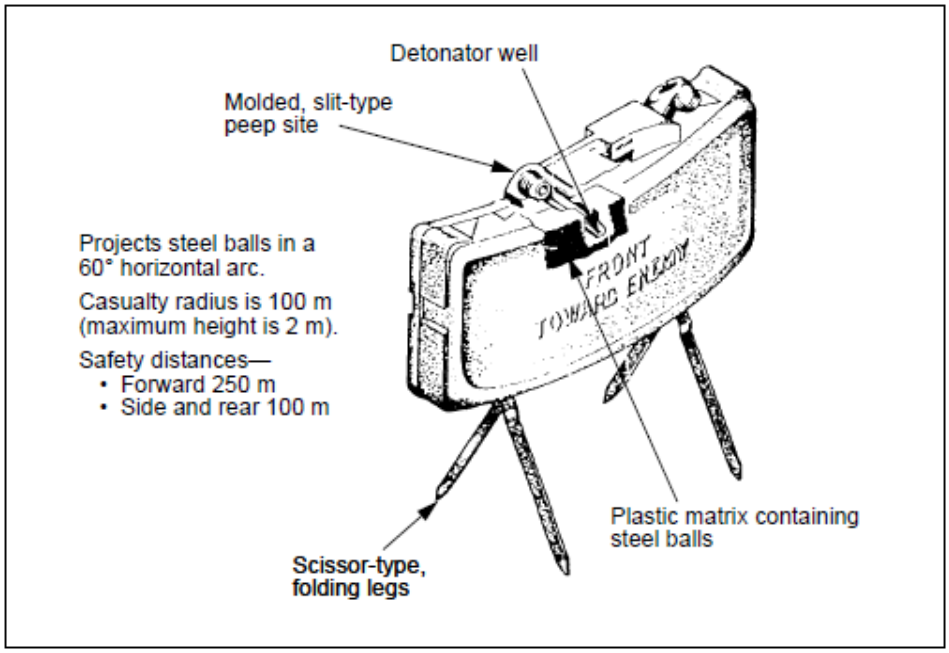
6. Determine commander's obstacle priorities, resources, and actual work sequence.

Commander Responsibilities

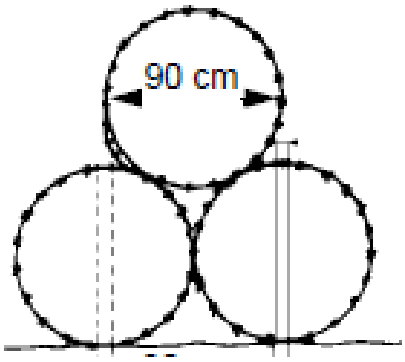
Develop and brief a tasking statement specific for the engineers – covers intent, guidance, and prioritization.
Specific order recommendations:
List of obstacle priorities
Obstacle layout diagramed on the terrain model.
Obstacle emplacement in the Troop to Task Matrix – including personnel for both emplacement and security.

During the mission: obstacle tracking (marking, reporting, recording) and continuously assess counter-mobility requirements based on current and future enemy threats.

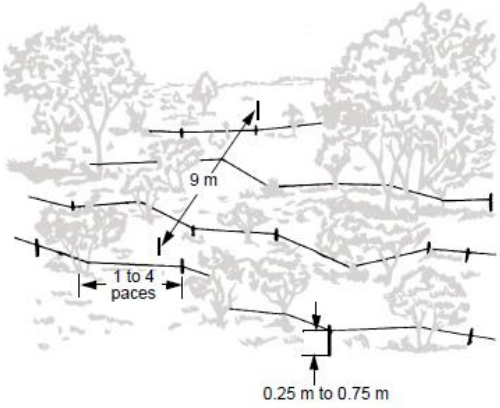
M18A1 Claymore The M18A1 claymore munition is a fragmentation munition that contains 700 steel balls and 682 grams of composition C4 explosive. It weighs 1.6 kilograms and can be detonated by command (By trip wire in Korea only).



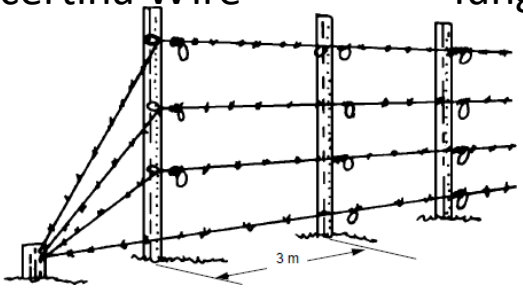
In-Class Decision Making Exercise (DMX) Reference – Obstacle Options



Triple-Standard Concertina Wire

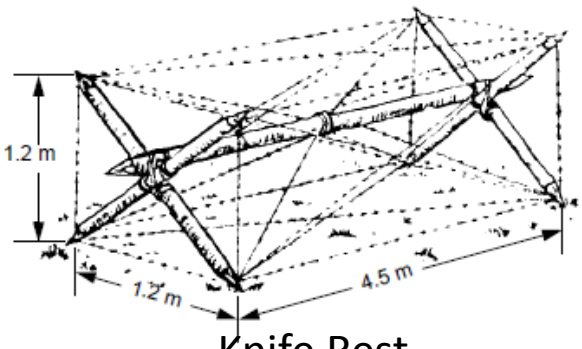


Tanglefoot

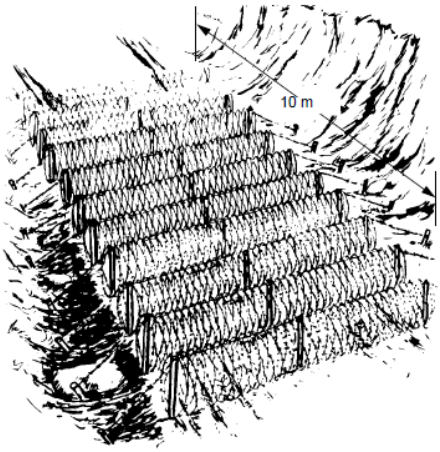


Four Strand Cattle Fence

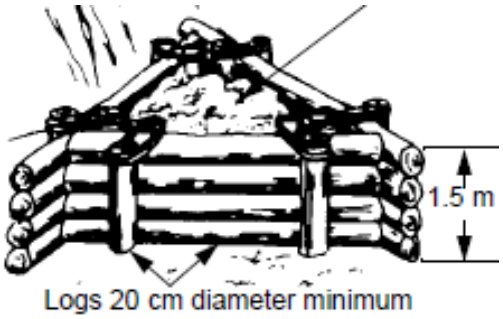
In-Class DMX Reference – Obstacle Options cont.



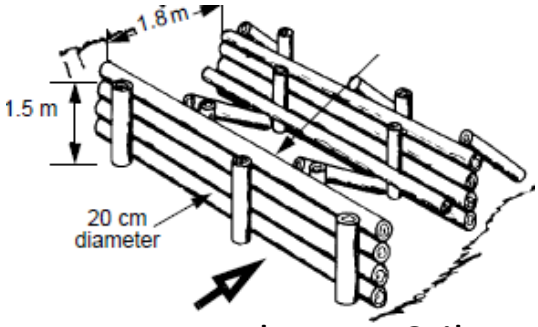
Knife Rest



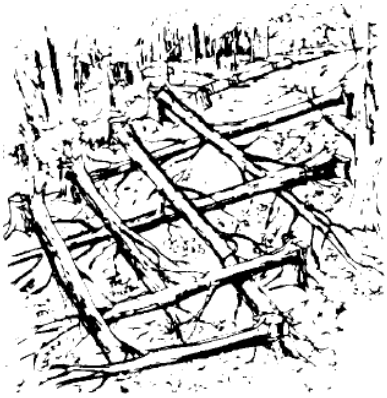
Eleven-Row Wire Obstacle



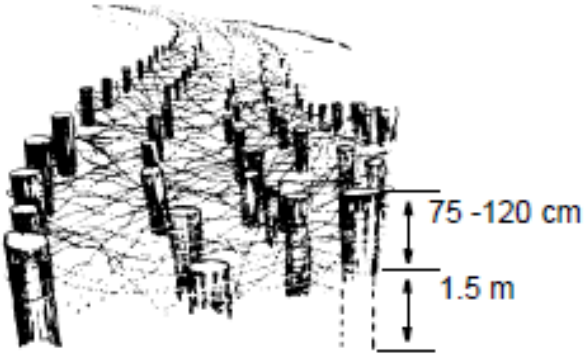
Triangular Log Crib



Rectangular Log Crib



Abatis



Post Obstacles

Engineers in the Offense

"While riflemen and machine gunners opened a rain of fire against the strongpoint's firing ports, this small band raced across the sand and up the steep slope. The Japanese knew they were in great danger. Scores of them poured out of a rear entrance to attack the Marines on top. Bonnyman stepped forward, emptied his carbine into the onrushing Japanese, then charred them with a flame-thrower. He was shot dead; his body rolling down the slope, but his men were inspired to overcome the Japanese counterattack. The surviving engineers rushed to place explosives against the rear entrances."

--- Across the Reef: The Marine Assault of Tarawa

In offensive operations, engineers normally work and fight well forward with the maneuver elements as an integral part of the combined arms team. Decentralization of control is required to provide necessary close engineer support to forward elements in offensive operations. Therefore, combat engineers are best employed in direct support roles with attachment of appropriate engineer elements to specific supported units as dictated by mission.

The combat engineer squad is the smallest unit assigned direct support missions and must be at least as mobile and survivable as the unit they are supporting.

Combat Engineer Employment in the Offense

The primary role of engineers in offensive operations are to:

- Ensure uninterrupted movement of friendly forces maintaining momentum of the attack.
- Provide flexibility to the supported maneuver unit.
- Degrade the enemy's ability to maneuver.

Battlefield Functions in the Offense

Engineer battlefield functions in the offense are the same as in other military operations. Engineers perform the following battlefield functions:

- Mobility.
- Counter-Mobility.
- Survivability
- General Engineering.

Engineers in the Offense (Continued)

Mobility

Mobility is the key to successful offensive operations. Its major focus is to enable friendly forces to maneuver freely on the battlefield. Mobility missions in the offense are:

- Engineer reconnaissance. Often necessary for reliable mobility information about the area over which the force is planning to advance. This reconnaissance *must* be made prior to friendly movement, since the information gained provides a basis for the estimate of engineer personnel, supplies, and equipment necessary to support the operation as well as the ability of the force to move in a certain area.

- Expedient/hasty road repair. Repair of minor combat damage to existing combat roads and trails. Follow-on forces in a general engineering role would handle extensive damage.

- River crossings. River crossings are among the most critical, complex, and vulnerable combined arms operations. River crossings will be conducted using assault or standard bridging equipment.

- Construction of landing zones (LZs)/forward arming and refueling points (FARPS). Helicopter-borne operations will require combat engineer support to clear landing zones and to construct FARPs.

- Construction and maintenance of expeditionary airfields. Engineers are organized and equipped to construct, repair, and maintain expeditionary airfields. They are equipped to construct these airfields in locations such as abandoned or existing airfields, highways, or reasonably level terrain with suitable soil conditions that require a minimum of construction effort.

- Obstacle breaching. The most recognized mission of engineers in the mobility functional role. Engineer support is needed to breach an obstacle any time a maneuver unit cannot by itself overcome an obstacle without affecting forward momentum.

Engineers in the Offense (Continued)

Counter-Mobility

While mobility of the force is the first priority in offensive operations, counter-mobility operations are vital to help isolate the battlefield and protect the attacking force from enemy counterattacks. Obstacles will be used in offensive operations to:

- Block or inhibit enemy movement. Obstacles can:
  - Help secure the flanks and rear of the attacking force during the initial phases of the attack.
  - Also impede enemy counterattacks by preventing the enemy from reinforcing weak areas under attack and denying the use of critical routes.
- Concentrate combat power. Obstacles enable friendly forces to control or defend an area with fewer men and assets (economy of force), thus making more combat power available for the main effort (ME).

Obstacle employment must be coordinated to prevent any interference with mobility requirements of the attacking force.

Survivability

During offensive operations, use of multiple routes, dispersion, highly mobile forces, and wise use of terrain are the best ways to ensure survivability. In addition, the use of protective measures decreases the lethality of enemy firepower. Engineer expertise, manpower, material, and equipment assist units to improve survivability through:

- Construction of fighting and protective positions. Whenever maneuver units halt, engineers build and improve as many protective positions as possible. These positions should be constructed expediently and utilize existing terrain when possible.

Assistance in camouflage and deception. Engineers install phony equipment and emplace phony minefields as part of a unit's camouflage and deception plan. Observation of both engineer equipment and work transmits a specific message of built up activity to the enemy, thereby contributing to the false intelligence picture.

Engineers in the Offense (Continued)

General Engineering

During offensive operations, the focus of general engineering is the sustainability of the force, ensuring that combat support and combat service support functions are able to remain as close as possible to maneuver units by:

- Replacing assault and tactical bridging with semi permanent fixed bridging.
- Improving and maintaining lines of communication (LOC) and main supply routes (MSRs).
- Constructing support facilities.
- Constructing forward airfields and airfield support facilities.
- Clearing minefields and other obstacles.

Engineer Reconnaissance

Engineers have specialized capabilities to collect technical information that complements the force's overall reconnaissance effort. These include but are not limited to; fords, rivers, roads, routes, bridges, tunnels, and obstacles.

Expedient/Hasty Road Repair

Normally considered a general engineering task and performed by engineering support units. However, constrictions may require forward combat engineer units to perform these functions in an expedient manner.

River Crossing

Engineers aid gap crossing through the employment of their heavy equipment to modify gaps and through expedient bridging. Examples included the Armored Vehicle Launched Bridge, Medium Girder Bridge, and Improved Ribbon Bridge.

Construction of LZs and Expeditionary Airfields

Creating expeditionary landing zones and/or drop zones can increase the speed and tempo of operations by decreasing the turn-around time for aircraft or response times of close-air support missions.

Engineers in the Offense (Continued)

Mobility Through Obstacle Breaching

Obstacle breaching is the employment of a combination of tactics and techniques to project combat power to the far side of an obstacle. Breaching is a synchronized combined arms operation under the control of the maneuver commander. To understand breaching theory and breaching tactics requires knowledge of key terms defined in the table below.

Key Term	Definition
Obstacle reduction	The physical creation of a lane through or over an obstacle. The lane can be created by making or finding a way through the obstacle.
Obstacle clearing	The total elimination or neutralization of an obstacle. Clearing operations are not conducted under fire and are usually conducted by follow-on engineer forces.
Proofing	Verifying that a lane is free of mines by passing a mine roller or other mine-resistant vehicle through as the lead vehicle. Proofing should be done when time, threat, and mission allow.
Marking`	A good marking system allows a force to quickly pass through a breached lane thereby maintaining momentum, giving confidence in the safety of the lane, and helping to prevent casualties.
“Bulling through”	Not a breaching operation, but a desperate decision made when a commander must react immediately to extricate his force from an untenable position within an obstacle and no other breaching operations are possible.
Bypass	A route that avoids the obstacle. When a unit bypasses an obstacle, it physically changes its direction of movement to avoid the obstacle.

Engineers in the Offense (Continued)

Breaching Tenets

Successful breaching operations are characterized by application of the following breaching tenets:

- Intelligence.
- Breaching fundamentals.
- Breaching organization.
- Mass.
- Synchronization.

Which can be abbreviated with the acronym – IFOMS.

Intelligence

A commander needs to "see the battlefield" to be successful. In operations where enemy obstacles can interfere with friendly maneuver, obstacle intelligence (OBSINTEL) becomes a priority. As the experts on obstacles, combat engineers should be incorporated with other human intelligence gathering forces to conduct engineer (obstacle) reconnaissance.

Specific OBSINTEL requirements include:

- Obstacle location.
- Obstacle orientation.
- Presence of wire.
- Gaps and bypasses.
- Minefield composition:
  - Conventional or scatterable.
  - Types of mines.
  - Depth.
  - Anti-handling devices.
- Location of enemy direct-fire weapons.

Engineers in the Offense (Continued)

Breaching Fundamentals

The breaching fundamentals are the actions that must be applied to ensure success when breaching against a defending enemy. SOSRA is the acronym for breaching fundamentals, which are to:

- **S**uppress. Suppression is the focus of all available direct and indirect fires on enemy personnel, weapons, or equipment to prevent effective fires on friendly forces. The purpose of suppression is to protect forces reducing and maneuvering through the obstacle and to soften the initial foothold. Suppressive fires in sufficient volume, a 3:1 minimum ratio, serve to isolate the breach site.

- **O**bscure. Obscuration hampers enemy observation and target acquisition and conceals friendly activities and movement. It may be employed to protect obstacle reduction, passage of assault forces and deployment of forces in assault formations.

- **S**ecure. The force secures the breaching site to prevent the enemy from interfering with obstacle reduction and passage of the assault force through the lanes created. Identifying the extent of enemy defenses is critical before selecting the appropriate technique to secure the breach. In general, enemy tactical obstacles are secured by fire and protective obstacles are secured by force.

- **R**educe. Once the other breaching fundamentals have been applied and become effective, obstacle reduction to create lanes through or over the obstacle begin. The number and width of lanes varies with the situation and type of breaching operation. The lanes must be sufficient to allow the force to cross and accomplish the mission.

- **A**ssault. A breaching operation is complete when the attacking force has assaulted through the obstacle and seized the far side objective, and eliminated enemy direct and indirect fires on the reduction area; and battle handover (if planned) with follow on forces has occurred.

Breaching Organization

The commander organizes the force with the necessary assets to accomplish SOSRA breaching fundamentals quickly and effectively.

Engineers in the Offense (Continued)

Breaching Organization (Continued)

- Support force. The support force's primary responsibility is to eliminate the enemy's ability to interfere with the breaching operation. Suppression is critical for a successful breach; therefore, the first priority of force allocation is the support force. A ratio of 3:1 against the enemy in direct and indirect weapons is generally required for a deliberate breach. For a hasty breach, a ratio of 2.5:1 is required. The support force is responsible for:
  - Isolating the battlefield with fires and suppressing enemy fires covering the obstacle.
  - Massing direct and indirect fires to fix the enemy in position and to destroy any weapons that are able to bring fires on the breaching force.
  - Control obscuring smoke to prevent enemy-observed direct and indirect fires.

- Breach force. The breach force's primary mission is to reduce the obstacle and facilitate the passage of the assault force by creating, proofing, and marking lanes. The breach force is a combined arms force of engineers, breaching assets, and enough maneuver force to provide local security. It is broken down into two elements; Security and Reduction. The security element is primarily maneuver forces and is normally responsible for providing additional suppression, obscuration, and local security. The reduction element is comprised of the reduction assets. The breach force must be capable of creating a minimum of one lane for each assault company or two lanes for a mechanized task force. Ideally, the breach force wants a minimum 50 percent redundancy in its equipment and organization to account for the heavy casualties that are usually expected in breaching operations. After reducing the obstacle, the breach force may be required to secure a lodgment on the far side for deployment of the assault force into an assault formation.

- Assault force. The assault force's primary mission is to destroy or dislodge the enemy from the far side of the obstacle; it secures the far side of the obstacle by physical occupation. The assault force must be sufficient in size to seize objectives that eliminate fires on the breaching site. Combat power is allocated to the assault force to achieve a 3:1 ratio on the assault objective.

Engineers in the Offense (Continued)

Mass

Breaching is conducted by rapidly applying concentrated force at a point or place to crack the obstacle and rupture the defense. Massed combat power is directed against an enemy weakness. Achieving necessary mass for the assault requires the breach force to open enough lanes through the obstacle to permit rapid passage and the built-up of forces on the far side.

Synchronization

Breaching operations require precise synchronization of the SOSRA breaching fundamentals by support, breach, and assault forces. Failure to synchronize effective suppression and obstruction with the obstacle reduction and assault can result in rapid, devastating losses of friendly troops in the obstacle or in the enemy's kill zone.

Breaching Operations

Breaching operations make maneuver possible in the face of enemy obstacle efforts. Since obstacles may be encountered anywhere, maneuver forces integrate breaching operations into all movement plans. The different types of breaching operations possible are In-stride and Deliberate breaches.

- In-Stride Breach. Maneuver units use in-stride breach to quickly overcome unexpected or lightly defended tactical obstacles. In-stride is:
    - An extremely rapid technique using standard actions on contact to seize and maintain the initiative
    - A decentralized, independent breaching operation that relies on well-rehearsed immediate action drills

The commander planning for an in-stride breach must consider missions for his maneuver and engineer forces that allow quick transition to a deliberate breach should attempts at an in-stride breach fail. A commander is driven to organize his force for an in-stride breach when:

- An unclear situation makes it necessary for several lead subordinate units to be capable of independent breaching operations to accomplish the mission.
- The enemy defense is so weak that the forces necessary to support, breach, and assault can be reasonably task organized into a subordinate unit and do not require the maneuver of other subordinate units to adequately suppress, secure, or reduce the obstacle.

Engineers in the Offense (Continued)

Breaching Operations (Continued)

- Deliberate Breach. A deliberate breach is a scheme of maneuver specifically designed to cross an obstacle to continue the mission. Characterized by thorough reconnaissance, detailed planning, extensive preparations, and explicit rehearsals, the deliberate breach is centrally planned and executed. Units conduct a deliberate breach when:
  - The unit fails an attempted in-stride breach of enemy tactical obstacles.
  - Force allocation ratios indicate that a confirmed enemy situation is beyond the capabilities of a subordinate unit.

Obstacle Reduction Techniques

Obstacle reduction techniques are the means by which lanes are created during breaching operations. Breach forces will seldom employ only one technique against any single obstacle. The techniques are:

- Mechanical. Involve the use of mine plows, mine rollers, bulldozers, bridging equipment, fascines, or any other heavy equipment assets.
- Explosive. Use the overpressure produced by the detonation of the explosives to activate single-impulse mines. Explosive means include both mounted and hand-emplaced explosive techniques

Mounted systems include the M58 mine-clearing line charge (MICLIC) or the Mk1 triple-shot Amphibious Assault Vehicle (AAV), which consists of three MICLICs mounted in the rear of the AAV.

Manual systems are the Bangalore torpedo, the APOBS (antipersonnel obstacle breaching system), and any other type of hand-emplaced explosive charge such as detonation cord, C4, and to a lesser extent TNT. These charges can be detonated by non-electrical and/or electrical initiation systems.

Additionally, fuel air explosives (FAE) delivered by aircraft or artillery can also be used against minefields.

- Manual. Include probing, grappling hooks, bolt cutters, assault ladders, and any other expedient method that may be used to breach the obstacle.
- Electronic. Through the use of mine detectors.

Engineers in the Offense (Continued)

Steps for Conducting a Breach

A sample execution matrix for a Marine Air-Ground Task Force (MAGTF) conducting a deliberate breach is provided in the table below.

Step	Action	Element	Remarks
1	Indirect fire and offensive air support provide suppression.	Support force	Ground units within support force move to overwatch positions.
2	Ground units in support force provide direct suppressive fire.	Support force	
3	Breach and assault forces move into position.	• Breach force • Assault force	Breach and assault forces prepare to execute tasks.
4	Smoke obscures enemy view of breach site.	Support force	
5	Obstacles are reduced and cleared lanes are marked.	Breach force	
6	Suppressive fire shifts beyond objective.	Support force	Coordinated with assault force.
7	Assault force attacks through breached lane.	Assault force	
8	Breached lanes handed off to follow-on forces.	Breach force	Can also be done by support force.
9	Resupply.	As required	
10	Reorganize to continue mission	As required	

Summary

During most offensive operations, demand for combat engineer support will exceed available resources. Maneuver commanders, with the advice of their engineer commanders, must prioritize the engineer effort. Combat engineer support, like other ground support assets, is task-organized in response to the anticipated threat and mission of the supported unit.

References

Reference Number or Author	Reference Title
FM 23-23	Antipersonnel Mine M18A1 Claymore
FM 5-102	Countermobility
MCWP 3-17	Engineer Operations
FM 5-34/MCRP 3-17A	Engineering Field Data
FM 5-100	Engineering in Combat Operations
FM 5-250	Explosives and Demolitions
JP 3-06	Joint Urban Operations
MCWP 3-11.2	Marine Rifle Squad
FM 20-32	Mine/Countermine Operations
FM 5-101	Mobility
FM 5-103	Survivability

Glossary of Terms and Acronyms

Term or Acronym	Definition or Identification
AAV	Amphibious Assault Vehicle
APOBS	Anti-personnel obstacle breaching system
AVLB	Armored vehicle launch bridge
DSOM	Defensive scheme of maneuver
FAE	Fuel air explosives
FARPS	Forward arming and refueling points
FASCAM	Family of area scatterable mines
FOCDPIG	Acronym to help recall the employment principles of re-enforcing obstacles: Fire, Observed, Concealed, Depth, Protected, Integrated, and Geometric
FPF	Final protective fire
FPL	Final protective line
HPMF	Hasty protective minefield
LOC	Lines of communication
LZ	Landing zone
MAGTF	Marine Air-Ground Task Force
ME	Main effort
MEDEVAC	Medical Evacuations
METT-T	Mission, Enemy, Terrain and weather, Troops ad support available – Time available
MICLIC	Mine clearing line charge
MSR	Main supply route
OBSINTEL	Obstacle Intelligence
PDD	Presidential Decision Directive
SFF	Self-forging fragment
SOM	Scheme of maneuver
SOSRA	Acronym to help recall the fundamentals of obstacle breaching: Suppress, Obscure, Secure, Reduce, and Assault

Notes