

CONSIDERATIONS CONCERNING FIGHTING ACTIONS IN THE SUBTERRANEAN ENVIRONMENT

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Abstract: *The topic addressed in this article is a current, highly discussed one and modern armies carry out numerous analyzes and make diverse comments on this issue. In this article, the author presents the general framework of operations in the subterranean environment and, based on the operational requirements necessary for conducting such operations, analyzes the perspectives that such operations have in urban operations and suggests directions of action needed to train forces. A separate analysis is performed on how the light infantry subunits from the Romanian Army should be equipped and prepared to deal with this kind of threats / requirements in accordance with the current acceptance of the phrase “Train as you fight.”*

Keywords: urban operations, subterranean operations, instruction

1. Introduction

The era of urban warfare has already begun and can no longer be avoided, and the urban environment is complex including airspace, ground space and subterranean space. *Subterranean military operations* is the official name of military actions that take place in underground cavities (existing natural caves, artificial underground installations built for military or civilian purposes) or tunnels. Our study begins with a presentation of the concept of operations in the subterranean environment from a general perspective of the operations in the urban environment. The conceptual delimitation of these specific operations, the analysis of the manner of action of the forces in the subterranean environment, become relevant topics of knowledge for the military operations carried out in an extremely hostile environment such as cities or towns.

The study aims to demonstrate that, in an urban conflict, in which there is a wide range of military missions, it is necessary to study the military actions that can be carried out in the subterranean environment and presents the directions of action regarding training and equipment in order to successfully manage these types of operations.

The most important urban areas include a whole range of tunnels, starting with those for underground transportation, maintenance, water, sewerage and telecommunications or military tunnels that are designed for attack or defense.

Military tunnels can be used to penetrate enemy territory to execute a surprise attack, or they can strengthen a defense, creating the possibility of carrying out an ambush or counterattack, but also increasing the ability to transfer forces from an area of the combat zone in another unseen and protected area. The tunnels can also serve

as a shelter for combatants and non-combatants against enemy attacks.

The greatest surprise in the recent war between Israel and the HAMAS militias in Gaza was the discovery of the sophisticated network of tunnels that Hamas has been developing since previous years. The existing network of tunnels under the Gaza Region offers a strong juxtaposition against the modern aviation, drones and artillery that Israel has on the ground.

Even though the use of tunnels belongs to an older type of war, this does not mean that it should be regarded as a curiosity of military action. Compared to the most sophisticated weapon systems used throughout history, tunnels have stood the test of time, and for centuries, have allowed military units to approach undetected enemy and have helped turn the battlefield to the advantage of weaker fighters.

Currently, we cannot estimate how long the supremacy of lasers, drones or missile defense systems will last on the battlefield. But one thing is certain, that as long as there are wars, underground tunnels and facilities will certainly be part of the battlefield.

2. Conceptual Delimitations

In the age of electronic warfare, where it is almost impossible to hide military forces, the fast passage in the underground offers a solution. Underground facilities are an almost constant reality in an asymmetric warfare. In irregular urban warfare, tunnels and bunker systems are essentially advanced methods of covering up actions and hiding forces. *“From a simple war instrument, the underground war has evolved into a global security threat for all states,”* wrote Daphné Richemond-Barak in his 2017 book, *“Underground warfare.”* [1] In major cities there are underground garages, underground passageways, subway lines, utility tunnels, sewer tunnels or storm water drainage tunnels. From the tactical point of view, the underground facilities

offer a series of facilities in both offensive and defensive actions.

During the offensive operations, the attacker can use besides the ground routes nearby the underground ones, allowing the infiltration of smaller forces behind enemy defenses. The purpose of this maneuver is to break the enemy’s defense and to block the routes of withdrawal of the forces from contact. Even if the subterranean actions do not achieve immediate success, the defense forces must defend themselves on two levels: ground and underground, being constraint to divide their forces that must be capable of both street and underground fights.

During the course of the defensive operations, the tunnels offer camouflaged and protected routes on which the forces of reinforcement can move or counterattacks can be launched. These passages can be used as communication routes, routes for moving the reserve troops, supplies and evacuating the wounded. The tunnels can be used to install armories to be used by contact forces. Through the underground passages telephone cables can be installed, which are protected against the movement of any tracked vehicles and against fire executed with artillery or aviation.

Underground passages provide limited firing sectors and amplify the effects of fragmentation ammunition. The interior of the tunnels offers extremely low possibilities of protection and concealment, it is dense darkness, and the air could be toxic. Combat support forces – air, tanks, artillery – are useless. The walls and ceiling can collapse at any time, and radio communications do not work.

The obstacles located in the intersections of the tunnels enable the creation of excellent places for executing the ambushes, allowing the transformation of the underground passages into areas of destruction. These obstacles can be quickly created using barbed wire, piles of debris and rubble, pieces of furniture between

which there are remote-controlled explosive devices or mines.

The efficient use of the equipment provided, the techniques of moving and communicating, the adaptation and the survival in the subterranean environments are foreign skills to most soldiers of the Land Forces.

The actions in the subterranean environment carried out in dark and tight spaces are very similar to the operations performed during the nights and are enhanced due to the narrow space in the tunnels. This type of action can trigger feelings of fear and helplessness, of increasing the feeling of isolation even to the most experienced soldiers. It is the most primitive and the hardest combat a fighter can face in the modern era.

3. Directions of Action

Given that the main mission of the infantry subunits and units is to ***“locate, fix and destroy the enemy by fire and maneuver,”*** if the enemy can prevent us from locating or fixing it, it will be almost impossible to destroy.

An approach aimed at solving our lack of competence should include four directions of effort including:

a) defining and developing the concept of subterranean war in an official doctrine;

b) designing and implementing a course with a curriculum specifically dedicated to training soldiers in the skills they need to fight and win in the subterranean environment;

c) including the tactics, techniques and procedures (TTP) specific to the subterranean war in the course of combat in the existing urban environment;

d) creating and developing a specialized Kit designed for military actions in the subterranean environment.

Following these directions together with involving several types of forces, has the advantages of using more resources and experience.

a) Defining and developing the concept of subterranean war in an official doctrine

The Land Forces do not have a doctrine elaborated to deal with the underground facilities, namely the fight in the subterranean environment, nor any comprehensive set of TTPs (tactics, techniques and procedures). The US Army published in 2017, “Small Unit Training in Subterranean Environments,” and in 2019 “ATP 3-21.51 Subterranean Operations” but it acknowledges that it is incomplete.

Given the extremely complex subterranean environment we need a new approach to fight. So far, we have thought of the underground as an obstacle that must be avoided if we encounter it. The large underground world existing in most major urban areas must be treated as a separate and unique environment and develop capabilities not only to cope with this situation, but rather to dominate it.

Specialists in the Land Forces should think about the major implications, advantages and disadvantages of conducting the entire range of subterranean military operations (especially offensive and defensive) and why not, even when conducting the resistance struggle on the temporary occupied territory.

It is necessary to set up a commission of experts, officers and non-commissioned officers to deal with the gathering and compilation of all available information on the history, actions and underground operations and to be responsible for the creation and further development of a specific doctrine, taking into account the fact that the subterranean war is not new.

b) Designing and implementing a course with a curriculum specifically dedicated to training soldiers in the skills they need to fight and win in the subterranean environment;

After defining the subterranean war, we must set up a training center that will prepare the soldiers to fight in the subterranean environment and to offer

courses built around the doctrine specific to the subterranean war.

Training within a center should not be limited to the formation of individual skills; the soldier should also be capable of training entire subunits. Together, individual and subunit training will achieve cohesion and increase the subunit's fighting power.

The training program would start with a theoretical stage, where the underground domain will be thoroughly defined. Furthermore, the course would provide an overview of the history of subterranean warfare, from the sieges of ancient cities to Vietnam, Korea, Afghanistan, Syria or Israel – carefully examining all case studies.

It is vital to look at the subterranean war as a complex concept, not in isolated and disparate cases, this being determined by the vision of the Land Forces to be prepared to fight anywhere in the world against close threats and non-state actors.

The subterranean warfare course also needs a practical stage, where the soldiers will develop the skills needed to conduct the subterranean war– from communication and interior movement techniques, to firing and use of explosives.

Tactics, techniques and procedures must start with tunnels detection, as the first step in addressing the underground threat on the battlefield is their discovery. This is best done with a combination of ground search and aerial search techniques using drones. Next, trainees need to learn how to systematically search and map underground facilities. They must master any equipment specially designed to be used in the subterranean environment, such as air pumping or wired communications facilities. After the trainees have gained these skills, they should be tested again in complete darkness and with NBC protective equipment.

In order to achieve the proposed objectives, the organizers of the course should work with as wide a range of partners as possible

to provide the best examples for soldiers. Many civilian companies work daily with and in underground facilities and have extensive experience in this field and here we refer to mining companies, those that build and maintain subway tunnels or use underground pipelines. Geologists, archaeologists and speleologists have spent years studying and mapping their complex cave systems – each with a unique perspective. We should use their expertise. It would also be beneficial to reach allies that have developed and maintained their underground expertise, such as the US and Israel.

The course should also include a working visit where trainees visit different types of underground facilities such as subway tunnels, mines, natural caves networks, or other complex infrastructures.

The culminating event of the course should be 2-3 STX and 1LFX which will cause the trainees to use underground facilities in case of war.

The soldiers must leave the Training Center not only with theoretical knowledge and practical skills that will help them successfully counteract the advantages of the enemy's underground facilities, but also with the abilities to exploit our own advantages. We will win the fight in the subterranean environment when not only can we not deny the enemy's underground spaces, but we use them to achieve our own goals.

In addition, the specialists at the Training Center should be responsible for further improving the doctrine and developing underground tactics, techniques and procedures, according to the principle set by General Charles Krulak that “military doctrine cannot be allowed to stagnate, especially an adaptive doctrine, such as maneuver warfare. Doctrine must continue to evolve based on growing experience, advancements in theory and the changing face of war itself.” [2]

The center must also offer specialized courses in the field of communications,

NBC instruction, use of specialized dogs, neutralizing explosive devices and combating NBC threats. These specific courses will complete the training of specialized fighters.

c) The inclusion of the TTP specific to the subterranean war in the course of combat in the existing urban environment;

The third line of effort to improve our fighting capabilities in the subterranean environment is to incorporate specific basic skills into the existing course. This is the fastest way to obtain information and develop the specific skills needed to prepare current forces. In order to adapt and create new TTPs, we consider necessary the study of *TC 3-21.50, Small Unit Training in Subterranean Environments* manual, published in November 2017. The combat techniques described in this manual largely correspond to the current needs of conducting combat in the subterranean environment.

d) Creation and development of a specialized Kit designed for military actions in the subterranean environment;

A unique environment requires unique equipment. Finally, we must develop a new kit to meet the particular requirements of the subterranean environment. It is simply a fact that the underground combat involves unique equipment needs that are not met by current tools.

At the most basic level, the kit must provide soldiers the ability to see, shoot and communicate underground.

1. Weapons

The current assault weapons will need to be replaced with machine guns and pistols that will provide automatic fire, have compact dimensions and be equipped with tactical flash lights. Also, the combat knife plays a major role in carrying out combat actions in narrow spaces. The use of offensive or defensive hand grenades can lead to the tunnel collapse or the creation of an overpressure that can adversely affect the soldiers in those confined spaces. Use

of the following alternative variants should be considered:

a) incendiary grenades – before using these grenades in confined spaces, precautions must be taken, because the fire will quickly consume the oxygen existing in enclosed spaces;

b) smoke grenades – the smoke can displace oxygen from the air, because of this the use of smoke grenades is dangerous and the gas mask does not ensure the protection of the soldiers against the smoke grenades;

c) sound and light grenades can be used in confined spaces to produce limited shock and to distract, without causing casualties among their own troops.

2. Light sources and optical equipment for night visibility

It is necessary for each subunit and fighter to have light sources of different shapes, weights and intensities. Current long-lasting lighting solutions are powered by generators, which are obviously not feasible in confined spaces and with the limited air supply in the underground. Any lighting solution will need to address other aspects of power supplies as well, in order to get rid of the weight of the batteries.

A device that produces a dazzling light is also required. A large, blinding light (having a reliable and long-lasting power source) would give the soldiers a great advantage.

We have to take into account that in the underground there is complete darkness. Current night-vision optical devices will be largely inefficient in an environment without ambient light and low temperature variations to no degree. The specialized forces should also be equipped with reflective or infrared ropes, so that only their own soldiers can see them.

3. The communications system

Actions in the subterranean environment also require cable-based communications (telephones or even Morse transmission

systems). The supplied radio stations, which are based on antennas, are inefficient in subterranean labyrinth environments. Unfortunately, cable communications, which are an essential part of the transmission equipment, is currently being removed from the land forces.

4. Protective equipment

Soldiers need adequate hearing protection, preferably over the ear, active Peltor-type protection, as gunfire noises and explosions are significantly amplified underground, however forces must be able to hear and communicate effectively.

There are many pros and cons in using ballistic protection equipment in underground actions, but one thing is certain: the helmet, knee pads and elbow pads are mandatory in equipping fighters. In larger underground spaces it is recommended to use ballistic shields that can ensure the fighters move in optimal conditions.

5. Equipment for ventilation, monitoring of the quantity and quality of the air and for the detection of toxic gases and substances

Other items that should be considered are individual air tanks and air quality and quantity monitoring devices. The devices for detecting toxic gases and substances could be supplemented with a canary in a cage like the one used by mine workers in coal mines to warn them about the appearance of carbon dioxide.

6. Ground-penetrating radars (GPR) and sonar

The GPR uses high frequencies (80 and over 1500 MHz) of electromagnetic waves, transmitted with a radar antenna. Radar pulses are reflected by various interfaces in the basement, and these are detected by the radar receiving antenna. Reflective interfaces can be: geological horizons, groundwater surfaces, rock/earth interfaces, objects of human origin or any other

surface that has a contrast of dielectric properties.

These devices are widely used in many areas, from archaeology, construction and even mining. It is preferable for a portable device to see through the walls of the tunnels (in all directions – lateral and vertical) and to indicate the distance from the surface. Sonars that can be used in conjunction with the radars which penetrate into the ground.

7. Powerful sound sources

The sound systems used for outdoor concerts would be a solution, and the environment is ideal for using loud sounds that would make an enemy unable to fight.

8. Security and reconnaissance robots

Similar to the concept of “guardian angel” that these UAVs have, these robots would offer protection due to the different sensors, knowledge of the local situation and even fire support. In order to prevent their loss when carrying out reconnaissance missions they can be attached with a cord.

9. Military dogs

Military dogs are a powerful advantage and can be successfully used in underground tunnels. Currently, specially trained dogs are mainly used by special forces and military police. However, their capacities and abilities are also very useful in the subterranean environment.

10. Industrial foam containers

Rapid industrial foam containers are required to block the various branches of the tunnels as we clean them to prevent the enemy's surprise attacks.

11. Modernized and adapted drilling machines and sapper tools

Soldiers must have skills in the use of specialized drilling machines and other sapper or specialized tools (steel concrete cutting pliers, pickaxes, crowbars, jack

hammers, welding machines, cordless saws, winches, etc.).

This list is far from a complete list of equipment needed to conduct operations in the subterranean environment. but it might give some ideas to the decision makers.

Without a specialized unit, a research center, a school or a training center, taking measures to develop new ways or tools to approach military operations in cities is almost impossible.

The opponents of these proposals will argue that we do not have the necessary resources and that the underground operations should be treated as part of urban operations. Training in underground operations has the value of every money invested, even at the cost of cutting investments elsewhere. It is a set of skills that the soldiers need both in symmetrical threats, but especially in the case of asymmetrical threats.

Arguing that actions in the subterranean environment should be treated as part of operations in the urban environment simply shows that this threat is not taken seriously.

4. Conclusions

If the conclusions drawn by the military specialists who have studied the conflicts of the last decades are correct, the

underground operations – both the offensive and the defensive ones – can be a separate field from the asymmetrical war equivalent to the terrestrial, maritime, aerial and cybernetic fields, which require doctrine and their own TTP.

In modern conflicts, tunnels have been used by insurgents, revolutionaries and urban terrorists, such as Chechen rebels during the two Grozny battles until the wider use of underground territory by ISIS in Iraq and Syria. Russia, China, North Korea and Iran boast of complex facilities with enhanced command and control and the ability to deploy thousands of soldiers, tanks, missiles and even launch aircraft from underground passageways.

The army must be able to fight and win anywhere, in “any climate and place.” Currently we are not prepared to fight in the subterranean environment. We cannot afford to ignore the subterranean war or to expect to adapt after the hostilities have begun. We must train our soldiers to fight and win in the subterranean environment with a new Subterranean War Center and our goal should not be to deny the use of underground spaces by opponents, but to dominate them.

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