ATP 3-21.51

Subterranean Operations

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Headquarters, Department of the Army

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Preface

ATP 3-21.51 provides doctrinal guidance and direction for all brigade combat teams (BCTs) and their subordinate elements conducting subterranean operations.

The principal audience for ATP 3-21.51 is all members of the profession of arms. Commanders and staffs of Army headquarters serving as joint task force (JTF) or multinational headquarters should also refer to applicable joint or multinational doctrine concerning the range of military operations and joint or multinational forces. Trainers and educators throughout the Army will also use this publication.

Commanders, staffs, and subordinates ensure that their decisions and actions comply with applicable United States, international, and in some cases host-nation laws and regulations. Commanders at all levels ensure that their Soldiers operate according to the law of war and the rules of engagement. (See FM 6-27.)

ATP 3-21.51 uses joint terms where applicable. Selected joint and Army terms and definitions appear in both the glossary and the text. Terms for which ATP 3-21.51 is the proponent publication (the authority) are italicized in the text and are marked with an asterisk (*) in the glossary. Terms and definitions for which ATP 3-21.51 is the proponent publication are boldfaced in the text. For other definitions shown in the text, the term is italicized and the number of the proponent publication follows the definition. This publication is not the proponent for any Army terms.

ATP 3-21.51 applies to the Active Army, Army National Guard/Army National Guard of the United States, and United States Army Reserve unless otherwise stated.

The proponent of ATP 3-21.51 is the United States Army Training and Doctrine Command. The preparing agency is the United States Army Maneuver Center of Excellence. Send comments and recommendations on DA Form 2028 (*Recommended Changes to Publications and Blank Forms*) to Commander, Maneuver Center of Excellence, Directorate of Training and Doctrine, Doctrine and Collective Training Division, ATTN: ATZB-TDD (ATP 3-21.51), 1 Karker Street, Fort Benning, GA 31905-5410; by email to usarmy.benning.mcoe.mbx.doctrine@mail.mil; or submit an electronic DA Form 2028.

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Introduction

Throughout history, subterranean operations have been part of warfare. The effect of subterranean warfare has had varying levels of significance dependent on the battle, campaign, or war.

Large defensive walls constructed around cities have been in use for thousands of years. During periods of invasion or siege, tunnel systems were often dug to permit escape and passage of water or supplies beyond enemy lines. Castles and fortresses during the middle ages provided formidable protection against enemies, and engineers were required to devise siege engines and sabotage tunnel systems to collapse walls and breach defenses.

In the American Civil War, tunnel systems were used on more than one occasion. In the Battle of Vicksburg and the Siege of Petersburg, Union forces dug sabotage tunnels beneath Confederate lines and detonated large amounts of gunpowder.

The British began digging a defensive tunnel complex at the Rock of Gibraltar in the late 1700s and construction continued until the 1960s. Used through the Cold War, the tunnel complex eventually contained over 34 miles of tunnels with areas designed for storage, vehicle maintenance, power generation, berthing, command and control, and medical treatment. In World War II, the Germans conducted much of their V-2 rocket production, assembly, and launch testing from highly developed underground facilities to protect them from Allied bombing campaigns.

Viet Cong guerillas successfully used battlefield tactical tunnels against the United States and Allied forces, especially near Cu Chi. Tunnels ranged from rudimentary cave-like structures to large, sophisticated, multilevel complexes that extended for miles. Entrances were well-concealed and often booby-trapped. Air and water locks and false side tunnels confused searchers. By the end of the war, there were over 4800 documented tunnels used by the Viet Cong.

In October 1978, a tunnel was discovered under the border between North and South Korea. This tunnel measured 1.1 miles long, 6.6 feet high, and 6.6 feet wide and ran through bedrock at a depth of 240 feet below ground. The tunnel was designed for a surprise attack on Seoul from North Korea and could accommodate the transfer of 30,000 heavily armed troops per hour. North Korea had planned to construct five southern exits and the tunnel was designed for both conventional warfare and guerrilla infiltration. Among other things, North Korea built a regimental airbase into a granite mountain.

In modern warfighting, various countries have used similar subterranean strategies. In the Syrian conflict, opposition forces dug sabotage tunnels to destroy Syrian government and military facilities. They also dug tunnels to move between key locations. This allowed them to remain undetected from intelligence, surveillance, and reconnaissance platforms and protected from air attack.

After the invasion of Afghanistan in 2001, Taliban and Al Qaeda fighters escaped into the mountainous cave complexes on the Pakistani border to evade detection and capture. These same complexes afforded Mujahedeen fighters protection against the Soviet invaders in the 1980s.

In the ongoing Palestinian and Israeli conflict, Hamas uses tunnels for smuggling goods from Egypt into the Gaza strip to avoid the Israeli blockade. Hamas also digs tunnels to protect senior leaders from Israeli air attack and to infiltrate into Israel to conduct attacks.

As the U.S. Army transitions to optimize for large-scale combat operations, it is essential to understand the complexity and relevance of subterranean operations. Our adversaries have adapted their capabilities against our weaknesses by expanding their use of underground facilities. Additionally, the growing urbanization around the world increases the scale and complexity of urban subterranean systems. These factors, along with the increased tempo and lethality of large-scale combat operations, mean that echelons above brigade play a greater role in setting conditions for successful subterranean operations. While brigade combat teams and below execute subterranean operations, the integration between echelons is essential to their success.

The historical examples of subterranean operations discussed above are only a few of the many that have taken place throughout human history. From the earliest recordings of human warfare until the present day, combatants continue to use the subterranean space for an advantage over their adversaries. Today, over 10,000 known subterranean facilities exist around the world. Whether to protect vital assets and capabilities, mitigate weapon system and sensor overmatch, to strengthen a larger defensive position, or simply to be used for transportation in our largest cities, subterranean systems continue to be expanded and relied upon throughout the world. Therefore, our Soldiers and leaders must be prepared to fight and win in this environment.

This ATP provides the commanders and staffs of brigade combat team formations with doctrine relevant to Army and joint operations. This publication explains how effective subterranean operations develop the situation and allow and provide commanders flexibility and adaptability. The doctrine described in this publication is applicable across unified land operations.

ATP 3-21.51 contains seven chapters and two appendixes:

Chapter 1 describes subterranean facility attributes, functions, design, and the associated hazards. This chapter also describes common subterranean terms, many taken from the mining community, which are used throughout the publication.

Chapter 2 discusses the threat forces and how they may use subterranean systems to accomplish their military objectives.

Chapter 3 discusses brigade combat team and battalion operations. This chapter discusses the steps that brigade and battalion commanders and their staffs may use when encountering a subterranean system. Specific subterranean considerations for planning through the military decisionmaking process are also discussed.

Chapter 4 discusses company and platoon operations, to include subterranean considerations during troop leading procedures. This chapter provides a framework to

guide the company grade leader through their decision-making process when encountering subterranean systems.

Chapter 5 describes squad and individual Soldier techniques when operating in a subterranean system. These include task organization, movement within the facility, mapping and marking, and many more.

Chapter 6 is a resource for planners and leaders, which provides an understanding of potentially available resources, enablers, and capabilities. This information facilitates planning and coordination prior to conducting subterranean operations.

Chapter 7 discusses sustainment in the subterranean environment, specifically discussing the resource requirements to survive and operate successfully in the environment.

Appendix A provides additional detail regarding physical and psychological conditions Soldiers are likely to face in a subterranean environment.

Appendix B provides instructions and examples of how to build subterranean training facilities. This information includes supply lists, pictures, and a list of current Department of Defense facilities that provide some level of subterranean environments for training.

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Chapter 1

Subterranean Environment

This chapter describes the attributes, functions, design attributes, and their associated hazards in the subterranean environment. The chapter also describes the various categories of subterranean systems along with commonly used terms that are unique to this environment.

ATTRIBUTES OF A SUBTERRANEAN SYSTEM

1-1. By using subterranean systems, enemies can protect critical assets, develop covert programs, and maintain a form of initiative against more powerful military opponents. Adversaries use such spaces and structures for command and control, defensive networks, operations, storage, production, or protection. Continued improvements in the construction of subterranean environments have increased their usefulness and their proliferation. For general categorical reference, this manual uses the term 'subterranean system' to refer to any space or structure located below ground.

1-2. The chart in figure 1-1 describes the attributes of subterranean systems. When assessing subterranean systems, units should provide as much information as is available. This information can be valuable in identifying known and unknown attributes and allocating the right assets for gathering additional information.

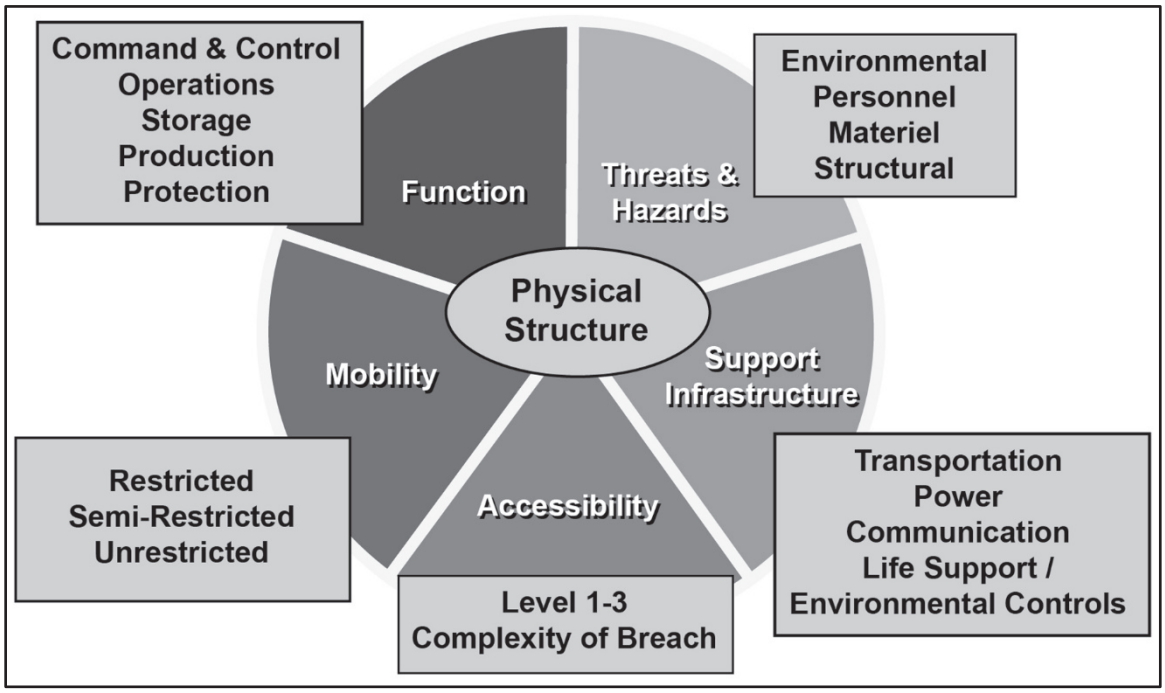


Figure 1-1. Attributes of a subterranean system

FUNCTIONALITY OF SUBTERRANEAN STRUCTURES

1-3. The enemy may use subterranean systems for purposes outside of their original design. When used by enemy forces, the five main categories that define their function are as follows:

- Command and control. This includes all systems related to enemy command, control, communications, computers, and intelligence.
- Operations. This includes passageways used for movement between two locations, systems used to stage military operations, or reinforced defensive network of bunkers, tunnels, and fighting positions.
- Production. Locations purposed for the production of equipment, munitions, or government laboratories.
- Storage. Locations whose primary purpose is to store materiel. May be climate controlled and near, but not always attached to a facility.
- Protection. Subterranean structures built to protect civilian and government officials from military strikes. This category only applies to noncombatants. The purposes of military bunkers fall under the operations category, which is listed above.

STATE FACILITIES

1-4. State sponsored subterranean structures include public civil works or underground facilities built for a military purpose. Military purposes include command and control, production or storage of military materiel, operations such as missile launch sites or maneuver defensive positions, and chemical, biological, radiological, and nuclear (CBRN) munition storage and production facilities.

1-5. State sponsored underground facilities present a number of substantial challenges for friendly forces. These facilities are often large, potentially containing dozens of rooms and multiple portals, and usually protected by portal barricades. Forcible entry and subsequent searches of these facilities require a substantial number of personnel as well as specialized breaching capabilities. Facilities used to manufacture or store resources such as ammunition, fuel, or weapons of mass destruction (WMD) can also pose significant hazards to attacking forces.

NONSTATE FACILITIES

1-6. Nonstate uses for subterranean spaces and structures include legitimate businesses for climate-controlled storage, tourism, and mining, or for illicit functions such as smuggling, and covert or extremist organizations.

TACTICAL PURPOSES

1-7. Subterranean facilities for tactical purposes may include caves, shallow tunnel systems, bunkers, or other underground structures that support battlefield operations used for concealment and movement of personnel, weapons storage and transport, command and control, and medical care.

STRATEGIC PURPOSES

1-8. Strategic uses for subterranean structures include facilities that support theater and national military objectives including command and control, WMD storage, and storage or concealment of other national, strategic, or military assets. Small tactical tunnels may become strategic issues if they cross national boundaries

SUBTERRANEAN THREATS, HAZARDS, AND RISKS

1-9. Risk, defined as probability and severity of loss linked to hazards, must be considered and managed prior to conducting subterranean operations. Risk management is the process of identifying, assessing, and controlling risks arising from operational factors and making decisions that balance risk cost with mission benefits (See ATP 5-19 for more information.) Leaders assess risk to protect the force and ensure mission accomplishment.

1-10. The subterranean environment amplifies the danger posed by threats, hazards, and risks relative to surface operations. The following five categories describe some of these challenges:

- Environmental and atmospheric hazards.
- Materiel hazards.
- Structural hazards.
- Psychological hazards.
- Tactical risks.

ENVIRONMENTAL AND ATMOSPHERIC HAZARDS

1-11. Environmental and atmospheric considerations are the most complex and dynamic of the five categories and pose the greatest hazard. Every action a friendly force takes underground may make the environment worse. Everything from weapons fire and explosions to the carbon dioxide from Soldiers breathing can contribute to an increasingly dangerous environment. Without understanding and planning for the environment, units may experience serious injury or death before making contact with enemy personnel.

1-12. The air we breathe is a mixture of different gases. Many contributing factors often lead to poor air quality in subterranean systems, which can be very dangerous. Poor air quality in subterranean environments can, at a minimum, physically stress personnel and reduce stamina and effectiveness. Soldiers must be alert to symptoms or conditions that may indicate poor air quality, such as a lack of oxygen, the presence of bad air, or CBRN agents.

1-13. Some of the most common poor air conditions are—

- Smoke. Smoke inhalation caused by underground fires in subterranean systems can lead to a variety of hazards, including reduced oxygen levels, thermal injury to upper airways, and chemical injury from inhaling toxic gases suspended in the smoke.
- Oxygen. Too much or too little oxygen in subterranean environments can both be problematic. Air overly rich with oxygen (above 23.5 percent) creates the risk for an explosion. Oxygen deficiency, however, is more common in a subterranean environment. The atmosphere is considered oxygen deficient when it contains 19.5 percent oxygen or less (21 percent is normal). At 17 percent oxygen, personnel may begin panting and, at 15 percent, personnel become dizzy and experience headaches. Personnel become unconscious, and potentially a fatality, if oxygen levels drop below 9 percent. At these low levels, personnel must use a breathing apparatus or return to the surface.
- Explosive gases. Monitor concentrated gases for lower and upper explosive limits. Below the explosive or flammable range, the mixture of the gas is too lean to burn. Above the upper explosive or flammable limit, the mixture is too rich to burn. Within the flammable or explosive limit, introduction of an ignition source may cause explosion.
- Carbon monoxide. Carbon monoxide is an odorless, colorless, and tasteless gas that accumulates in low areas and displaces oxygen. Carbon monoxide is a by-product of combustion. The exhaust from vehicles and generator equipment also produces it. It can react with blood and prevent the transfer of oxygen. Symptoms of dangerous levels of carbon monoxide are headaches and dizziness, and high doses can be fatal. Firing weapons inside confined spaces can quickly elevate carbon monoxide to dangerous levels.
- Carbon dioxide. Carbon dioxide gas is also colorless and odorless. It enters caves and displaces oxygen in a variety of ways. Water absorbs and then releases carbon dioxide as it passes through soil with high concentrations of carbon dioxide. Human and animal respiration generates carbon dioxide as well. Carbon dioxide can settle in areas without ventilation because it is heavier than oxygen. A concentrated presence of carbon dioxide is dangerous. Even low levels in the atmosphere (less than 1 percent) causes a lack of focus, loss of energy, weakness, and anxiety to those exposed to it. Exposure to high levels (concentrations of 10 to 15 percent) for only a few minutes leads to unconsciousness and suffocation, while higher levels cause death within 1 minute. Even a small increase in the number of personnel can have a dramatic effect on carbon dioxide levels.
- Hydrogen sulfide. Hydrogen sulfide gas is colorless but has the odor of rotten eggs. Through the process of anaerobic digestion, hydrogen sulfide often results from the microbial breakdown of organic matter in the absence of oxygen gas, such as in swamps and sewers. It also occurs in volcanic gases, natural gas, and in some sources of well water. It reacts with enzymes in the bloodstream to inhibit respiration. High concentrations can cause lung failure. Lower concentrations cause burning of the respiratory tract and the eyes.
- Methane. Methane is colorless and odorless and can cause asphyxiation. The decomposition of organic wastes in low-oxygen environments, such as sewers and subterranean systems, leads to methane, which is both flammable and explosive.

Note. The stratification or layering of gases inside a subterranean system can lead to significant air quality differences between the floor and ceiling of a given subterranean space. These potential differences are critical to understand when monitoring the atmospheric conditions.

1-14. Adequate ventilation prevents most gases associated with bad air from reaching dangerous concentrations. Although mechanical means for ventilating subterranean systems may not be available, measures can be taken to reduce or avoid the risk, such as the following:

- Point vehicle exhausts away from openings.
- If working in a confined space, Soldiers must monitor each other for symptoms of exposure to poor air.
- Extinguish fires.
- Use caution when opening or entering sealed areas.

1-15. Gas (or air) monitors are of significant benefit if utilized prior to tunnel entry. For example, placing them on a robot to detect the presence of poisonous, toxic, or harmful gases prior to entry. These monitors are simple to operate and maintain and are widely used in the firefighting, mining, and rescue environments. Questionable air quality can exist at any time during subterranean operations, so the use of handheld or portable gas detectors is highly recommended at all times when operating underground. Plans for incorporating air-monitoring equipment into the unit's subterranean standard operating procedures (SOPs) should include procedures for equipment training, maintenance, and calibration.

1-16. Fire is a significant risk in the subterranean operating environment. Fire rapidly consumes oxygen, is a direct hazard to Soldiers and equipment, and can cause explosions if the fire reaches combustibles such as explosives or fuel containers. Units should be prepared to extinguish fires using the appropriate method and equipment, noting that different types of fires require different types of extinguishers.

1-17. Overpressure is exceptionally dangerous in subterranean spaces. The overpressure created from the use of explosives and weapons can be significantly higher than when on the surface, and propagation effects are very different. Shock waves reverberate, combine, and cancel; therefore, the closest forces may or may not experience the overpressure in the same manner as those farther away.

1-18. Wireless communications are usually very limited. These include within the facility, subterranean to surface (vice versa), and potentially even surface to surface near a subterranean facility due to excessive noise, confusion, depth (overburden), confined space acoustics, little to no light, combined with surface terrain that is usually restrictive and with limited lines of sight. Strained communications, degraded global positioning systems, confined space in unknown terrain, and other difficult environmental factors make navigation, command and control, and even fratricide prevention measures extremely difficult.

1-19. The subterranean environment magnifies the impact of both natural and manmade obscurants. They tend to persist for much longer due to lower amounts of air movement. Obscurants can include smoke and dust from breaching, equipment movement, seismic activity, fires, weapon discharges, explosions, and other sources. These conditions rapidly degrade the ability to see and sense the surroundings. Units must prepare to operate in this environment using sensors, training, and rehearsals.

1-20. Water can be especially dangerous in an underground facility. Water traps restrict access to other parts of a subterranean facility and reduce the effect of gases and explosives. When trying to traverse a water trap, drowning becomes a serious concern. Soldiers' may submerse their weapons, which may not fire properly once surfacing on the other side of the water trap. Additionally, water traps may be electrified. Electrified water, intentional or inadvertent, may electrocute Soldiers. Therefore, Soldiers should consider testing water traps with voltmeters prior to entering them.

1-21. Subterranean environments contain numerous vertical, horizontal, and other hazards to movement such as steep slopes, stairwells, vertical shafts, uneven flooring, holes, deadfalls, and natural and manmade hindrances on the floors and walls, along with others hazards unique to the specific operating environment and threat. Hazards may be disguised and very difficult to detect in low light, no light, and obscured conditions. Units should incorporate these hazards into their training plans and marking procedures.

1-22. In some areas, wildlife is also a concern. Passageways may have venomous insects, reptiles, or diseased rodents.

1-23. Some facilities may not have sufficient discharge umbilicals to carry out human waste and other trash. Operating in such facilities may unwittingly expose friendly forces to dangerous hygiene issues and bacterial infections. Friendly forces may also contribute to such conditions if operations continue for an extended duration.

MATERIEL HAZARDS

1-24. Materiel items such as those located in large storage facilities, laboratories, or missile launch sites are extremely dangerous to handle or operate around. Not only can rocket fuels, toxic chemicals and material, chemical, biological, and radiological-related items, and munitions contribute to bad air quality, they can also prevent or limit the use of certain types of munitions and explosives within these facilities. Soldiers must exercise extreme caution when suspecting or locating these items inside a facility. In most cases, units should incorporate specialized technical forces such as explosive ordnance disposal (EOD) or CBRN assets to handle these situations.

STRUCTURAL HAZARDS

1-25. Building standards for subterranean systems vary. Even within the same country, facilities may vary widely in complexity and safety. Soldiers must use caution when breaching or using weapons inside a subterranean structure so as not to cause an inadvertent collapse. The enemy may deliberately collapse portions of passageways to deny access or trap personnel inside. The enemy can easily collapse passageways when there is a lack of structural integrity.

1-26. Soil is heavy. A single cubic foot of soil weighs about 100 pounds, and a cubic yard can weigh up to 2700 pounds. In a collapse, the human body is not strong enough to support these loads. Therefore, before entering a subterranean system, and throughout the operation, personnel should be alert for problems with the structural integrity. This is especially true in combat situations where explosions or fire may have undermined the support structure. Newly formed cracks in the soil near openings can indicate any of the following:

- Loose rocks or dislodged construction materials overhead.
- Damaged, cracked, and dislodged shoring.
- Indications of fire damage to the support structure.
- Moisture lines indicating a break in the soil.

1-27. Soil, water, and air quality can contribute to degraded structural integrity. When identifying a structural hazard, communicate the hazard to everyone on the team. Mark and avoid the hazard, and if possible, remove it. When shoring is required, employ a trained structural engineer with appropriate knowledge of stabilization techniques to provide additional safety.

PSYCHOLOGICAL HAZARDS

1-28. Soldiers descending into unknown subterranean spaces often face a sense of isolation, entrapment, and claustrophobia due to the temperature changes, navigating a strange maze of passageways, lack of natural light and air movement, and other factors prevalent in subterranean spaces. Additionally, spiritual, philosophical, cultural beliefs, and previous experiences with subterranean spaces may affect a Soldier's psychological well-being. The darkness and disconnection from the surface environment affects an individual's conception of time. Entering unknown subterranean spaces may reduce a Soldier's perceived sense of security, even before direct fire contact with the enemy.

1-29. Account for these psychological hazards when planning, executing, and post operations, as they influence a unit's ability to accomplish their subterranean mission and may have long-term effects. Teaching and training resilient Soldiers requires mental conditioning, fostering of spiritual and emotional health, and building strong teams. Resilient Soldiers mitigate risks and preserve the force when facing complex situations in the worst of conditions.

TACTICAL RISK

1-30. Subterranean systems pose a unique set of challenges, which add to the risk level of an operation. No two subterranean systems are identical; therefore, it is crucial that leaders assess, understand, and mitigate risks for each system they encounter. Leaders failing to recognize when their units have or are close to,

culminating is the most substantial cause of increased tactical risk levels in subterranean systems. It is easy for a unit to underestimate how many rooms and corridors exist and become over-extended. Leaders must account for the unknown nature of these systems and be prepared to provide additional personnel when needed.

1-31. Narrow passageways, emplaced explosives or booby traps, and redundant fighting positions compound the serious threat of enemy personnel. Just like friendly forces, every action they take in the subterranean facility potentially makes the environment worse. Their weapons fire, explosives, and potential manipulation of the facility's controls compound the threat.

1-32. Subterranean environments also limit visibility, movement, tracking, and communications. For example, night vision equipment, which intensifies ambient light, cannot "see" in no-light conditions. These challenges can drastically slow the pace of an operation as well as complicate casualty evacuation.

1-33. Subterranean environments provide the enemy with additional options when employing commonly used weapons such as mines, booby traps, and direct fire systems. They can place explosive hazards on or within the floor, walls, or the ceiling of the underground facility. In addition to explosive booby traps, they may use spikes to penetrate their victim. Booby traps can consist of rockfalls and wall or ceiling collapses to cause crushing injuries. Units must prepare to detect and address these hazards.

DENIAL AND DECEPTION

1-34. Based upon the use and importance of subterranean structures, the enemy may go to great lengths to hide construction efforts and finished structures. Construction of small tunnels may begin inside existing buildings, which makes identifying the system difficult. During construction of larger facilities, excavated material may be transported away from the site in an effort to make it look more like a mining operation or to minimize the ability to estimate the size of the internal layout. Some governments use the construction of civil infrastructure to mask the construction of a connecting or parallel government subterranean facility.

1-35. After initial construction, the builders may move equipment inside the excavated space or build over the portal, thereby hiding the entrance. More importantly, nations built many of these subterranean systems decades ago. Therefore, any signs of construction have long since vanished. Additionally, they may place camouflaged netting over portals, vents and shafts, or plant vegetation around these items in an effort to make them blend in to the surrounding environment. Units should always assume that without control of the subterranean environment the enemy has freedom of maneuver.

OBSTACLES

1-36. Most subterranean structures have some level of access control in the form of at least one, if not multiple barricades. Underground facilities include protective and tactical obstacles outside of them. Units must overcome these obstacles before engaging the portals. (Refer to ATP 3-90.4 and ATP 3-34.20 for more information on protective and tactical obstacle reduction.) Barricade refers to doors, gates, hatches, and framing, as well as the presence of any reinforcement to hinges, locking mechanisms, or the barricade itself to control entry and exit. Portal refers to the rough opening in a wall, tunnel, and so forth that provides the means to access a space. The accessibility levels and methods outlined in paragraphs 1-37 through 1-40 help to characterize the complexity of the barricade and type of breaching equipment needed to gain entry based upon portal construction and barricade design.

CLASSIFICATION OF BARRICADES

1-37. Classify barriers to quickly identify and describe the materials used to build portals and entrances to subterranean spaces and structure. Relay this information via reporting to allow enablers to prepare the appropriate equipment to conduct a potential breach. Paragraphs 1-38 through 1-40 describe the three barrier classification levels.

1-38. Level 1. This level includes residential and commercial grade entry-control barricades along with a range of concealment techniques (covering with a rug, piece of wood, furniture, foliage, and so forth). The level 1 barrier has the following characteristics:

- Portals include openings in walls made of various material (sheetrock, cinder block, brick, and so forth) in building-type structures and tunnels constructed in dirt and rock. The portal does not contain any additional reinforcement or hardening.
- Barricades are standard-use, made of wood or metal and have a hollow or solid core. They possess standard locking mechanisms (deadbolts, door chains, padlocks, and so forth), hinges, handles, and fasteners. They do not possess any special reinforcement against access.
- Entry is possible through forced-entry on the barricade or surrounding wall using basic entry techniques. While explosive and thermal breaching techniques work, their use would likely be excessive.

1-39. Level 2. Level 2 includes advanced access point concealment techniques (such as false floors and walls, special elevator floor access, and so forth) and reinforced residential or commercial grade entry-control barricades to include double-barricade usage in the same portal (security gate and door). They serve to restrict or control access to public areas normally associated with public utilities, law enforcement, other secure government buildings, and private commercial businesses. The level 2 barrier has the following characteristics:

- Portals include reinforced framing as well as sturdier wall construction (concrete, brick, steel studs, and so forth) for additional support.
- Barricades use locking mechanisms that are heavier gauge metal, deadbolt and latch points with metal plating to prevent prying, modified hinges (welded, setscrews, and so forth) to prevent removal, and reinforced handles and fasteners. The barricade itself can also contain a security bar or internal re-locking bars to reinforce against ramming-type entries.
- Entry is possible through forced entry on the barricade or surrounding wall using extensive mechanical or basic explosive and thermal breaching techniques.

1-40. Level 3. This level uses doors designed for high levels of security or protection against blast effects, such as vaults and blast doors. Governments use this type of access point to protect national-level assets whether it is a command-bunker facility, a critical communications facility, or a WMD program facility. The level 3 barrier has the following characteristics:

- Portal sizes can vary from personnel size to vehicle size and barricades can vary in thickness and overall reinforcements. Portals generally have heavily reinforced wall construction or can be existing bedrock. Framing is typically an insert design of very thick, heavy gauge, composite metal anchored into bedrock or very thick concrete walls (see figure 1-2, page 1-8).
- Initial entrances may contain multiple barricades. Usually, locking mechanisms are large diameter than internal locking bolts or plungers with or without hydraulic latches. Barricades may or may not be associated with electromechanical or personal recognition-access control systems (badge, personal identification number code, or biometrics).
- Entry may require specialized breaching techniques and personnel including the use of multiple explosive charges (steel cutting, shape, and bulk) and the extensive use of thermal cutting techniques.

Note. Ensure trained engineers conduct a thorough assessment of level 3 doors before attempting to breach them. An incorrectly executed breach on the largest and most complicated doors may result in a permanent barricade.

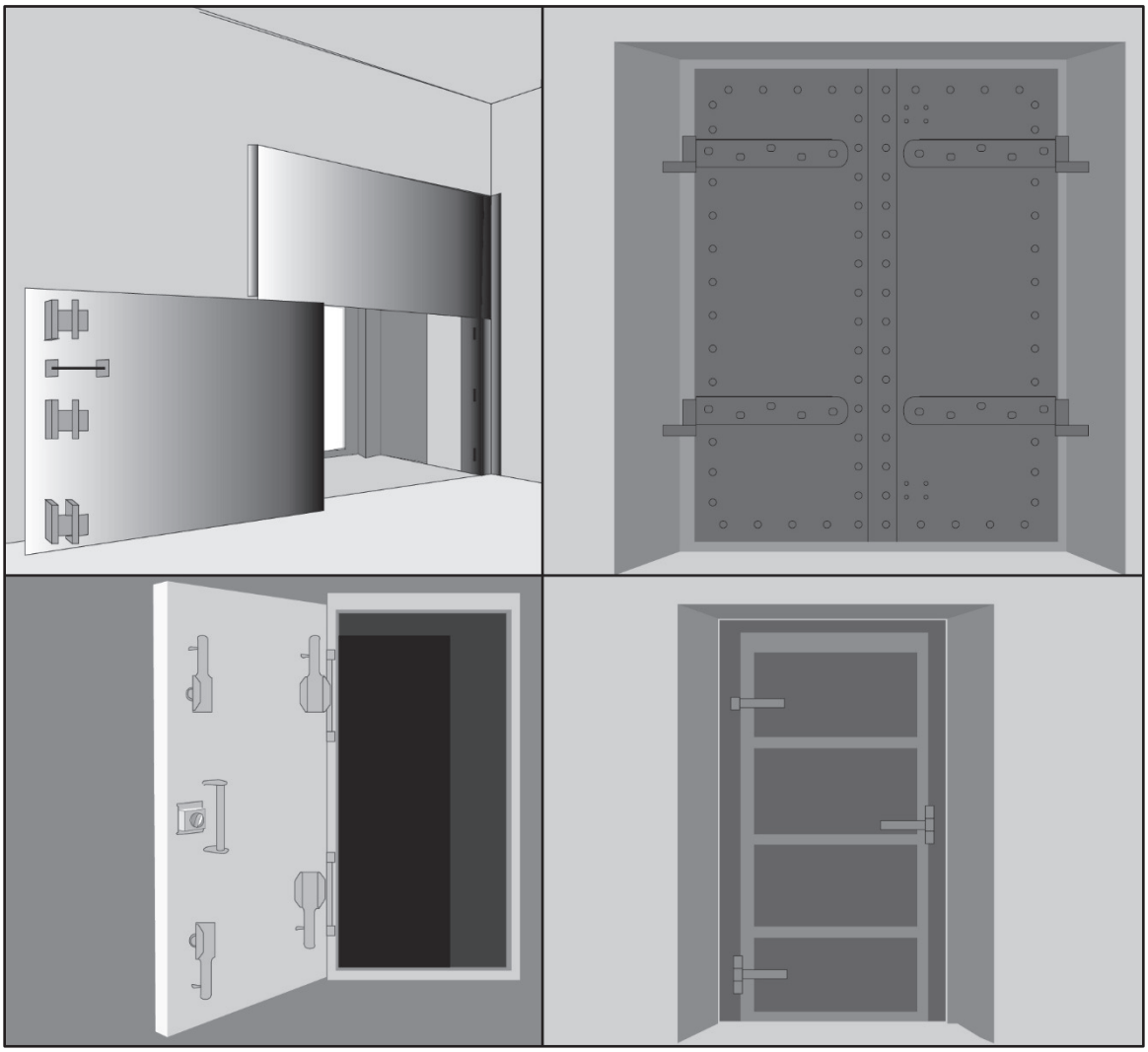


Figure 1-2. Level 3 portals, examples

DESIGN EFFECTS ON SUBTERRANEAN MOBILITY

1-41. Subterranean spaces and structures vary greatly in size. Access points and internal corridors may be small and narrow, greatly restricting movement, or they may be large enough to drive trucks carrying ballistic missiles. Label passageways, maneuver corridors, and inside subterranean spaces and structures based upon the implications for ground forces who may need to operate in the environment with the following labels:

- Restricted. Soldiers may need to crawl or walk single file, which can affect the proper use of personal protective equipment. Examples include rudimentary or sophisticated tunnels and narrow shafts.
- Semi-restricted. Soldiers are able to walk one or two abreast with all issued personal protective equipment. Examples likely include sophisticated tunnels or a passageway (drift) in an underground facility. These spaces are similar in size to those found in buildings in the urban environment.
- Unrestricted. Large enough to allow for a front wider than two Soldiers abreast with tactical spacing. Some facilities are large, wide, and tall enough that tactical vehicles can drive through them. Ballistic missile storage facilities or underground aircraft hangars include areas of unrestricted mobility.

1-42. Many facilities have multiple access portals, some designed for personnel and others for vehicles and equipment. Smaller portals may be easier to breach and enter but hinder tactical mobility once inside. Incorporate these considerations into course of action (COA) development and the final risk assessment.

CATEGORIES OF SUBTERRANEAN SYSTEMS

1-43. Table 1-1 defines the specific subterranean categories and subcategories and includes a general description of each.

Table 1-1. Subterranean environmental categories

CATEGORIES	***Category 1*** ***TUNNELS, CAVES, AND NATURAL CAVITIES***		***Category 2*** ***URBAN SUBSURFACE SYSTEMS***		***Category 3*** ***UNDERGROUND FACILITIES (Military Purposed)***	
Subcategories	Rudimentary	Sophisticated	Substructures	Civil works	Shallow	Deep
Description	Lack of shoring	Shoring; basic amenities	Basements, parking garages	Subways, sewers, aqueducts	Silos, bunkers (<20 m)	Military bases (>20 m)
Functions	Civil: commercial operations, transportation, and storage enemy: C2, operations, storage, production, protection				C2, operations, storage, production, protection	
Supporting amenities/ infrastructure	Power cords, small generators, lights, ventilation shafts, small pumps		Electrical power, transportation corridors, life support systems, environmental controls, communications lines *Internal redundancies may exist allowing the facility to operate for extended periods independent from external support			
Common threats	Personnel, improvised explosive devices, traps, direct fire methods				Military offensive and defensive measures	
Common hazards	Environmental (poor air quality, dangerous gases, wildlife), materiel (munitions, fuels), structural integrity					
Legend: C2 – command and control, m – meters						

CATEGORY 1. TUNNELS, NATURAL CAVITIES, AND CAVES

1-44. Category 1 includes rudimentary and sophisticated systems. Rudimentary systems lack shoring (support, usually made of wood, brick, or reinforced concrete) to prevent structural collapse (see figure 1-3, page 1-10). Some tactical tunnels, natural cavities, and caves exist within very solid rock that provides extensive support. Other tunnels, cavities, and caves are unstable and prone to collapse with even small disturbances. Sophisticated systems have shoring despite the type of surrounding geology and usually contain basic amenities such as drainage, electricity, and air ventilation.

1-45. Sophisticated tunnels often have the following amenities:

- Power outlets, power cords, and lighting.
- Ventilation shafts.
- Drainage pipes and pumps.
- Dimension (greater height, width, or length).

Figure 1-3. Rudimentary tunnel

CATEGORY 2. URBAN SUBSURFACE SYSTEMS

1-46. Urban subterranean systems are divided into substructures and civil works. These include basements, shelters, and parking garages that may appear similar to sophisticated tunnels or appear more robust with complex, supporting infrastructure. Civil works include aqueducts, sewers, subways, transportation, and utility tunnels (see figure 1-4). Civil works such as subways and transportation tunnels usually include complex supporting infrastructure. Urban subterranean systems may be able to withstand military strikes due to their depth or the types of materials used in construction; however, they are not designed for that purpose. During World War II, the London urban subterranean systems were used extensively to protect the population from German bombing attacks.

Figure 1-4. Subway

CATEGORY 3. UNDERGROUND FACILITIES

1-47. Underground facilities are sophisticated complex structures specifically designed and built to be unobserved and to provide maximum protection. They vary widely by size, construction technique, and purpose. Underground facilities designed and built to serve as command and control, operations, storage, production, and protection facilities provide some of the most challenging tactical environments that friendly forces can expect to encounter. Underground facility portals come in a wide variety of designs. Examples of some portals are illustrated in figure 1-5, page 1-12.

1-48. Underground facilities are broken into two subcategories, shallow and deep, based on depth and the amount of overburden (soil, dirt, rock) above them. In addition to providing concealment, the greater amount of overburden provides an increase of cover and protection from explosive blasts as follows:

- Shallow. A facility with 20 meters or less overburden. Examples include silos, cut-and-cover facilities, and basement bunkers.
- Deep. A facility with more than 20 meters overburden. Examples include protection sites for government officials, military operations facilities, and research and production facilities for WMD.

1-49. Subterranean systems may have segments from each of the different subcategories. For example, a rudimentary tunnel may utilize a natural cave opening and be excavated to become a sophisticated tunnel, which may lead to a deep underground facility that may have its own subway connected to a public transportation line. Such facilities do exist and do not lend themselves to easy classification.

1-50. Terms used to describe the size, depth, shape, and purpose of underground facilities vary across services, agencies, industries, and countries. Construction standards also vary geographically, especially between developed and under-developed nations. As friendly forces plan operations in subterranean systems, they must ensure their subordinates understand unique subterranean terms and risk.

1-51. Underground facilities may not be protecting strategic value facilities like command and control nodes or WMD. Many countries protect artillery, short-range rocket systems, and air defense systems in such facilities. Civilian populations use underground facilities as protective shelters.

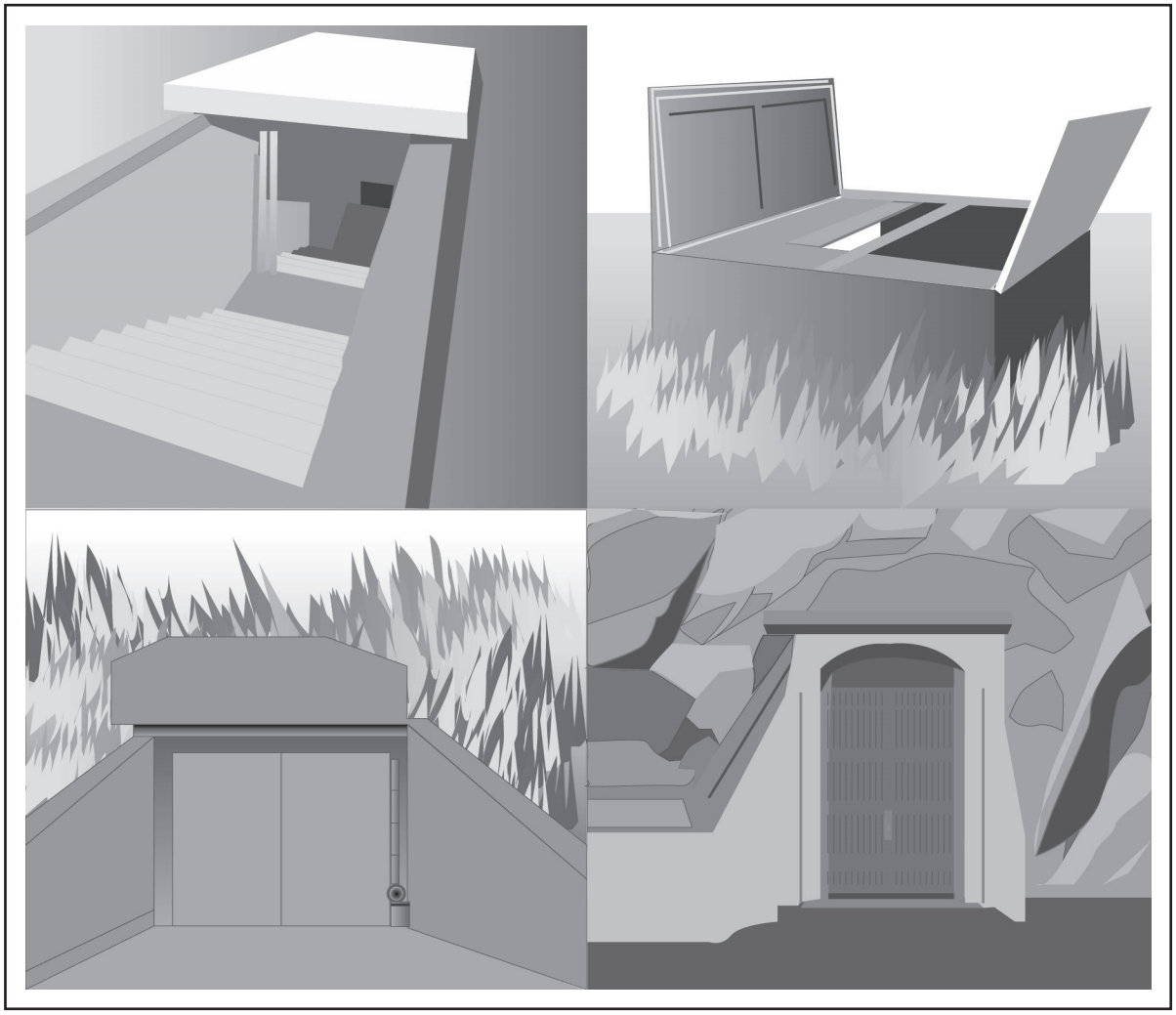


Figure 1-5. Underground facilities portals

1-52. Underground facilities may include the following external umbilical structures with some having robust internal redundancies:

- Power, such as above ground power lines, buried power lines, substations, transformers, power generators, batteries.
- Communications, such as, landline wire and fiber-optic cables, buried antennas, surface antennas, satellite dishes, internal and external networks.
- Life support and environmental controls, such as heating, ventilation and air conditioning, water lines or storage containers, vents, water chillers, sewage disposal, dehumidifiers, carbon dioxide scrubbers, CBRN filters, blast valves, air handlers.
- Transportation—access ways, vehicles, trains, conveyors, escalators, elevators.

1-53. Most underground facilities have some number of umbilicals that facilitate a combination of functions including command and control, operations, production, protection, or storage.

1-54. Underground facilities usually rely on umbilicals to function. In many cases, consider underground facilities functionally mitigated if rendering the critical umbilicals inoperable. For example, cutting communication lines around the facility or destroying satellite dishes or antennas outside may defeat the function of the facility. Cutting off enemy access to storage facilities may functionally mitigate them. Targeting life support or environmental control umbilical systems external to the underground facility may render it nonmission capable. Umbilicals, if large enough, may also serve as alternate entry points into a subterranean facility.

LEXICON

1-55. Table 1-2 includes a list of terms commonly used by civilian and other government agencies to describe features of subterranean systems.

Table 1-2. Subterranean system features

Term	*Definition*
Adit	A mine entrance that is horizontal or nearly horizontal, which can be used to enter, ventilate, or drain water from the mine.
Alcove	A limited and localized enlargement of a tunnel to accommodate equipment.
Barricade	Refers to doors, gates, hatches and framing, as well as the presence of any reinforcement to hinges, locking mechanisms, or the barricade itself to control entry and exit.
Blast door	A door designed to withstand blast effects.
Blast berm	A wall or mound of earth directly in front of a portal used to deny or minimize kinetic weapon effects.
Blast valve	A valve, normally open, to facilitate ventilation which closes automatically when exposed to high blast pressures. May close for CBRN protection.
Bomb trap	A space designed to contain or divert blast effects.
Confined space	An enclosed or narrow space not meant for continuous human inhabitance.
Deep	A facility with more than 20 meters overburden.
Drift	A horizontal, or near horizontal, passageway within a subterranean system that does not open to the surface on both ends.
Fall	A mass of roof rock or other material that has fallen in the mine.
Footprint	The surface area that incorporates all the components of a subterranean system.
Gallery	A large horizontal or a nearly horizontal underground passage, either natural or artificial.
Hard structure	Structures resistant to kinetic weapons effects. Highways, railroad tunnels, some bridges, and airfields are hardened due to their typical design.
Hardened structure	A structure intentionally strengthened to provide protection from kinetic weapon effects.
Mission space	The space where the facility functions occur. Also known as the functional area.
Overburden	The amount of earthen material above the ceiling of the subterranean system.
Portal	The structure surrounding the immediate entrance to a mine; the mouth of a cave or tunnel.
Shallow	A facility with 20 meters or less overburden.
Silo	A vertical, cylindrical structure extending from the surface into the ground used to protect a missile.
Shaft	A long, narrow, often vertical passage in a subterranean space generally used for ventilation, drainage, or hoisting of personnel or materials.
Tunnel	A horizontal, or near-horizontal, underground passage that is open to the surface at both ends.
Umbilical	Supporting Infrastructure that allows a system to function.
Legend: CBRN – chemical, biological, radiological, and nuclear	

CONSTRUCTION OF SUBTERRANEAN SPACES AND STRUCTURES

1-56. Construction of subterranean structures varies greatly based upon the category and complexity of the structure, the building nation or group, and the geology where it is located.

NATURAL

1-57. Subterranean spaces, such as caves and caverns, occur naturally and form over time through various geologic processes and environmental conditions. They can be adapted for civil or military purposes. People have used natural caves and caverns for hiding civilian and military personnel, storing supplies, and planning operations. Relatively quickly, organizations may refurbish these spaces into military subterranean systems.

HAND-DUG

1-58. Tunnel systems, like those used in Vietnam, can be dug with hand tools over a period of weeks, months, and even years. These systems are shallow and range from short point-to-point tunnels to large multilevel complexes. Construction of these types of facilities is often easy to conceal from reconnaissance assets because sophisticated equipment is not required and the builders displace only small amounts of earth.

1-59. Adversaries can build tunnel systems in almost any environment; including jungle, mountain, and urban terrain (see figures 1-6 and 1-7). Typically, tunnels pose a tactical-level threat. However, tunnel systems used to cross national boundaries can have strategic implications.

1-60. During construction of subterranean systems, the enemy may include booby traps, explosive hazards, and false tunnels intended to thwart exploitation efforts.

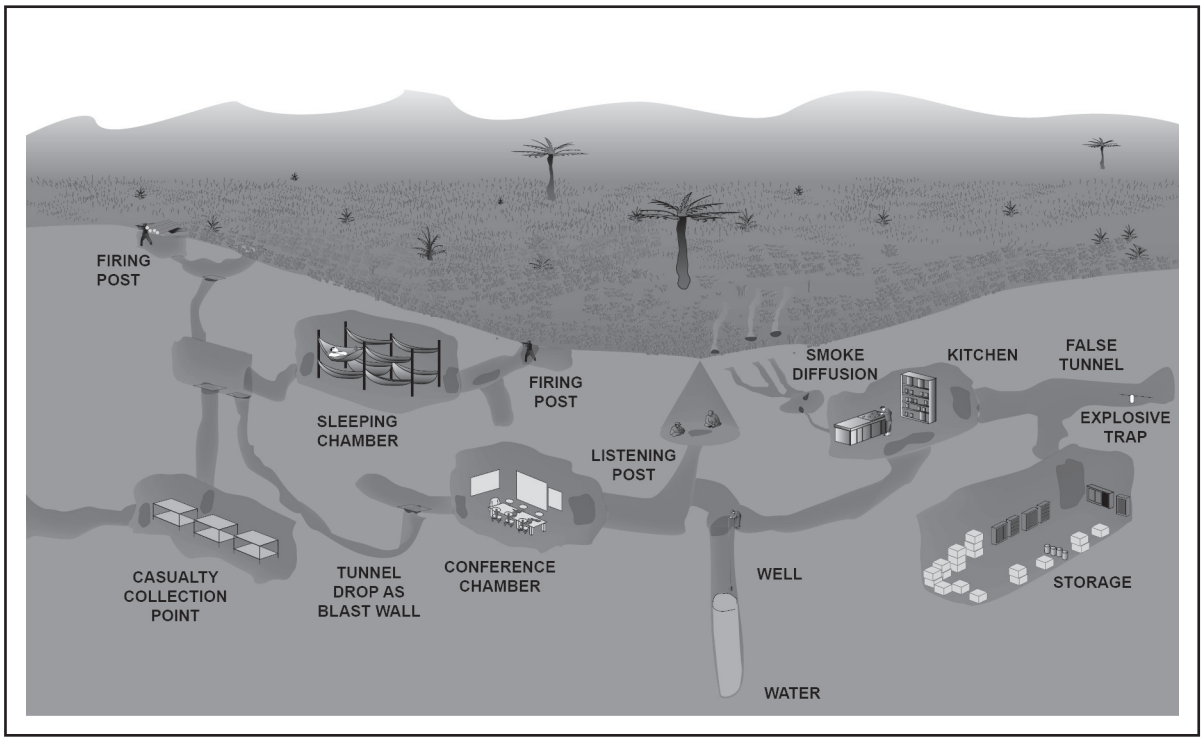


Figure 1-6. Tactical tunnel system in jungle environment

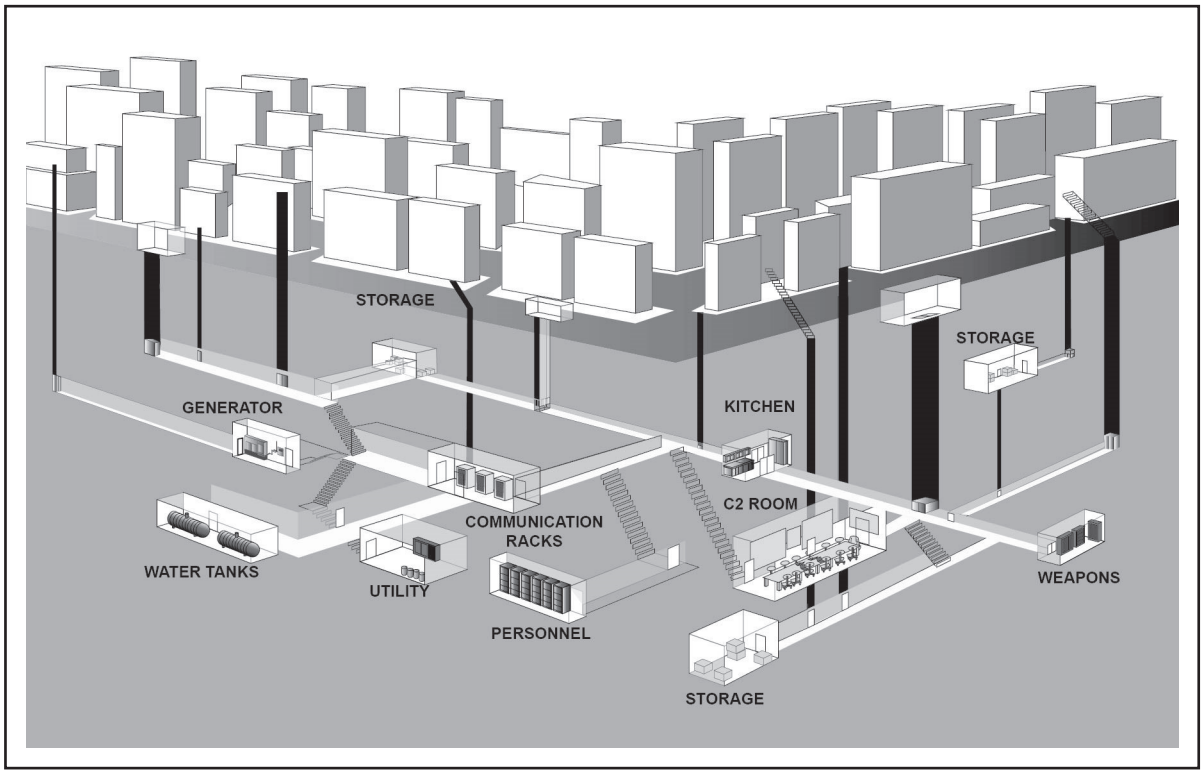


Figure 1-7. Tactical tunnel system in urban environment

CUT AND COVER

1-61. Shallow underground facilities and civil subterranean systems, such as sewers and aqueducts, are typically built using the cut and cover method. Construction crews excavate an area, build the structure, and then cover the project with the original earth. They frequently have ramps providing access to the facility and may have thick, reinforced, concrete walls and ceilings. Their locations look like any other large construction project and are noticeable by the presence of large earth moving equipment like bulldozers, front-end loaders, excavators, and dump trucks.

TUNNELED

1-62. Deep underground facilities and civil systems such as subways are often excavated using the drill and blast method or by using drill jumbos, road-headers, and tunnel-boring machines. The construction site of a facility using the drill and blast method may resemble that of a mine. Construction crews use drill jumbos and tunnel-boring machines on special purposed facilities, as those pieces of equipment are rare and expensive to operate. The displaced earth (tailings) is sometimes moved away to prevent the enemy from determining the size of the tunnel.

1-63. Construction engineers design underground facilities to withstand military strikes. They may include multiple design features to accomplish this. Most facilities place their mission space in the deepest location possible to protect the function of the facility. The deepest facilities can withstand any surface and air strikes. To mitigate damage to the mission space from blast waves through the access tunnels, underground facilities often have bomb traps, multiple interior turns, and blast doors. External features such as blast berms alleviate blast effects from entering a facility (see figure 1-8, page 1-16).

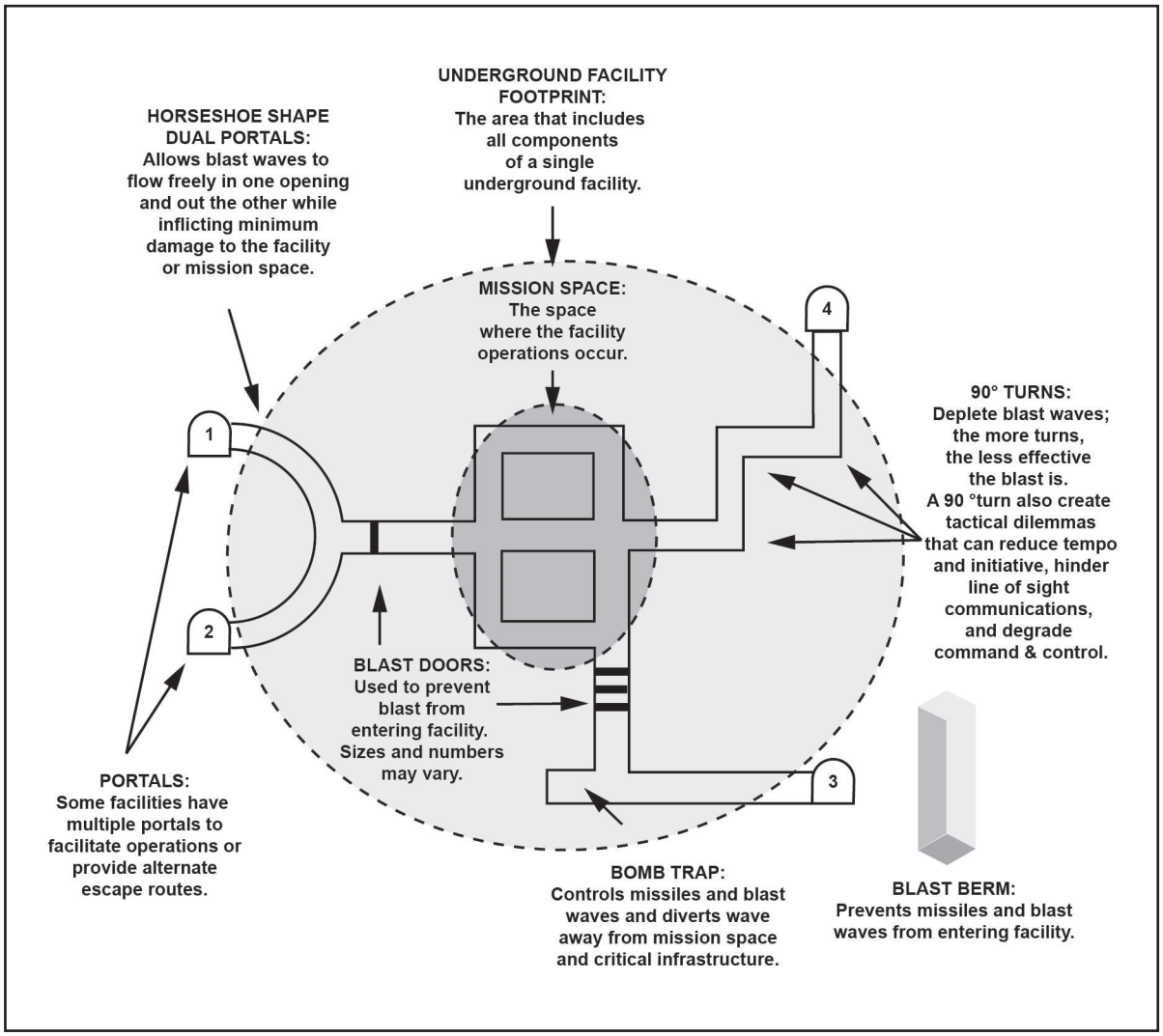


Figure 1-8. Underground facilities design features, top view

Chapter 2
Threat

As we prepare for military conflicts in the future, subterranean systems play a major role in shaping both friendly and enemy operations. This is especially true of conflicts in large urban centers and around strategic assets secured in purpose-built underground facilities.

THREAT TYPES AND OBJECTIVES

2-1. Today several countries are actively developing their subterranean capabilities. These countries include Russia, China, the Democratic People's Republic of Korea, and Iran. Each of these countries has constructed underground facilities that support the overall military strategy for their country. An example of one of these countries is the Democratic People's Republic of Korea, commonly known as North Korea. North Korea may have started building its subterranean capabilities in the mid-1960s, providing adequate time to take much of its military and governmental activities underground through the creation of numerous underground facilities and combinations of defensive structures.

2-2. Irregular threats have the capability to use the subterranean environment as well; however, they generally cannot openly construct military facilities the way nation-states can. An example of nonstate threats using the subterranean environment is Hezbollah, which created a complex integrated network of underground tunnels and bunkers throughout southern Lebanon as a key component of its planned area defense. The Islamic Resistance Movement's (Hamas') tunnel systems vary in design and range, from sophisticated interconnected networks with multiple entrances and exits that support various functions to rudimentary tunnels with limited functional capacity. These examples are only a few of the subterranean systems used worldwide today.

2-3. Threat forces have been using subterranean systems for decades to gain an advantage over their opponents. Historical examples of threats exploiting the subterranean environment to their advantage abound, from the Vietnam War to modern day Korea, Afghanistan, and Hezbollah. Repeatedly, adversaries seen as technologically inferior have secured victories through their creative use of the subterranean environment. During subterranean operations, the BCT should be prepared to face and defeat traditional, irregular, and hybrid threats as described below:

- Traditional or regular. Regular threats are part of nation-states employing recognized military capabilities and forces in understood forms of military competition and conflict. The Islamic Republic of Iran Army and the Peoples Liberation Army of China are examples of regular forces.
- Irregular. Irregular threats are opponents employing unconventional, asymmetric methods and means to counter U.S. advantages. A weaker enemy often uses unconventional methods to exhaust U.S. collective willpower through protracted conflict. Unconventional methods include such means as terrorism, insurgency, and guerrilla warfare. Economic, political, informational, and cultural initiatives usually accompany and may even be the chief means of irregular attacks on U.S. influence. The Revolutionary Army Forces of Columbia-People's Army and Al Qaeda are examples of irregular forces.
- Hybrid. *Hybrid threats* are the diverse and dynamic combination of regular forces, irregular forces, terrorist, or criminal elements acting in concert to achieve mutually benefitting effects (ADP 3-0).

2-4. Regardless of which threat type is using the subterranean environment, they design their subterranean activities to protect combat power and prolong a conflict. This allows a technologically overmatched threat to defeat a more powerful adversary through attrition. The main objectives of threat subterranean operations are—

- Control access (limited entrances and exits).
- Negate technological overmatch (defeats information collection platforms, weapon system standoff, and ordnance capabilities).
- Control the tempo (through deception and delay tactics; additionally, once friendly forces enter a subterranean system, the opposing force can decide when they want to fight or withdraw).
- Inflict mass-casualties.
- Force decentralized and dispersed operations (disrupts communication, limits visibility, and prevents massing of fires).
- Achieve surprise.

THREAT COMMON CONCEPTS FOR THE SUBTERRANEAN ENVIRONMENT

2-5. A nation-state threat has the dedicated time and resources to build underground facilities for predetermined functions as part of that nation's military strategy. Each underground facility serves a tactical, operational, or strategic level purpose for the countries' strategy. Understanding this purpose provides insight into the facilities design and function. Recognizing each country has an established order of battle and limited resources; they allocate priority and distribute resources accordingly for each underground facility. Category 3 underground facilities are further defined as follows:

- Strategic underground facilities. Used by all threat countries to secure strategic national assets such as WMD storage and production facilities, critical command and control nodes, and other assets of strategic value.
- Operational underground facilities. Primary focus of a military's purpose as seen in North Korea with their long-range hardened artillery sites and in China with their coastal defense missiles.
- Tactical underground facilities. Primarily seen in North Korea protecting tactical capabilities along the border with South Korea.

2-6. Nonstate threats continue to exploit the subterranean environment; however, they are limited in their capability to build underground facilities (category 3). They can repurpose tunnels, natural cavities, and caves (category 1), and urban subterranean (category 2) systems. Taliban caves in Afghanistan, Hezbollah tunnels, and fortified urban areas controlled by Hamas are a few recent examples of repurposed subterranean systems by nonstate threats.

THREAT TACTICS FOR TACTICAL SURFACE ENGAGEMENTS WITH SUBTERRANEAN ACTIVITIES

2-7. A complex battle position is a defensive location designed to employ a combination of complex terrain and engineer effort, such as camouflage, concealment, cover, and deception to protect the unit within it from detection and attack while denying its seizure and occupation by the enemy. A subterranean, complex battle position is further defined as a complex battle position with significant subterranean supporting infrastructure. The additional subterranean component strengthens the durability of the position and limits intelligence collection from the site. Subterranean, complex battle positions share many of the same characteristics of a complex battle position with a couple of additions. These characteristics are as follows:

- Limited avenues of approach to a subterranean, complex battle position.
- Avenues of approach are easily observable by the defender.
- 360-degree fire coverage and protection from attack.
- Engineer effort prioritizing camouflage, concealment, cover, deception measures, and countermobility efforts to disrupt attacks.
- Large logistics caches.
- Sanctuary from which to launch local attacks and counterattacks.
- Increased survivability.
- Concealed subterranean facilities hinder the ability of friendly forces to gather accurate damage assessments and other information.

2-8. The use of a subterranean, complex battle position does not change the function and intended purpose from that of a traditional, complex battle position. A threat may integrate subterranean, complex battle

positions into their main defense forces for an area defense. Threat forces place smaller battle positions-subterranean in the disruption zone, while the battle zone may include a network of larger and more battle positions-subterranean to include subterranean positions in mutually supporting locations. These battle positions-subterranean use the terrain, durability of the positions, and extensive obstacles to defend and defeat enemy offensive actions. As enemy forces enter the battle zone, which are already degraded by disruption force actions, effective camouflage, concealment, cover, and deception measures obscure friendly understanding of the threat's actual main defensive positions. Decoy battle positions–subterranean may be encountered in the disruption, battle, and support zones to deceive the attacking commander on where and when to mass their combat power.

2-9. Threat forces may use battle positions–subterranean in numerous environments. Only time, resources, and the engineering capability of the threat forces limit their ability to construct these facilities. Threat forces typically place battle positions–subterranean along avenues of approach, key terrain, or urban terrain unless it is an underground facility with a special purpose. Connected passageways allow threat forces to withdraw, infiltrate, or conduct attacks against friendly communication elements and sustainment forces. Additionally, threats may use battle positions–subterranean as part of a larger offensive action against U.S. forces, serving as hide positions for stay behind or bypassed forces that may emerge to desynchronize and disrupt friendly forces.

Threat Elements Defending a Subterranean, Complex Battle Position

2-10. The enemy commander of a complex battle position designates their subordinate units as functional elements based on the threat task organization for the defense. The name of the element describes its function within the defensive action.

Disruption Element

2-11. The subterranean, complex battle position employs a disruption element to detect friendly forces and provide early warning to the defending element. To accomplish these tasks, the disruption element may emplace combat security outposts and ambush teams. In addition, the disruption element can establish antilanding ambushes and antilanding reserves during coastal operations. When a subterranean, complex battle position is defending, disruption elements may remain in concealed positions to provide the commander with a reconnaissance capability. The disruption element may also include indirect fire assets, such as mortars, to provide immediate and observed harassing fires.

Main Defense Element

2-12. The enemy's main defense element of a subterranean, complex battle position is responsible for defeating an attacking force by guiding it into kill zones, where enemy fires and obstacles cause significant destruction to the attacker's combat power. Designated enemy elements fix the friendly forces in kill zones while these and other elements attack by direct and indirect fires or through support-by-fire positions. The enemy may direct other elements to maneuver on fixed friendly forces to defeat them. The enemy employs close-support fires to defeat friendly forces approaching and in kill zones and uses counterfire to neutralize or destroy friendly forces' indirect fires, supporting their attack into the enemy defensive array. If necessary, final, protective, indirect fires complement subterranean, complex battle position direct fires and demolitions intended to defeat friendly forces forward of the battle position. The main defense element can also cover the withdrawal of the support element if an evacuation of the subterranean, complex battle position is ordered.

Reserve Element

2-13. The reserve element of a subterranean, complex battle position exists to provide the commander with tactical flexibility. During the counterreconnaissance battle, the reserve may augment disruption elements to provide additional security forward of the main defense element. However, the reserve rarely does so if such action would reveal the location of subterranean portals to friendly forces. Some typical additional tasks given to the complex, battle position reserve may include—

- Conducting a counterattack.
- Conducting counterpenetration (blocking or destroying the friendly forces penetration of the complex battle position).

- Conducting anti-landing defense.
- Assisting engaged forces in breaking contact.
- Acting as a deception element.

Support Element

2-14. The support element may be located within the subterranean, complex battle position outside of the subterranean, complex battle position or a combination of the two. The support element has the mission of providing one or more of the following to the defending element:

- Sustainment.
- Command and control.
- Supporting direct fire (such as heavy machine gun, antitank-guided missile, recoilless rifle, or automatic grenade launcher).
- Supporting indirect fire (mortar or artillery).
- Supporting nonlethal actions (for example, jamming, psychological warfare, or broadcasts).
- Engineer support.

Command and Control of a Subterranean, Complex Battle Position

2-15. Normally, command and control of a subterranean, complex battle position is more difficult than that of a standard battle position. Dispersion of enemy forces between the surface and subterranean spaces and the associated environmental challenges may hamper a defender. To maintain security and avoid detection, defenders make all possible use of secure communications, such as couriers and wire. Regular force threats require communications to the higher headquarters and integrated fires command.

THREAT FORCES DEFENDING OPERATIONAL AND STRATEGIC UNDERGROUND FACILITIES

2-16. Only time and capability limit a nation state threat when it comes to the design and layout of their underground facilities. Trained engineers, using relatively current technologies, have designed underground facilities to protect operational and strategic capabilities. Threat forces can design these facilities for multiple purposes using various configurations. The majority encountered on the battlefield serve a military purpose. However, a threat country may build subterranean systems to support civilian factories. These military subterranean facilities protect capability and preserve the defending force from attackers. Expect a deliberately planned defense for each of these underground facilities. Additionally, expect an appropriate level commander in each of these facilities along with the appropriate forces task organized to support the mission of the facility and its defense.

Threat Operational Underground Facilities

2-17. Numerous threat forces build shallow underground facilities in conjunction with supporting trenches, bunkers, and hardened artillery sites that support ground forces. Shallow underground facilities are the most common military subterranean structures. These structures have several entrances, exits, and protective measures and can be connected with deep tunneling impervious to attack from above, thus enabling rapid, protected maneuver under and around attacking forces. If the threat has a regular force structure and has the time and capability to expand subterranean activities, then the threat forces may create sites to protect their artillery or other critical capabilities. North Korea uses hardened artillery sites to protect the majority of its artillery along its defensive belts. A hardened artillery site is a fortified, battery fighting position that can be manmade or the site can be a modification of a natural cave system. While these sites in North Korea are the most publicized, all potential nation-state adversaries have the ability to build similar structures in the lead-up to a conflict. Many, beyond North Korea, already have similar sites established. Usually, these sites possess a fire direction center communicating with the integrated fires command, ammunition storage, and barracks. A hardened artillery site may contain trenches, tunnels, reinforced doors, and internal self-defense measures against ground attack. To protect against aircraft attacks, a hardened artillery site may use antiaircraft systems concealed on an elevator system. Figure 2-1 and figure 2-2, page 2-6, show examples of what a hardened artillery site may look like.

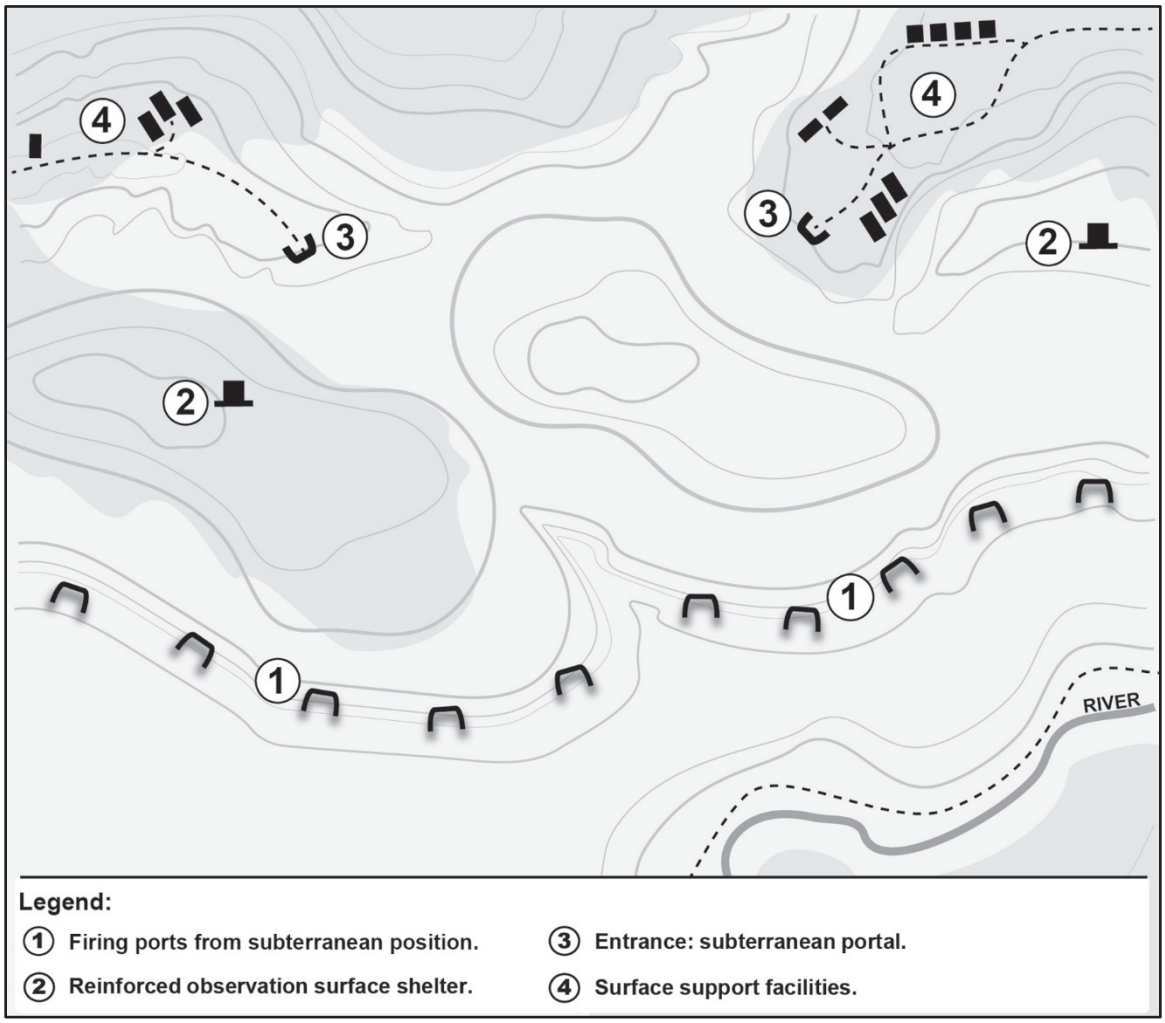


Figure 2-1. External view of a possible hardened artillery site

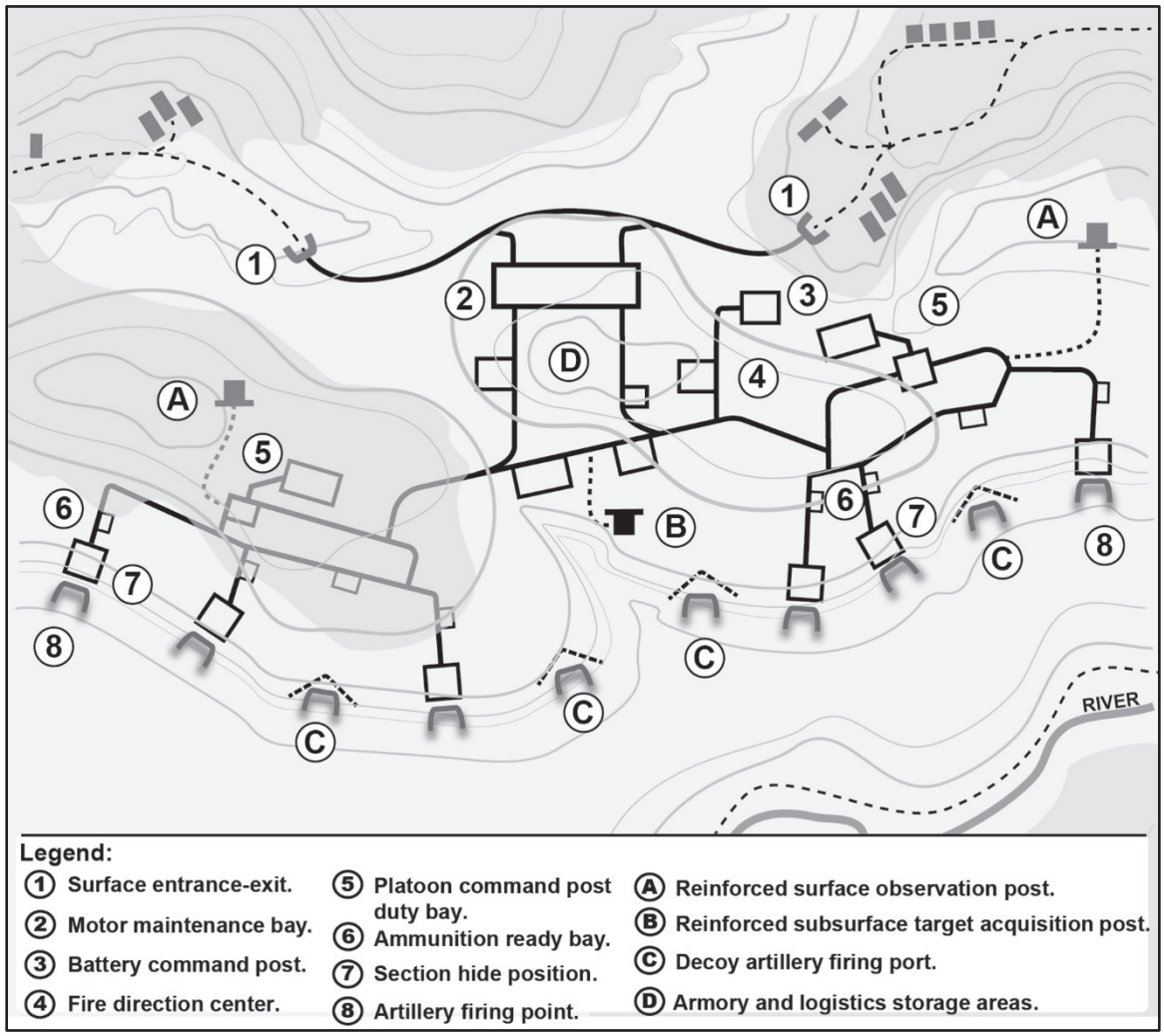


Figure 2-2. Internal view of a possible hardened artillery site

2-18. Threat countries use underground facilities for coastal defenses and naval capabilities. They use these facilities to protect vessels from aerial attack, as well as for ammunition and fuel storage. Threat anti-landing forces may also occupy underground facilities along potential landing sites, major ports, and on select naval bases.

2-19. While the figures above depict the complexity of an underground facility on a horizontal level, they do not account for the vertical complexity of a potential site. Figure 2-3 shows an example of how multiple floors can quickly increase the complexity of one of these sites.

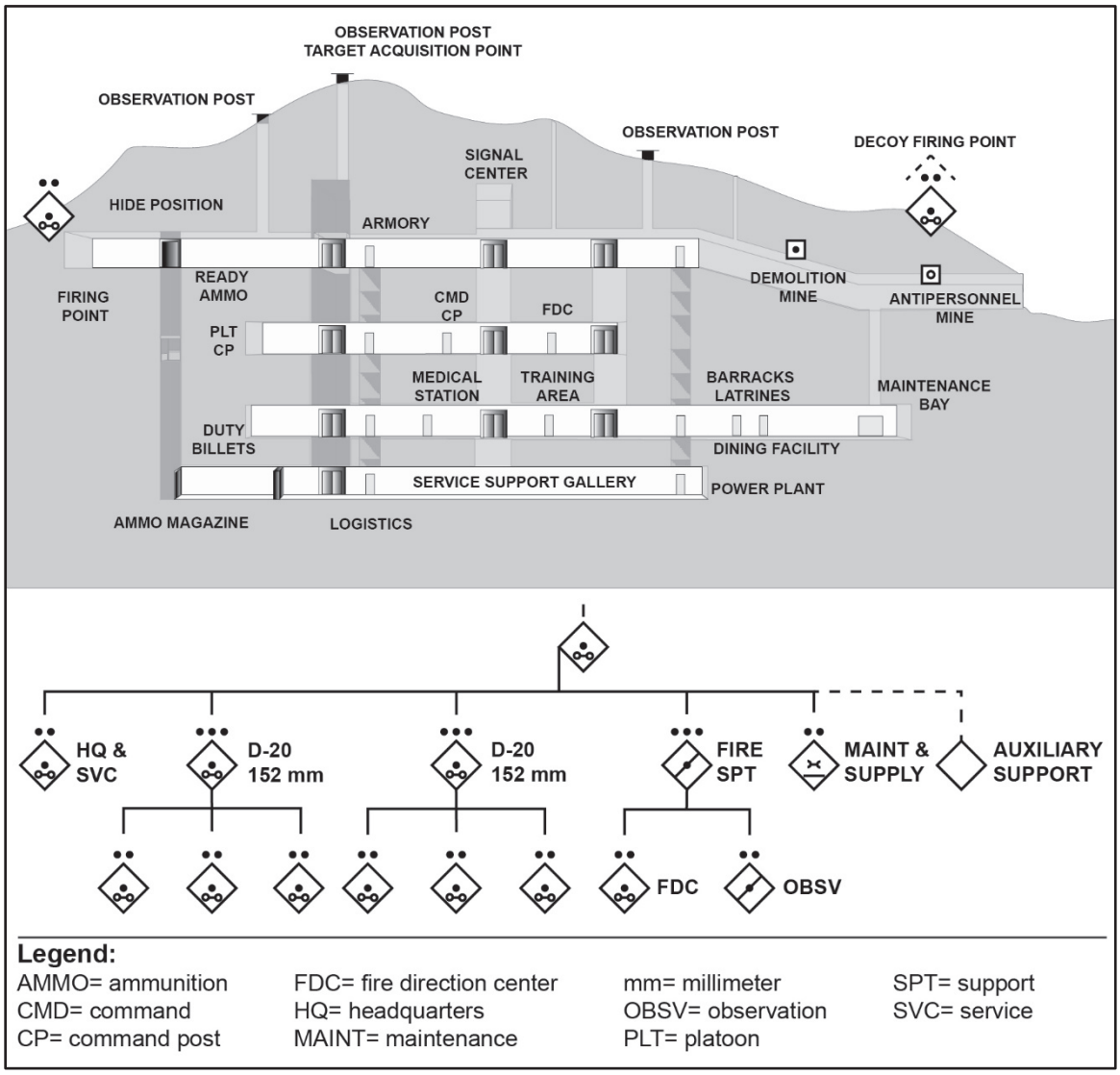


Figure 2-3. Side view to show potential complexity of a hardened artillery site

Threat Strategic Underground Facilities

2-20. Threat countries may use underground facilities to protect their air force capabilities. This could include airfields with portions of runways and hangars underground for protection from aerial attack. The enemy may place support activities such as airplane manufacturing, vehicle fuel and ammunition storage, and aircraft repairs and maintenance into underground facilities. Due to the resources and time required to construct these underground facilities, only a few countries have this capability. Since these facilities can handle larger pieces of equipment, they are larger, with tunnels and doors around 40 to 45-meters wide and 10 to 12-meters high, based on requirements. The doors typically feature moveable blast walls and concrete barricades to offer additional protection. Threats may potentially place air-defense radars and weapons systems on elevator platforms. Doing this protects the systems while underground and allows for employment when raised to the surface.

2-21. Threat countries have a capability to place factories inside underground facilities to protect elements essential to a country's military capabilities. These underground facilities protect several key industries and conceal their activities. A threat country that builds its factories underground could be able to produce ammunition, fuel, and maintenance parts and store these for long periods, making it difficult to degrade the

threat's military capability. Underground facilities that support factories have some umbilical characteristics that separate them from strictly military facilities. These may be—

- Road infrastructure that supports the operation of the facility.
- Civilian infrastructure nearby.
- Civilian or noncombatants working at the site.
- Toxic industrial hazards presence.
- Potential CBRN storage or production materials.

2-22. Threat forces may use underground facilities as command and control facilities for senior leaders. These facilities contain the capability to sustain a continuity of government with locations for both civil and military leaders. The enemy carefully chooses these sites and incorporates camouflage, cover, deception, and other security measures. They hide the entrances to these underground facilities, sometimes obscuring portals within residential buildings. The facility may have medical facilities on site and CBRN protection.

NONSTATE THREAT FORCES UNDERGROUND FACILITIES

2-23. Nonstate threat forces have used subterranean systems to gain an advantage over a superior force. Whether in a large urban environment, mountainous rural regions, or many others, friendly forces can expect to encounter enemy subterranean threats in all of these environments.

2-24. The following vignette describes the subterranean challenges the Israeli Army faced in 2006.

The 2006 Lebanon War was years in the making. In 2000, when the Israeli Defense Forces withdrew from southern Lebanon, Hezbollah began preparation for its planned defense, anticipating a day when it would be required to defend the region from the Israeli Defense Forces. This preparation included building an intricate and secret military infrastructure throughout southern Lebanon that consisted of tunnels, bunkers, and observation posts, all supplied with large stockpiles of artillery rockets, antitank guided missiles, mortars, food, water, and medical supplies.

In July 2006, Hezbollah initiated an indirect fire attack into northern Israel to create a diversion that concealed the operation of an ambush element targeting an Israeli Defense Forces convoy. Hezbollah successfully attacked the patrol and kidnapped two Israeli Soldiers. This action resulted in a military response from Israel that embroiled the region in war.

Israel's first offensive operations of the war consisted of a combination of air and artillery strikes designed to accomplish two objectives: to destroy Hezbollah's long-range rocket launchers and to deny Hezbollah freedom of movement with the kidnapped Israeli Defense Forces Soldiers.

To achieve these goals, Israeli military forces targeted bridges and roads, Hezbollah command posts, long-range missile locations, and other military targets. However, despite Israel's air and artillery campaigns, Hezbollah was able to continually fire rockets into Israel at a rate of more than 100 a day.

In an effort to stem this onslaught and manage perceptions to present Israel as the victor, Israel initiated a ground campaign and engaged with Hezbollah fighters. It was at this point that the Israeli Defense Forces, and the world, confronted the magnitude of Hezbollah's defensive positions, tactical skill, and armaments. As an Israeli Defense Forces Soldier put it, "We expected a tent and three Kalashnikovs—that was the intelligence we were given. Instead, we found a hydraulic steel door leading to a well-equipped network of tunnels" full of highly trained Hezbollah fighters equipped with flak jackets, night-vision goggles, communications equipment, and in some cases even Israeli uniforms and equipment. Hezbollah's defenses throughout southern Lebanon were impressive. Not only did they incorporate the subterranean environment, they also planned ambushes, rehearsed logistics routes, seeded minefields, and built other tactical defensive positions.

CHARACTERISTICS OF THREAT DEFENSES IN SUBTERRANEAN SYSTEMS

2-25. Threat forces defending these subterranean systems have numerous advantages available to them. The type of underground facility influences the type and number of defensive forces and designs, which nest with the underground facility defense plan. The structure is designed with the defender in mind; this provides opportunities for the threat defender to—

- Canalize and control movement of the attacking force.
- Delay and degrade the attacking force.
- Maintain observation and situational awareness of the attacking force.

2-26. Entrances to threat tunnels, subterranean systems, and underground facilities reflect several types of defensive measures. The defensive measures can range from simple concealment to sophisticated blast doors. Figure 2-4 shows the outer blast door and an inner door. Threat forces secure these doors in the event of an attack.

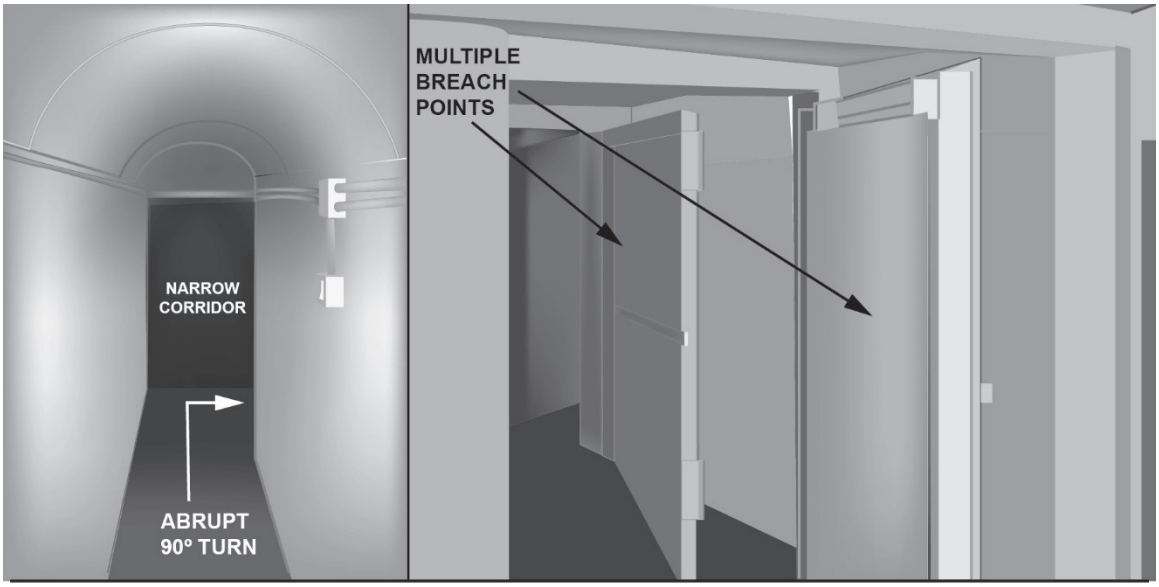


Figure 2-4. Threat passageways and barricades, examples

2-27. Threat forces design engagement areas that hinder and reduce U.S. forces' ability to mass fires and maneuver. Sharp turns that limit visibility and restrict passageways are one way for the enemy to do this. These engagement areas may incorporate explosive hazards to produce large numbers of casualties. Enemy forces may trap and defeat an attacking force through their engagement area design.

2-28. U.S. forces can expect to encounter various countermobility obstacles throughout an underground facility. Only time, resources, and imagination limit the enemy employment of these obstacles. Threat forces use water obstacles, mines, decoy tunnels, booby traps, explosive hazards, and cameras to monitor attacker movement and maintain situational awareness.

2-29. Use of chemical agents by the defenders may occur. These chemical agents do not dissipate as easily as above ground. When prepared to use chemical agents, the enemy incorporates their use into the defensive plan for that specific underground facility.

2-30. Air quality varies depending on the sophistication and type of subterranean system. Deeper, more sophisticated underground facilities may have ventilation systems and the ability to remove natural gases

before they reach dangerous concentrations. Factories have a different type of ventilation system dependent on the factory and its use (see figure 2-5 for examples). Simple tunnels and underground facilities may lack adequate ventilation and threat forces may operate at degraded capabilities while in these structures. All underground facilities have camouflage, concealment, cover, and deception to prevent accurate identification of the ventilation system since a ventilation system may be an indicator of a facility's function and characteristics. Consider air quality and air handling systems during the *planning* phase of an assault on a category 2 or category 3 underground facility, as these systems may be reliant upon umbilicals for operation. Umbilical destruction could inadvertently compound friendly force difficulty in clearing and securing these facilities.

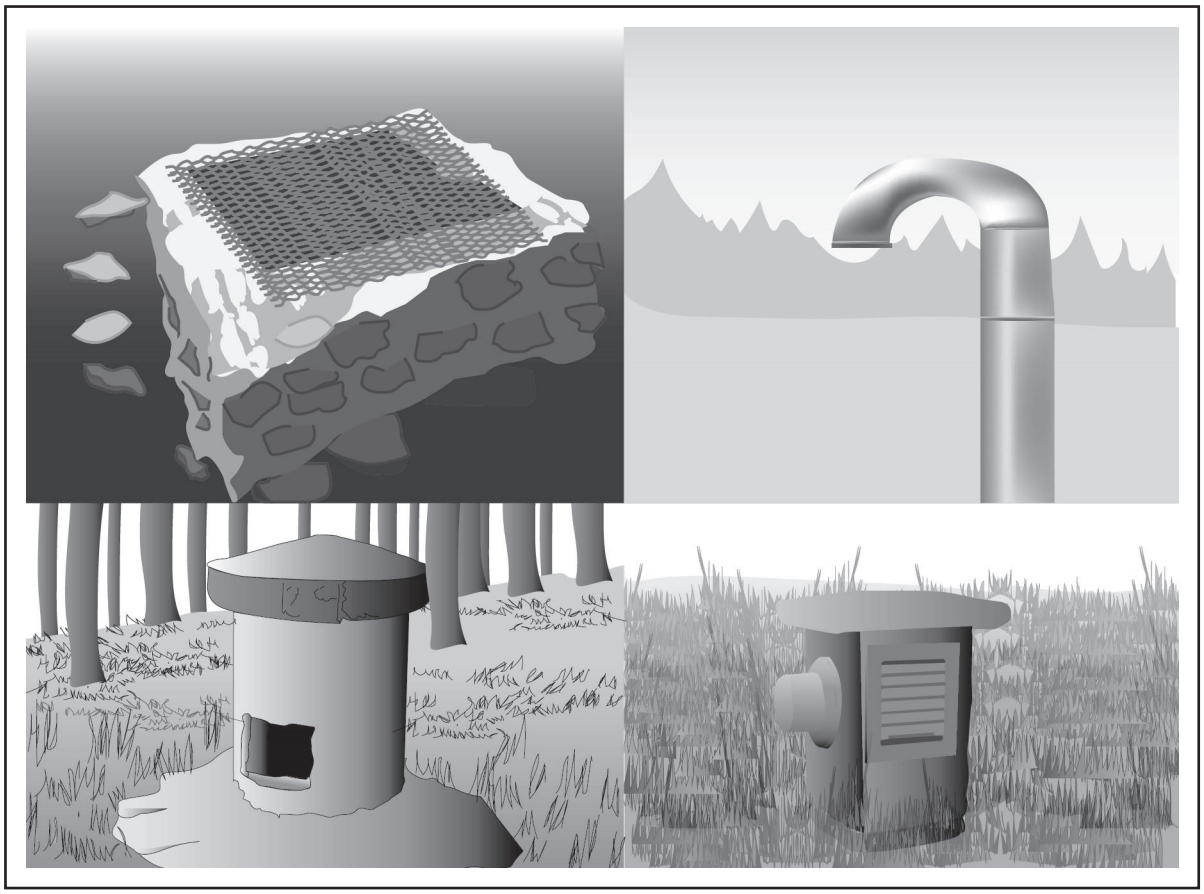


Figure 2-5. Four vent examples

Chapter 3
Brigade Combat Team and Battalion Operations

Subterranean operations are extremely intensive in terms of time, manpower, and resources. While the tactics and planning processes used in other combat operations still apply, units must account for the unique challenges of the subterranean environment. Clearing a single underground facility can cause a unit to lose momentum during combined arms maneuver. In addition to the fight within the subterranean facility, enemies protect most of their underground facilities with external defenses that must be defeated to enter the facility.

CONTACT WITH UNDERGROUND FACILITIES

3-1. Subterranean operations pose a wide variety of unique, environmental challenges and potential hazards that make them inherently high-risk. As a general premise, U.S. forces should avoid entering and operating in subterranean environments when possible. Units use the find, assess, mitigate, and continue mission framework (discussed later in this chapter) when encountering subterranean facilities.

3-2. The preferred COA is to mitigate the underground facility, its portals, or its effects, and to continue with the unit's original mission. Several options exist to mitigate the underground facility's effects on mission accomplishment. These options include bypass, neutralize, control, and contain. Additionally, commanders may choose to clear a facility. However, an attack to clear an underground facility, specifically a deep or potentially large subterranean network, requires a deliberate decision. Normally, higher headquarters directs a subordinate unit to clear an underground facility. The commander may select one or multiple options depending on their assessment of the tactical circumstances.

DEFINING THE BCT AND BATTALION FIGHT

3-3. Operations in a subterranean environment require detailed and deliberate planning while considering the unique challenges of being underground. In addition to the hazards associated with subterranean operations themselves, the purpose of the underground facility may pose a hazard. Facilities that contain CBRN capabilities pose an additional risk to friendly forces and civilians. Additionally, the indiscriminate use of explosives in sensitive sites may damage critical underground facility components related to air circulation or cooling systems, which could lead to catastrophic consequences. During subterranean operations, commanders should consider their unit's capabilities and limitations in this unique environment. A lack of personnel or specialized capabilities may cause a unit to culminate sooner than expected. In facilities potentially containing WMD, units may require inorganic expertise to render the facility safe. Commanders at all levels must ensure subordinate echelons clearly understand their intent and the rules of engagement.

3-4. Responsibilities of battalions and BCTs in contact with underground facilities differ from companies and below in several key aspects (see chapter 4 for information on company and platoon operations). The most significant of these is the synchronization of multiple operations simultaneously. Unlike companies and platoons that have a single objective, battalions and BCTs must synchronize surface and subterranean operations in time, space, and purpose across all warfighting functions. Compounding this challenge is the loss of visual contact and potentially radio communications with subordinate elements once they enter a subterranean environment.

3-5. Integrated with the efforts of divisions and corps, BCTs have the responsibility of shaping, setting conditions, and synchronizing operations across multiple domains. In conjunction with the land and air domains as part of a coordinated operation, units may leverage the space, cyberspace, and potentially maritime domains when conducting subterranean operations. Disrupting enemy communications, employing

additional fires assets and information collection, and manipulating life support systems are potential ways units can employ additional domains.

BRIGADE COMBAT TEAM TYPES AND CAPABILITIES

3-6. With the proper training and resources, all BCT types can execute subterranean operations to varying degrees. Differences in equipment and personnel distribution may create advantages or disadvantages for specific formations depending on the tactical circumstances surrounding particular underground facilities or subterranean networks. All BCTs can mitigate underground facilities or subterranean networks to varying degrees with their organic combat power; however, BCTs usually require substantial augmentation to enter, clear, and seize an underground facility. (Refer to FM 3-96 for additional information on BCT formations and their capabilities.)

INFANTRY BRIGADE COMBAT TEAMS

3-7. Infantry brigade combat teams (IBCTs) are better suited for operations in restrictive and severely restrictive terrain than other types of BCTs. They are the ideal choice for entering, clearing, and seizing an underground facility or other subterranean space that is in mountainous, swampy, or other restrictive terrain. A lack of organic mobility makes the IBCT the least capable formation for dealing with subterranean systems while maintaining their momentum. Additional augmentation such as transportation, EOD, military police (MP), engineers, and additional CBRN units may be required to enable seizing an underground facility.

3-8. Capabilities of an IBCT include—

- Conducting Infantry-intensive dismounted small-unit operations.
- Small-unit mobility inside buildings, underground infrastructure, and restrictive interior spaces.
- Conducting air assault, air movement, or airborne operations.
- Employing a Cavalry squadron consisting of mounted and dismounted personnel.
- Weapons companies and organic mortars to support maneuver and provide supporting fires.
- CBRN capability not tied to vehicles, which allows full CBRN capability in all subterranean facilities.

3-9. Limitations of an IBCT include—

- Limited firepower, mobility, and armored protection.
- Limited rapid repositioning of dismounted maneuver forces.
- No armored medical evacuation transport.
- Limited command post (CP) positioning options due to minimal protection.
- No organic gap crossing capability.
- Limited communication ranges with nonvehicular systems.
- Limited digital systems, which decreases situational understanding.
- Limited transportation assets to facilitate rapid sustainment.

STRYKER BRIGADE COMBAT TEAMS

3-10. The Army designed, staffed, and equipped the Stryker brigade combat team (SBCT) primarily to conduct operations in small-scale contingency operations. Its mobility, three Infantry battalions, and reconnaissance and security assets make it well suited for mitigating as well as entering and clearing an underground facility. The SBCT is the optimal formation to attack, clear, and seize an underground facility or subterranean network that is in terrain that favors vehicular movement. Like the IBCT, the SBCT requires additional augmentation to seize an underground facility.

3-11. Capabilities of an SBCT include—

- Superior mobility, especially in areas with substantial road networks.
- Using mobile gun systems and antitank guided missile platoons for reducing exterior defenses and limited breaching.
- Digital situational awareness down to vehicle level.
- Organic mortar fires at company level.
- Enhanced optics for reconnaissance of the underground facility.

3-12. Limitations of an SBCT include—

- Minimal protection from direct and indirect fire.
- Severely reduced vehicular movement in restricted terrain.
- High usage rate of consumable supplies, particularly class III, V, and IX.
- Increased vehicle recovery requirement.

ARMORED BRIGADE COMBAT TEAMS

3-13. The Army designed, staffed, and equipped the armored brigade combat team (ABCT) to conduct combined arms maneuver operations. Its maneuver, firepower, protection, and organic reconnaissance and security units make it the preferred choice for mitigating an underground facility or subterranean network and continuing the mission to another objective. The ABCT's limited dismounted Infantry capability makes it the least capable formation for entering, clearing, and seizing an underground facility. In addition to the augmentation requirements consistent across the other BCTs, the ABCT may also require Infantry augmentation to clear and seize a large underground facility.

3-14. Capabilities of an ABCT include—

- Mobile, protected firepower in organic combined arms teams.
- Armored combat vehicles that increase survivability when fighting through an underground facility's external defenses.
- Excellent cross-country mobility in unrestricted and semi-restricted terrain
- M1A2SEP tank main gun rounds that breach certain types of portal barricades and reduce external defensive positions.
- M88A2 tank recovery vehicles that can pull some barricade doors from their hinges.
- Enhanced optics for reconnaissance of the underground facility.
- Psychological impact of tanks and Infantry fighting vehicles on the enemy.
- Digital situational awareness down to vehicle level.
- Armored medical evacuation capabilities.

3-15. Limitations of an ABCT include—

- Less dismounted Infantry than other BCTs.
- Severely reduced movement in restricted terrain.
- High usage rate of consumable supplies, particularly class III, V, and IX.
- Increased vehicle recovery requirement.
- Increased danger to friendly forces, civilian population, and structures due to weapons effects.
- CBRN capability tied to a vehicle platform, which may limit its capability in smaller facilities.

COORDINATING WITH ECHELONS ABOVE BRIGADE

3-16. Normally, units conduct subterranean operations in conjunction with a larger mission, operation, or campaign in which the vast majority of the fighting is on the surface. Since companies conduct most of the subterranean fights, battalions and brigades must simultaneously provide them direct support while providing command and control of other surface and subterranean engagements in their area of operations. Degraded communications and navigation from below the surface and even at the surface, due to restricted terrain that often surrounds underground facilities, exacerbates an already challenging situation. Command and control, enabled by the principles of mission command, is paramount.

3-17. At EAB, synchronizing the broader operation and managing specialized enablers against a large number of requirements is extremely challenging. The sensitivity, timing, and priority of subterranean operations may have operational or even strategic ramifications in the larger campaign. The nature of such operations, which may include the countering of WMD, makes them enabler intensive. Many critical technical enablers are in short supply; therefore, the EAB manages their employment. These assets might include host nation and international noncombatant technical experts that need special protection.

3-18. In addition to the specialized enablers, there are associated sustainment and protection requirements that often accompany subterranean operations. Large amounts of water may be required for decontamination. Oxygen tanks, self-contained breathing apparatuses, and specialized breaching materials might need quick resupply, protection, and staging, all of which likely need to be transported over restricted and hostile terrain. For EAB, success in the close fight invariably requires units in the consolidation and support areas to assume responsibility for subterranean operations. When this happens, battle handoff is critical. Synchronizing the continued security, assured mobility, detainee operations, and sustainment of the subterranean fight must be coordinated at EAB.

3-19. Subterranean systems, specifically underground facilities, have many unknowns by their nature. Due to the potential strategic impact of these facilities, EAB develops information collection plans to inform the subordinate BCT collection plans. This should not only include a synchronized collection and analysis plan tied to targeting at EAB, but should also include various collection assets at EAB.

3-20. All the above factors—and others—make the subterranean fight and its impact on the larger operation, multi-echeloned in nature. The faster U.S. and unified action partners synchronize this multi-domain and multi-echeloned fight, the more effectively they defeat enemy units and networks to win the campaign.

OPERATIONS PROCESS AND TACTICAL TASKS IN THE SUBTERRANEAN FIGHT

3-21. Supporting and executing the operations process (Plan, Prepare, Execute, and Assess) is critical in all military operations. This potentially becomes more challenging when planning for and executing subterranean operations. The hidden nature of an underground facility's interior spaces makes it difficult for staffs to assist the commander in driving the operations process, specifically with respect to understanding and visualizing the operation. A comprehensive information collection plan is necessary to reduce uncertainty surrounding the exterior of the underground facility or subterranean network. This allows the commander and staff to focus on the less defined aspects of subterranean operations (see ADP 5-0 for additional information on the operations process).

3-22. Battalion and BCT staffs must clearly articulate task and purpose for subordinate elements for surface and subterranean operations. Framing the mission by selecting the appropriate tactical tasks is critical to clearly expressing the commander's vision and intent.

3-23. The remainder of this chapter focuses on category 3 subterranean systems, underground facilities. Units apply these same principles for contending with category 1 and category 2 subterranean systems. (See chapter 1 for additional information on categories of subterranean systems.)

MITIGATING CONTACT WITH UNDERGROUND FACILITIES

3-24. Entering and fighting in a subterranean environment is extremely high-risk and units should avoid these fights whenever possible. BCTs and battalions quickly mitigate underground facilities, their portals, and their effects when they encounter a subterranean system to maintain momentum and to protect the force.

PLANNING FOR CONTACT WITH UNDERGROUND FACILITIES

3-25. In many cases, units receive a mission that is unrelated to subterranean operations. However, within their operational area there may be multiple known or suspected subterranean systems. Developing branch plans that address the possibility of contact with enemy forces employing underground facilities, subterranean networks, or their surface level defenses is critical to maintaining momentum towards accomplishing the original assigned mission.

Arraying Combat Power

3-26. Known or suspected areas that contain a high density of underground facilities or other subterranean spaces present several challenges for friendly forces. One of the most significant decisions a commander makes during planning is how to array their combat power during movement to protect the force.

3-27. Portals into underground facilities are frequently camouflaged and difficult to detect. Commanders and staffs must assume that locating all of the portals associated with an underground facility or subterranean network may be impossible. A sophisticated enemy allows friendly maneuver forces to pass a portal before acting to strike a less protected target such as a communication element or sustainment assets. Enemies using this technique of subterranean envelopment challenge friendly force conventional planning estimates in regards to what should be a rear or consolidation area. For this reason, the dispersion and organization of friendly maneuver units is critical to enhancing overall security.

3-28. BCTs often position their maneuver units towards the front while moving on a contiguous battlefield with fires, protection, command and control, and sustainment assets towards the rear of the formation. In an environment saturated with underground facilities, it is often prudent to disperse maneuver units throughout the formation to balance security. Figure 3-1, page 3-6, depicts these different techniques.

3-29. The purpose of positioning maneuver units in the middle or rear of the formation is not to protect a non-maneuver unit. Using this technique, the maneuver units are simply operating in a position to provide evenly distributed security for the entire formation against potential threats from unknown directions.

3-30. Although more secure, the challenge with dispersing maneuver units throughout a formation during movement is the need to reposition them forward to support the original assigned mission such as an attack. Commanders and staffs must identify a phase line (PL) or similar trigger for the unit to adjust its formation in preparation for actions at the objective.

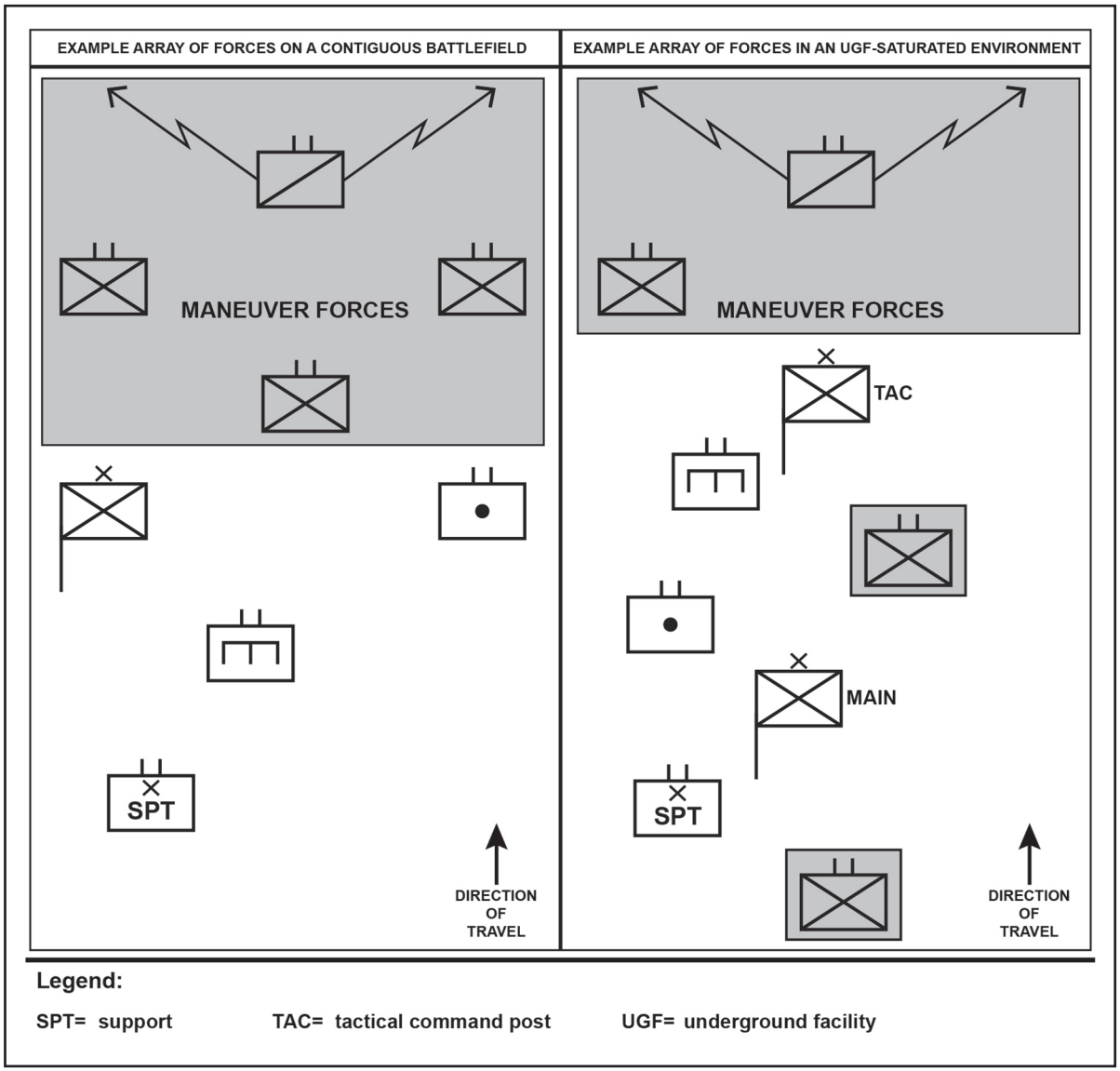


Figure 3-1. Techniques for arraying combat power in different operational environments

Commander's Guidance for Contact with Underground Facilities or Subterranean Networks

3-31. Commanders must clearly articulate criteria for engagement, disengagement, bypass, and possible entry of an underground facility or subterranean network to their subordinate leaders. If subordinate elements decisively engage an underground facility, subterranean network, or their surface level defenses, units risk jeopardizing accomplishment of their assigned mission if they are unprepared for that contingency. Examples of these types of criteria are outlined below:

- Engagement criteria. Engage any portal with indirect or joint fires assets immediately upon identification of enemy forces. Engage with direct fire only if enemy forces are placing effective fires on friendly forces.
- Disengagement criteria. Disengage from contact with a portal if defeating enemy forces requires more than one maneuver company.
- Bypass criteria. Bypass and report the location of all portals showing no enemy activity.

- Entry criteria. Friendly forces do not breach or enter portals unless they are confirming an enemy asset on the high payoff target list to be inside of the underground facility or subterranean space, or significant threats exist within the underground facility that require friendly forces to defeat enemy forces inside of the facility, or if directed by higher headquarters.

3-32. Establishing criteria for engagement, disengagement, bypass, and entry of an underground facility or subterranean network assists the commander in controlling the tempo of operations during movement to their assigned objective. Maintaining a rapid tempo is critical during operations where engaging underground facilities or subterranean defenses is not a unit's primary purpose. Units that do not maintain a rapid tempo in this environment risk becoming decisively engaged and endangering accomplishment of their assigned mission.

3-33. Commanders and staffs must fully address the possibility of coming into contact with an underground facility, subterranean network, or their surface-level defenses when operating in underground facility-saturated environments. Although every underground system and its surrounding terrain are different, using the steps of find, assess, mitigate, and continue mission (paragraphs 3-34 through 3-75) provide the basic framework from which to approach this challenge.

FIND

3-34. The BCT or battalion makes initial contact with the underground facility or subterranean network either through visual means or by receiving direct fire from their surface-level defenses. Ideally, a reconnaissance unit such as the Cavalry squadron or a battalion scout platoon. However, well-camouflaged underground facilities or portals may go undetected until they initiate contact with the unit's main body.

3-35. If the unit is in direct fire contact with an underground facility, subterranean network, or their external defenses, subordinate elements execute an appropriate battle drill such as react to an ambush (near) or knock out a bunker.

3-36. If the unit is in visual contact only, the commander implements a focused reconnaissance effort to identify as much information as possible about the size and scope of the underground facility or subterranean network. Examples of information requirements are number of portals and their locations, ventilation shafts, external defenses, and terrain that would support the maneuver of friendly forces. Additionally, markings on signs posted by portals may provide information as to whether the underground facility has a chemical, biological, or nuclear purpose.

ASSESS

3-37. Based on the information collected during the reconnaissance effort or from contact with enemy forces, the commander decides how best to mitigate the underground facility or subterranean network, their portals, or their effects on friendly forces. The commander's decision is formed by their experience and judgment combined with the tactical circumstances. Key considerations in making this decision are—

- Current and potential future effects of the underground facility or subterranean network on friendly forces.
- Effects of mitigating the underground facility or subterranean network on the unit's ability to accomplish its original assigned mission.
- Effects of not mitigating the underground facility or subterranean network on the higher headquarters' mission.
- Effects of the underground facility or subterranean network on follow-on forces.
- Time available.
- Available combat power and other resources.
- Likelihood of the unit decisively engaged at or near the underground facility or subterranean network.
- Estimated duration to mitigate the underground facility or subterranean network (temporary or permanent).

MITIGATE

3-38. The intent of mitigating an underground facility or subterranean network portals is to reduce or eliminate enemy effects on friendly forces and to preserve combat power and maintain momentum towards

the unit's assigned objective. Commanders mitigate portals or their effects by choosing to bypass, neutralize, control, contain, or clear. Units execute these techniques in isolation or in concert, and potentially at multiple locations simultaneously depending on mission, enemy, time, troops available, terrain, and civil considerations (METT-TC) variables.

3-39. Broadly speaking, the commander has options to mitigate subterranean systems that involve more or less time. All of these options include reporting the location of any portals that may influence friendly operations and follow-on forces. The quicker options include bypassing observed portals, establishing an overwatch position, or destroying portals with fires that potentially have an impact on friendly forces while remaining units continue to maneuver. The more deliberate and time-consuming options involve conducting an area or zone reconnaissance to identify all of the portals and supporting surface infrastructure of a subterranean system. The unit in contact either destroys the portals, thereby containing the enemy force, or establishes overwatch positions to mitigate the subterranean system's effects on other friendly forces in the area. Finally, the most time and resource intensive option involves entering and clearing the facility. In most cases, this is not the preferred option. However, it may be necessary at times; and therefore, units must be prepared to execute these complex operations upon receipt of the appropriate orders.

3-40. The commander has five options to mitigate an underground facility or subterranean system, each requiring a different amount of time, effort, and combat power. Figure 3-2 depicts the approximate levels of time and resources required for each option relative to each other. Commanders may execute these options in isolation, sequentially or simultaneously, or may transition from one to another based on the tactical circumstances. Mitigation options available to the commander include the following:

- Bypass.
- Neutralize.
- Control.
- Contain.
- Clear.

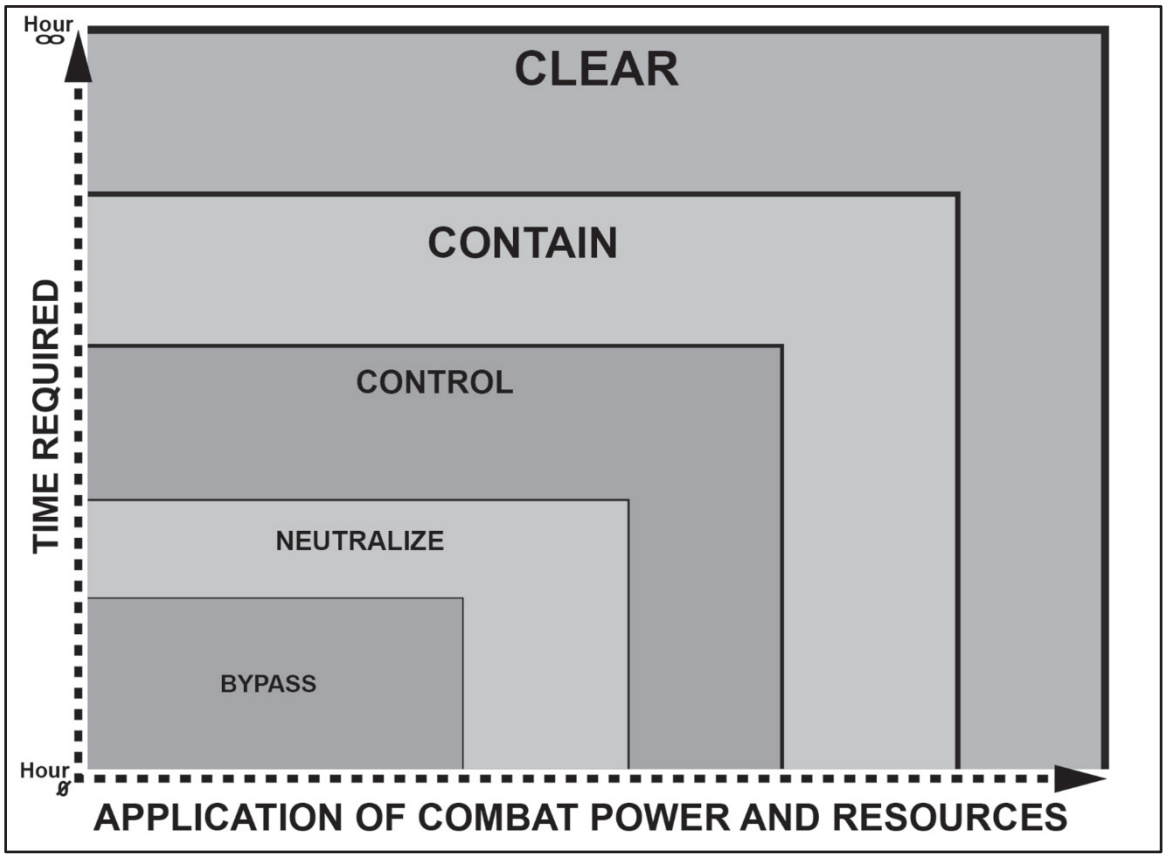


Figure 3-2. Comparison of mitigation options

3-41. When deciding whether to establish and maintain overwatch, the commander must weigh the division of combat power against the potential risk to friendly forces. Within the following options, the commander considers the various overwatch requirements:

- An option for establishing overwatch may include leaving a subordinate element to perform reconnaissance or surveillance.
- The commander may also transition responsibility for overwatch to another unit as directed by their higher headquarters.

3-42. Mitigating underground facilities or subterranean networks without establishing overwatch is not advisable due to potential risks to follow-on forces. However, the need to maintain momentum and preserve combat power may dictate this COA. Commanders and staffs must inform their higher headquarters of all subterranean system portals in the area of operations, specifically those that have no assigned overwatch.

Bypass

3-43. *Bypass* is a tactical mission task in which the commander directs their unit to maneuver around an obstacle, position, or enemy force to maintain the momentum of the operation while deliberately avoiding combat with an enemy force (FM 3-90-1).

3-44. Executing a bypass of a portal (or multiple portals) is the least intensive mitigation option in terms of combat power and other resources. It may or may not be the least intensive option in terms of time required. Usually, units select bypass when the commander decides that the need to maintain tempo and preserve combat power is more critical than the risk associated with bypassing a portal.

3-45. Units can conduct a bypass either by maneuvering around the portal (lateral separation) or by continuing their direction of movement and traversing directly over or in the immediate vicinity of the portal

(vertical separation). Bypassing a portal using vertical separation is faster but usually feasible only if enemy forces are not actively using the portal. Bypassing using lateral separation can provide force protection; however, it consumes additional time and may place the unit into contact with unidentified portals on the unit's flanks.

3-46. Commanders make every effort to maintain contact with portals when executing a bypass to guard against unexpected enemy actions. Commanders can accomplish this using subordinate maneuver elements, unmanned aircraft system (UAS) rotary wing aviation, or other means that may be available.

3-47. The bypassing unit conducts a battle handover with follow-on forces to maintain contact with the bypassed portal if feasible. Regardless of whether units conduct a battle handover, they must report all bypassed portals to their higher headquarters to assist in maintaining a clear common operational picture at all echelons.

Neutralize

3-48. *Neutralize* is a tactical mission task that results in rendering enemy personnel or materiel incapable of interfering with a particular operation (FM 3-90-1).

3-49. Neutralizing a portal (or multiple portals) is usually not time or resource intensive compared to other mitigation options. Commanders select this option when enemy activity at portals is having an effect on the maneuver of friendly forces from ranges exceeding the primary weapons systems of friendly units.

3-50. When electing to neutralize a portal, commanders attempt to eliminate the portal's effects on friendly forces through the destruction of enemy personnel or equipment. Units often do this by using indirect or joint fires. When using fires, neutralizing a portal does not involve the use of friendly maneuver units to close with the portal.

3-51. Commanders may neutralize a portal by burying it or otherwise blocking the means of entry or exit. This tactic assumes that friendly forces can close with the portal without assuming too much risk and potentially allows the commander to prolong the effect of neutralization without deliberately entering the underground facility itself. It is important to consider that the effects of neutralizing a portal may be temporary based on the enemy's ability to replace casualties or damaged equipment. Therefore, it is critical to maintain contact with any neutralized portals at least until the entire unit has passed.

3-52. Commanders may decide to transition mitigation options from neutralize to either control or contain as their unit moves closer to the portals. They make this decision based on whether the enemy resumes activity at the identified portal combined with previously determined engagement and disengagement criteria. In all cases, the unit reports the presence and status of portals to their higher headquarters to assist in maintaining the common operational picture.

Control

3-53. *Control* is a tactical mission task that requires the commander to maintain physical influence over a specified area to prevent its use by an enemy or to create conditions necessary for successful friendly operations (FM 3-90-1).

3-54. Controlling a portal is a resource intensive task. Commanders may select the option of control if previous attempts to neutralize a portal were unsuccessful, if enemy activity begins at a portal within the range of a maneuver unit's primary weapons systems, or if the commander decides to control the portal due to its potential impact on friendly forces.

3-55. To achieve the effects of control, the commander positions a maneuver unit to prevent a portal's use by enemy forces. This may entail positioning a unit either at or in the immediate vicinity of the portal. The preferred option is to emplace forces at the maximum range where they can still achieve the effect of control. The maneuver unit establishes either an attack by fire or a support-by-fire position from which to control the portal. The unit may also need to defeat existing surface-level defenses such as bunkers, trenches, or enemy maneuver forces to reach their attack by fire or support-by-fire positions. Commanders consider the enemies' ability to engage and potentially fix their forces before directing a subordinate unit to control a portal.

3-56. It is important to note that a maneuver unit can only control a portal as long as they are in a position to deny its use to the enemy. The commander must decide how long to control the portal, as well as determining whether the responsibility for controlling it transitions between subordinate elements, or potentially to an external organization, as friendly forces continue movement.

3-57. More than one enemy portal may confront the BCT (or battalion) simultaneously. Commanders weigh the potential ability of each portal to influence friendly maneuver when deciding how many portals they physically control.

Contain

3-58. *Contain* is a tactical mission task that requires the commander to stop, hold, or surround enemy forces or to cause them to center their activity on a given front and prevent them from withdrawing any part of their forces for use elsewhere (FM 3-90-1).

3-59. Containing a subterranean system can be an extremely resource intensive task. Commanders select this option when previous attempts to neutralize or control a facility have proven ineffective and when the enemy activity within the subterranean facility creates unacceptable risk to friendly forces.

3-60. When mitigating a subterranean system, units use the contain option to functionally seal the portals and to permanently or semi-permanently deny their use to the enemy and prevent them from using their internal forces elsewhere. Units accomplish this by collapsing tunnels with explosives, welding steel across barricade openings, blocking portals with earthen material, or by other available means. A facility is contained when it is sealed and no longer available for friendly or enemy use.

3-61. Containing a subterranean system begins with a hasty attack by friendly forces to eliminate enemy resistance at the portals and in the immediate area. Similar to the option of control, friendly forces may have to defeat surface level defenses to reach the portal. After the initial engagement, a zone or area reconnaissance must take place to identify all of the portals and umbilicals of the facility. This allows the unit to properly contain the facility and prevent the enemy forces inside from withdrawing. It is critical that subordinate units avoid entering the facility unless they meet established entry criteria. This prevents them from committing the larger organization to an engagement unprepared.

3-62. Once friendly maneuver units defeat enemy resistance at the portal, they establish a cordon to provide security for enabler units such as combat engineers, EOD teams, or maintenance-team welders. Leaders ensure that subordinate elements check for explosive hazards, booby traps, or other anti-handling devices, and that they position appropriately to avoid risks posed by the sealing technique. Specialized enablers seal the portal, and are prepared to make repeated attempts if not initially successful. Friendly forces maintain the cordon until the enablers have withdrawn and an inspection of the portal is complete to ensure that it is unusable by the enemy. At this point, consider the portal sealed.

3-63. The option of contain requires maneuver forces, specialized enabler units, and in most cases a significantly larger amount of time to execute than previously discussed mitigation options. Commanders weigh the risk of decisive engagement and impacts to mission accomplishment against the ability of an enemy to affect friendly operations before directing subordinate elements to contain any subterranean systems.

Clear

3-64. *Clear* is a tactical mission task that requires the commander to remove all enemy forces and eliminate organized resistance within an assigned area (FM 3-90-1).

3-65. Clearing a portal, underground facility, or subterranean network is the most time and resource intensive option for mitigation. When commanders come across a subterranean system and choose to clear, in most cases, their originally assigned mission is no longer possible according to the original timeline. It is important to note that in this context, clear differs from seize. When clearing, a commander focuses on destroying or removing enemy resistance and not on retaining the terrain represented by the underground facility. The commander may direct the clearing of a portal, underground facility, or subterranean network for any of the following reasons:

- Directed by their higher headquarters.
- Confirming an enemy asset on the high payoff target list is inside of a subterranean facility.

- Function and physical position of the underground facility or subterranean network prevents further maneuver by friendly forces (such as a series of hardened artillery sites, air defense artillery positions, or anti-armor firing positions that dominate a maneuver corridor).

3-66. Commanders may also consider partial clearing of an underground facility or subterranean network as a variation of the option to clear to conserve time and preserve combat power. Assigning specific objectives to focus, and in some cases limit, friendly actions underground is critical to controlling the technique of partial clearing. Examples of this type of focused guidance may include the following:

- "Clear to the first tunnel intersection, assess, and then provide a recommendation to continue or withdraw based on the level of enemy contact."
- "The focus is on the artillery. Clear until two artillery pieces have been destroyed and then withdraw."
- "The purpose is to destroy the anti-aircraft artillery position. Clear up to 200 meters inside. Report with a recommendation if it has not been located by then."

3-67. Whether clearing the entire underground facility or only a portion, commanders must dedicate substantial combat power to the operation. See paragraphs 3-76 through 3-225 of this chapter for a detailed discussion of clearing requirements. Minimum combat power requirements include—

- Establishing an outer cordon (security force) to secure the area around the portal against an enemy counterattack.
- Establishing an inner cordon (assault force) to prevent enemy forces from fleeing out of other identified or unidentified portals. The assault force also requires the capability to breach the portal barricade.
- Employing a dedicated clearing force to enter the underground facility or subterranean network and destroy enemy forces or specified targets.
- Use of specialized enablers such as combat engineers, CBRN reconnaissance teams, nuclear disablement teams, military working dogs, EOD teams, or linguists and interpreters.
- Repositioning logistics and medical assets to support sustainment requirements of the assault and clearing forces.

3-68. Another important consideration when deciding to clear an underground facility or subterranean network is the availability of required specialized equipment. Resources such as breaching equipment and demolitions, ballistic shields, robotics, air quality monitors, and explosive hazard detection and neutralization equipment are critical to the success of subterranean operations. The commander must consider how many of these specialized resources are available, and the time required transporting them to the point of need, before directing a subordinate element to clear a subterranean system.

3-69. Commanders must consider the possibility of coming into contact with WMD or their precursor materials inside of an underground facility or subterranean network. This contingency is significant for force protection and operational reasons. Commanders must assess which mission-oriented protective posture (MOPP)-level units entering the underground facility are prepared to achieve and evaluate the associated risk prior to directing subordinate elements to begin clearing.

3-70. The presence of WMDs also transitions an underground facility or subterranean network into an operationally, and potentially, strategically significant target. Units that encounter WMDs or their precursor materials should be prepared to secure the site until specialized technical enablers can arrive to conduct a thorough assessment and potential exploitation. This security requirement may cause the unit's original assigned mission to transition to another follow-on element.

CONTINUE MISSION

3-71. Once a unit mitigates the effects of the subterranean system affecting the maneuver of friendly forces, they prepare to resume their originally assigned mission. The commander directs overwatch to be established of all known portals, either by a friendly maneuver unit or by sensors, if tactically feasible. The commander may designate a specific time to maintain overwatch to avoid permanently dedicating combat power.

3-72. The commander or staff may also coordinate with their higher headquarters to transition responsibility for overwatch of portals to a follow-on force. This transition may be to another maneuver unit (BCT or battalion) or other units such as an MP company.

3-73. Units report the presence and status of all known portals to their higher headquarters to assist in maintaining the common operational picture, regardless of the established overwatch. Minimum information that should be reported includes—

- Location of all known portals.
- Enemy activity encountered at each portal.
- Actions taken by friendly forces to mitigate portals.
- Battle damage assessment.
- Status of each portal (active, inactive, sealed, and so forth).
- Method of marking portals (if used).
- Any bypassed portals without further mitigation efforts.
- Assessment of remaining portals' effects on future maneuver by friendly forces.

3-74. The unit conducts consolidation and reorganization as they prepare to resume their original assigned mission. The amount of time and effort required varies widely depending on the scope of mitigation efforts and the options chosen by the commander. At a minimum, units do the following:

- Distribute a fragmentary order with updated instructions to subordinate elements.
- Gain an accurate status of personnel, equipment, and key weapons systems.
- Conduct casualty evacuation.
- Conduct the minimum resupply necessary to continue operations.
- Execute task organization changes as required.

3-75. The following vignette (ending at paragraph 3-76) describes the mitigation option of contain.

Mitigating Underground Facilities

3/52 SBCT is a Stryker brigade combat team assigned to a JTF, which has been conducting large-scale combat operations across various terrain. At date-time group (DTG) XXX, the JTF headquarters designates 3/52 SBCT as a JTF shaping operation and directs them to conduct an attack to destroy enemy forces on Objective Lincoln to pass 1/49 ABCT, the JTF main effort, on to Objective Devil. The 3/52 SBCT staff begins the military decisionmaking process (MDMP) immediately and develops the following mission statement:

On DTG XXX, 3/52 SBCT attacks to destroy enemy forces on Objective Lincoln to pass the JTF main effort (1/49 ABCT) on to Objective Devil.

The JTF headquarters task organizes the following additional assets to 3/52 SBCT to support the attack of Objective Lincoln:

Operational control (OPCON):
579 MP Company.
23 EOD CO.
344 Multifunction Intelligence Team.

Direct support:
A/1-65 ARB (6 x AH-64 attack helicopters).

Figure 3-3, page 3-14, depicts 3/52 SBCT's task organization for the operation.

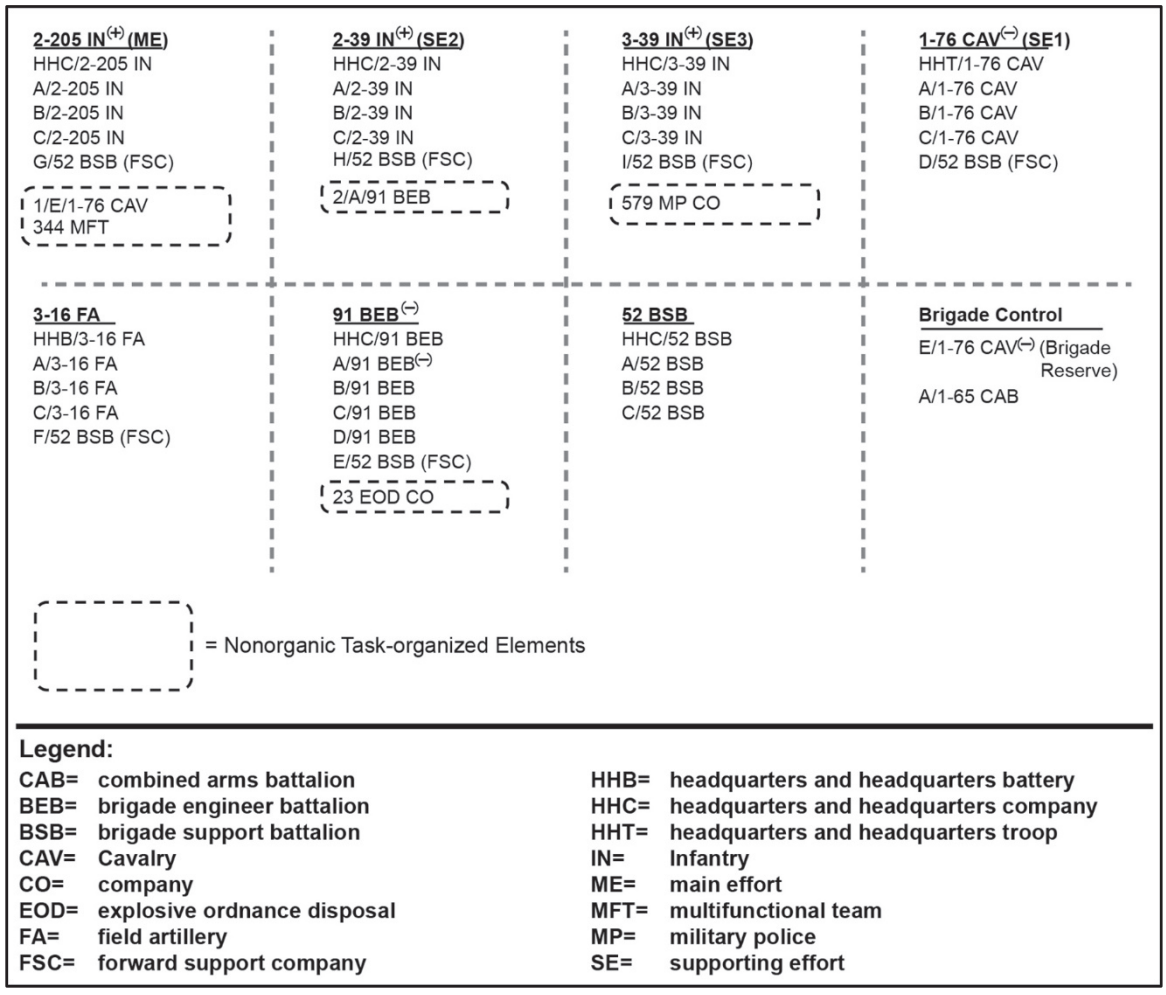


Figure 3-3. 3/52 Stryker brigade combat team task organization

The 3/52 SBCT S-2 (brigade intelligence staff officer) assesses that Objective Lincoln is a 152-millimeter (mm) artillery battery firing position defended by an understrength Infantry battalion that has a dismounted Infantry company as well as a motorized Infantry company. It is assessed that the 152-mm artillery battery position is well fortified and can range Objective Devil. Additionally, it is known that the enemy makes extensive use of underground facilities and subterranean networks. The S-2 assesses that contact with an underground facility is likely during movement to Objective Lincoln. Figure 3-4 depicts the situation template for the area of operations.

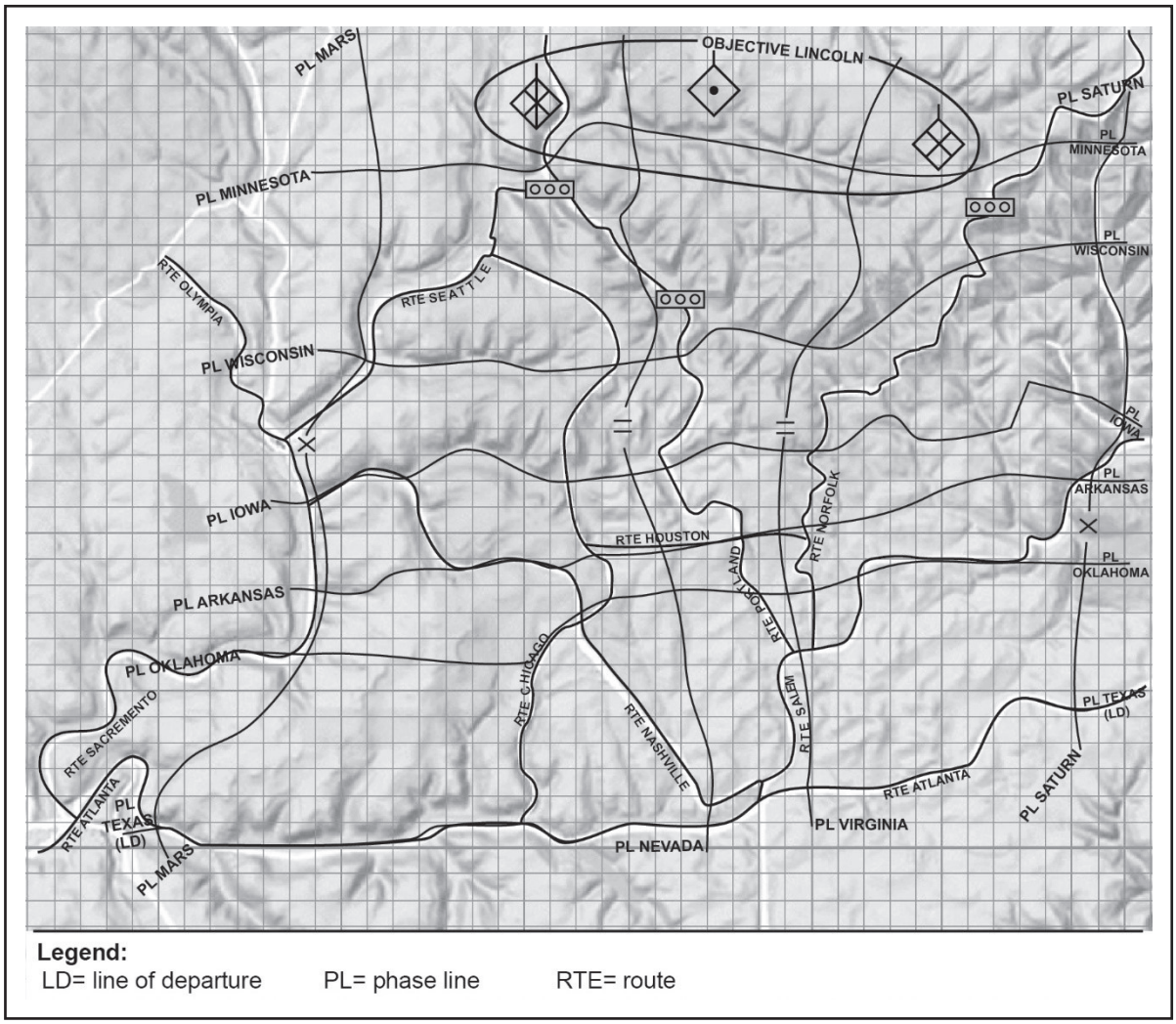


Figure 3-4. Enemy situation template

3/52 SBCT moves with two Infantry (known as IN) task forces abreast and one in trail while 1-76 CAV (known as Cavalry) conducts a moving screen on the east of the SBCTs axis of advance. 2-205 IN is designated as the BCT main effort. 3-39 IN and 2-39 IN are supporting efforts to enable the destruction of enemy forces on Objective Lincoln. Figure 3-5 depicts the 3/52 SBCT concept of the operation.

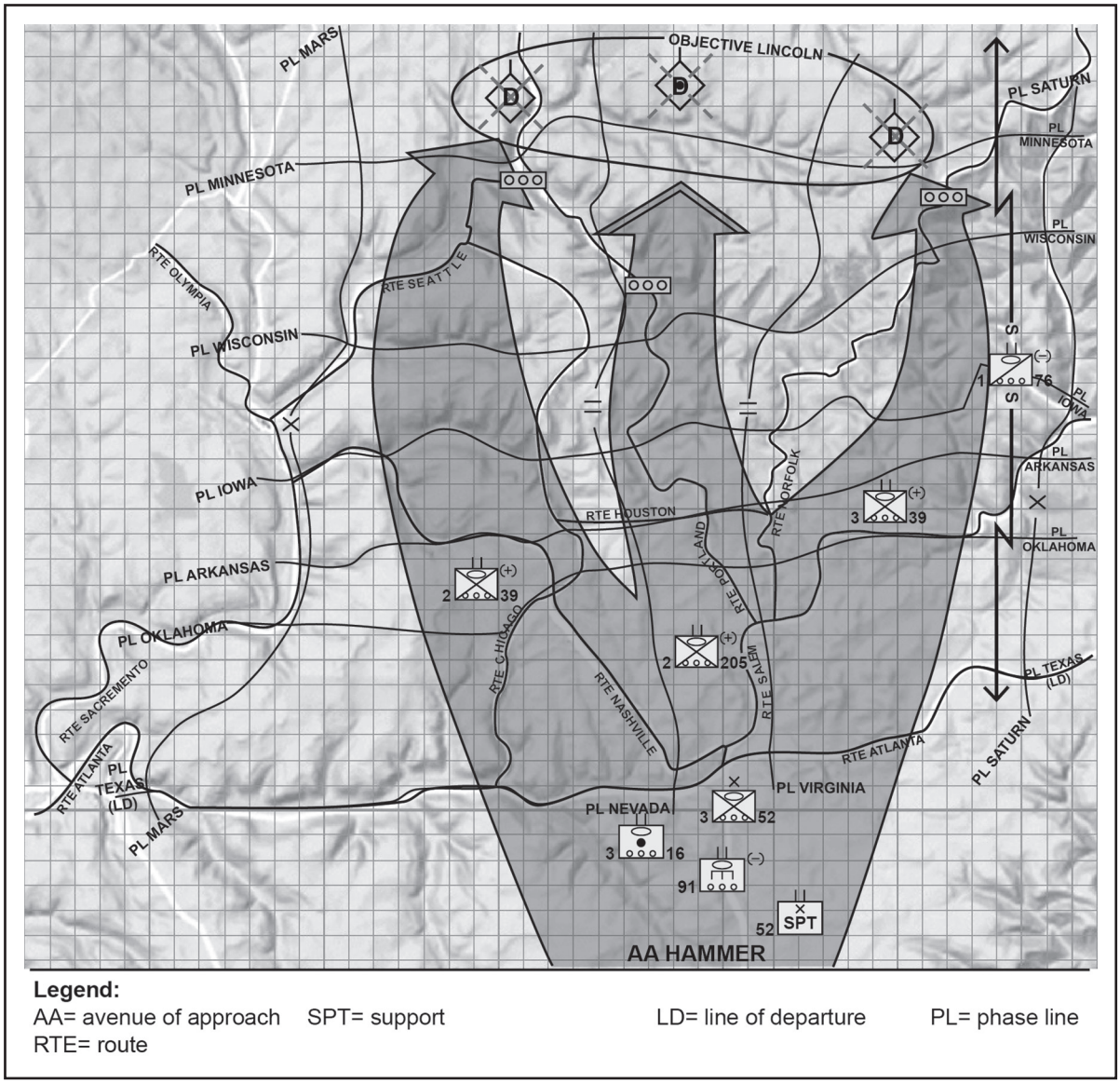


Figure 3-5. 3/52 Stryker brigade combat team concept of the operation

At DTG XXX, 3-39 IN and 2-39 IN cross the line of departure and begin movement along axis of advance Hammer. 1-76 CAV establishes the first of multiple screen lines. At DTG XXX, 1-76 CAV reports visual contact with an enemy infantry platoon. At DTG XXX, 2-39 IN reports direct fire contact with an unknown, enemy-sized formation north of PL Oklahoma. The 3/52 SBCT S-2 reports UAS footage indicating the appearance of two ventilation shafts along axis of advance Hammer south of PL Iowa in the vicinity of Route Portland, which could indicate the presence of a defended, underground facility. Figure 3-6 depicts the 3/52 SBCT updated common operational picture.

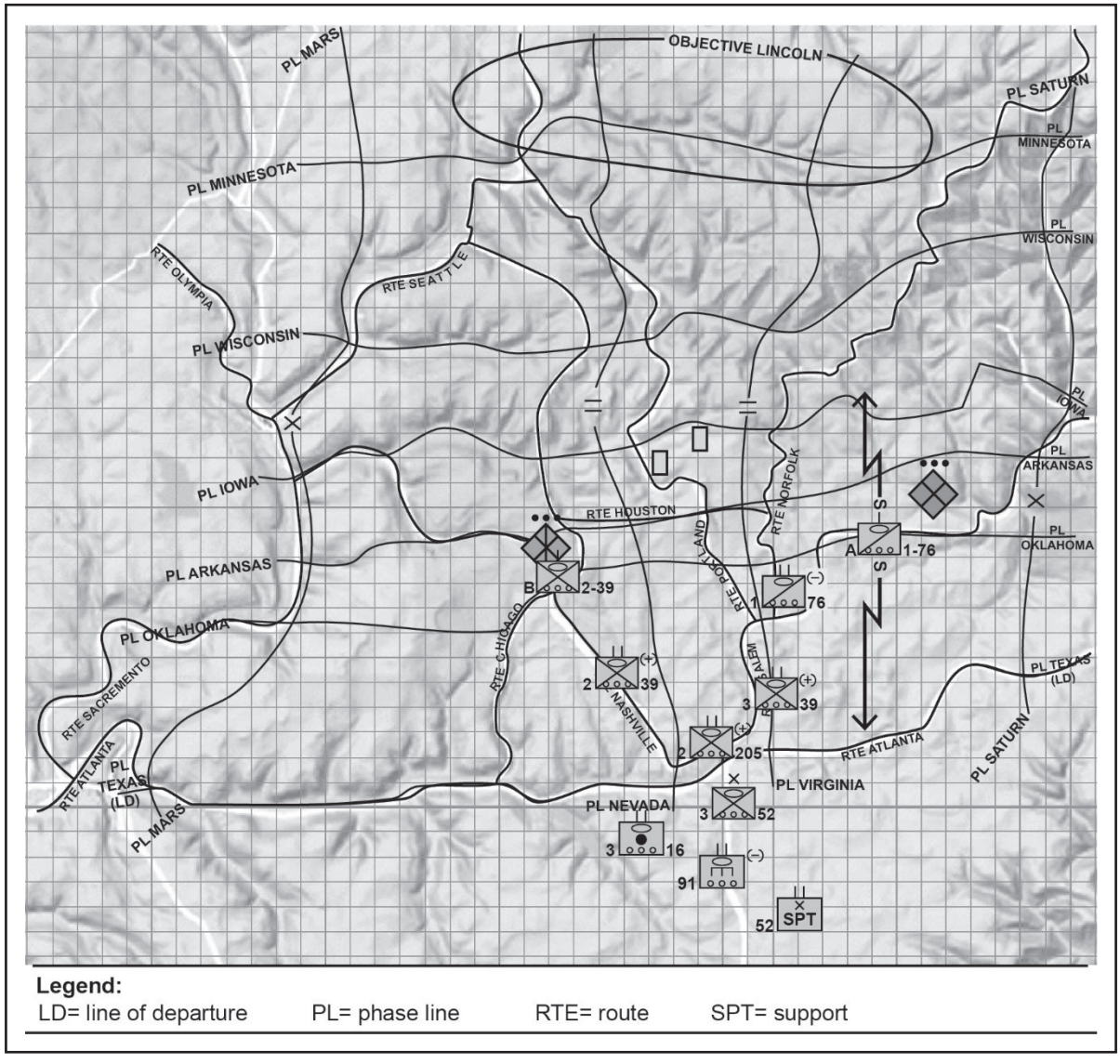


Figure 3-6. Updated 3/52 Stryker brigade combat team common operational picture

At DTG XXX, the enemy motorized infantry platoon that 1-76 CAV is observing is destroyed by attack aviation and 2-39 IN reports the destruction of one, enemy dismounted infantry platoon.

At DTG XXX, the 3/52 SBCT Shadow UAS receives enemy air defense artillery contact and is destroyed. Prior to the air defense artillery (ADA) contact, the UAS feed indicated multiple obstacle belts along Route Portland. The enemy ADA is targeted and destroyed by fixed-wing aviation assets.

The 3/52 SBCT staff assesses the likelihood of an underground facility that could prevent the BCT's ability to conduct the attack of Objective Lincoln and would also prevent 1/49 ABCT from executing the JTF's decisive operation on Objective Devil. The 3/52 SBCT commander assesses the available time and combat power and directs subordinate elements to contain all identified portals to maintain momentum and set the conditions for 1/49 ABCT. The underground facility is designated as Objective Taft. 2-39 IN is designated as part of the security force and tasked to establish the outer cordon west of PL Nevada between PL Arkansas and PL Wisconsin to allow the main effort freedom of maneuver. 3-39 IN is also designated as part of the security force and tasked to establish the outer cordon east of PL Virginia between PL Arkansas and PL Wisconsin to allow the isolation force freedom of maneuver. 1-76 CAV is tasked to screen along PL Wisconsin to establish the outer cordon north of Objective Taft. 2-205 IN (main effort) is tasked to attack to contain portals on Objective Taft. A/91 Brigade Engineering Battalion (BEB[-]) and 2/B/52 Brigade Support Battalion (BSB) (maintenance) are task organized OPCON to 2-205 IN. 3-16 Field Artillery (FA) is tasked to establish three position areas for artillery along Route Houston to provide suppression and obscuration.

At DTG XXX, C/3-39 IN destroys an enemy infantry motorized platoon on Route Norfolk in vicinity of PL Iowa and establishes blocking positions east of PL Virginia. B/2-39 IN engages and destroys two, enemy, dismounted infantry squads and the task force establishes blocking positions west of PL Nevada. 1-76 CAV moves to and establishes a screen along PL Wisconsin. At DTG XXX, the outer cordon is established. Figure 3-7 depicts establishing the outer cordon.

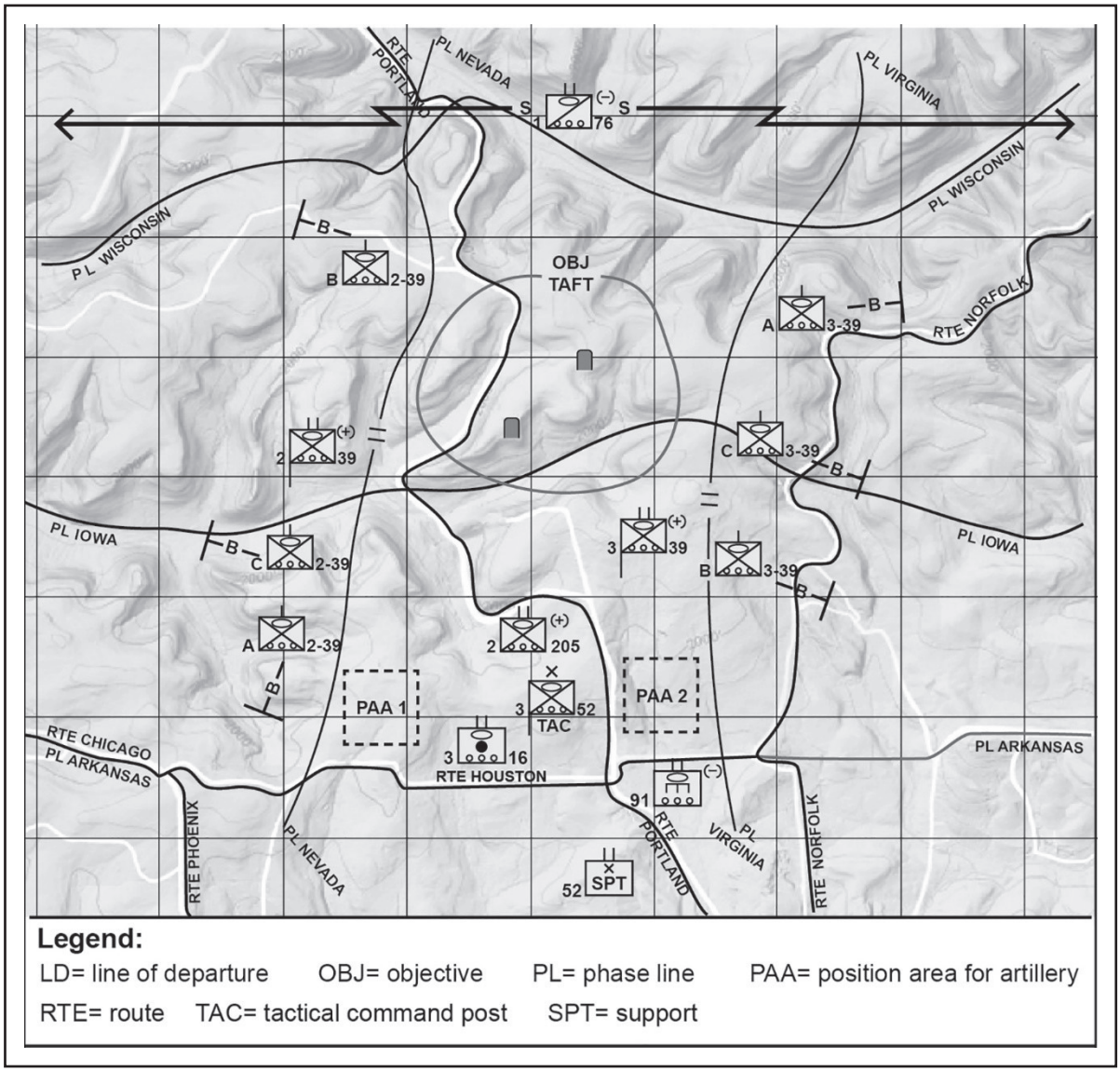


Figure 3-7. 3/52 Stryker brigade combat team outer cordon established

The establishment of 1-76 CAV's screen is the trigger for 2-205 IN to begin their movement towards the underground facility (Objective Taft). B/2-205 IN is the lead company for 2-205 IN. At DTG XXX, B/2-205 IN encounters and reports several obstacles to mounted movement along Route Portland. B/2-205 IN bypasses obstacles to maintain momentum, destroys two, enemy dismounted squads in fortified defensive positions, and establishes a support-by-fire position to allow C/2-205 IN to assault the main enemy defensive positions. A/2-205 IN follows and assumes and is tasked to breech obstacles out of contact to facilitate Stryker support.

At DTG XXX, C/2-205 IN attacks to isolate Objective Taft. A reinforced enemy infantry platoon is destroyed and the company captures six enemy prisoners of war. During consolidation and reorganization, C/2-205 IN identifies two ventilation shafts, one a recessed personnel entrance and the other large enough to pass a small vehicle. Documents captured from the enemy indicate the underground facility is military grade and used for storage of munitions of unknown type.

The C/2-205 IN commander reports the findings and requests engineer assets to seal the underground facility. The 2-205 IN commander directs B/2-205 IN to reposition to surveil the large entrance and A/2-205 IN to escort engineer assets to Objective Taft and recover the enemy prisoners of war. Additionally, the 2-205 IN commander reports the underground facility findings to 3/52 SBCT and requests MP support to assume control of the enemy prisoners of war, as well as a class V resupply to enable future combat operations on Objective Lincoln. Figure 3-8 depicts establishing the inner cordon and setting the conditions to isolate the underground facility.

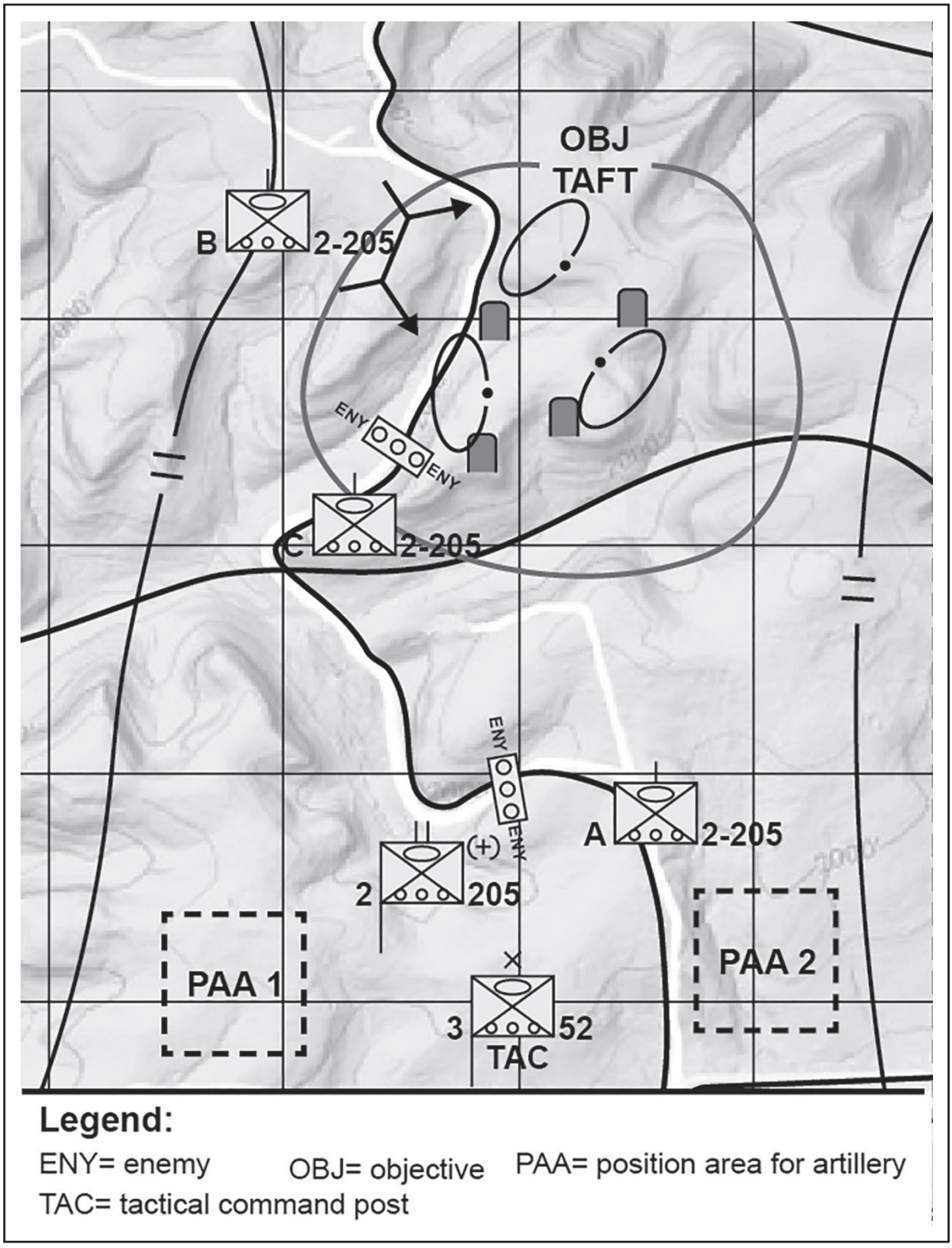


Figure 3-8. Establishing the inner cordon

At DTG XXX, the JTF directs 3/52 SBCT to complete the isolation and establish helicopter landing zones to support the air movement of 2-327 IN (JTF Reserve). The JTF further directs 3/52 SBCT to receive 2-327 IN and conduct a relief in place to maintain persistent surveillance of the underground facility while 3/52 continues their mission to Objective Lincoln.

At DTG XXX, B/2-39 IN reports enemy, indirect fire contact. Counterbattery radar indicates the indirect fire point of origin is in the vicinity of Objective Lincoln. The 3/52 SBCT S-3 (battalion operations officer) clears fires and advises the 3/52 SBCT commander to authorize counterfire, which is conducted by 3-16 FA. The 3/52 SBCT S-3 requests JTF UAS to surveil the point of origin.

At DTG XXX, A/91 BEB$^{(-)}$ begins to seal the underground facility ventilation shafts and entrances. A/91 BEB$^{(-)}$ seals ventilation shafts with earthen material and uses demolition charges to seal the recessed personnel entrance. The A/91 BEB$^{(-)}$ commander reports sealing the larger entrance to be untenable with earthen material or demolition and recommends steel welds to complete the containment of underground facility portals. At DTG XXX, 2/B/52 BSB maintenance initiates the welding operation on the final underground facility portal. Figure 3-9 depicts the isolated underground facility.

Figure 3-9. Isolated underground facility

At DTG XXX, 2-327 reports that the lead elements of their battalion are en route to helicopter landing zone Falcon. Their estimated time of arrival is 15 minutes. The arrival of 2-327 IN is the trigger for 2-39 IN and 1-76 CAV to consolidate their blocking positions and to begin collapsing the screen to prepare for movement. At DTG XXX, the final portal entrance is sealed and inspected, and 2-327 has completed the relief in place. The 3/52 SBCT commander directs the task forces to resume movement along axis of advance Hammer and to retain the current task organization to avoid further delays in the attack on Objective Lincoln.

CONDUCT AN ATTACK OF AN UNDERGROUND FACILITY

3-76. Due to their high risk, units should avoid subterranean operations when possible. However, circumstances exist where conducting an attack to seize an underground facility becomes an operational necessity. This occurs when an underground facility houses an asset of critical importance to the enemy. Examples of these types of assets include the following:

- National or strategic-level command and control facilities.
- Weapons of mass destruction production or storage facilities.
- High-end technology development centers.
- Nuclear power production facilities.
- National laboratories.
- Strategic reserves of critical supplies such as fuel, oil, specialized munitions, food, or currency.

3-77. BCT and battalion staffs must be able to plan, prepare, execute, and assess an attack of an underground facility to enable the success of these critical missions.

PLAN

3-78. Planning to conduct an attack of an underground facility is demanding for BCT and battalion staffs. A larger than usual number of unknowns, the risks, and hazards inherent in the subterranean environment, and the necessity to synchronize surface and subterranean operations simultaneously combine to create a substantial challenge. It is critical, therefore, for staffs to focus certain aspects of the MDMP on factors specific to the subterranean fight (refer to FM 6-0 for more information). The following steps describe the nuances of the MDMP process when planning for subterranean operations.

STEP 1 – RECEIVE THE MISSION

3-79. Commanders initiate the MDMP upon receipt or in anticipation of a mission to attack an underground facility. Usually, BCTs and battalions attack an underground facility as a directed mission from the unit's higher headquarters. It is critical to issue warning order (WARNORD) #1 to subordinate units immediately upon receipt of the mission to allow for preparation of specialized equipment or personnel.

STEP 2 – MISSION ANALYSIS

3-80. Mission analysis is a critical step when planning for subterranean operations. The following paragraphs describe the unique subterranean considerations during this process.

Analyze the Higher Headquarters' Plan or Order

3-81. Commanders and staffs thoroughly analyze the higher headquarters' plan or order. They determine how their unit, by task and purpose, contributes to the mission, commander's intent, and concept of operations of the higher headquarters. The commander and staff seek to understand:

- The higher headquarters'—
  - Commander's intent.
  - Mission.
  - Concept of operations.

  - Available assets.
  - Timeline.
- The missions of adjacent, supporting, and supported units and their relationships to the higher headquarters' plan.
- The missions or goals of unified action partners that work in the operational areas.
- Their assigned area of operations.

Perform Initial Intelligence Preparation of the Battlefield

3-82. Intelligence preparation of the battlefield (IPB) is the systematic process of analyzing the mission variables of enemy, terrain, weather, and civil considerations in an area of interest to determine their effect on operations. The IPB process identifies critical gaps in the commander's knowledge of an operational environment. The initial IPB process seeks to define the operational environment surrounding the underground facility or subterranean network and, to the extent possible, the environment within the underground facility. For mission analysis, the intelligence staff, along with the other staff elements, uses IPB to develop detailed threat COA models, which depict a COA available to the threat (see chapter 2 for additional information on threat).

3-83. It is rare that a staff has all of the information it requires about a facility when planning to attack an underground facility. Using a combination of information collection techniques can address critical information gaps. Intelligence staffs collect, analyze, and distribute all available information pertaining to the underground facility to aid the staff and subordinate units in planning efforts. ADP 1-02 does not support the method illustrated in figure 3-10, on page 3-26. It is simply a technique for graphically summarizing known information about an underground facility.

3-84. Figure 3-10, on page 3-26, illustrates a graphic method of portraying an underground facility on a map, aerial imagery, or other staff products.

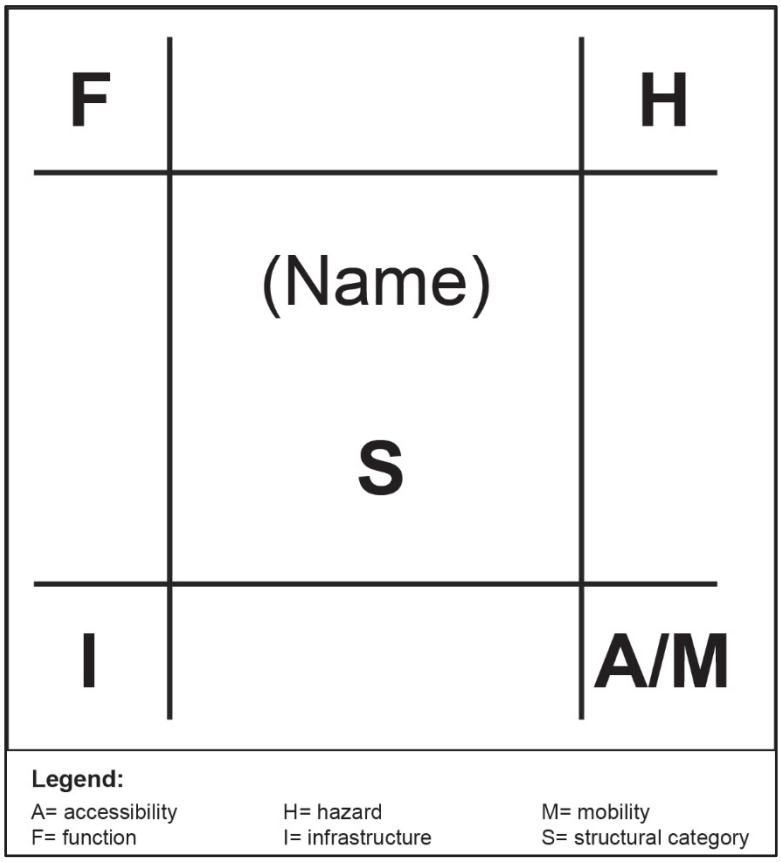


Figure 3-10. Graphic depiction of an underground facility

3-85. Table 3-1 defines the data fields associated with the graphic symbol in figure 3-10. Each data field has associated codes to provide additional information as shown in tables 3-2 and 3-3.

Table 3-1. Graphic data fields for underground facilities

Field	*Field type*	*Description*
S	Structure classification	Code that designates structural classification
F	Function	Code that designates primary operational function
H	Hazard	Code that identifies the most dangerous hazard
I	Infrastructure	Letters that identify known support infrastructure
A	Accessibility	Code that identifies required breaching assets
M	Mobility	Letters that designate portal or passageway size and effects on movement

3-86. Table 3-2 depicts the codes associated with structural category (data field "S"). See chapter 1 for additional information on structural classification of subterranean spaces.

Table 3-2. Structural category codes

Category	*Code*	*Description*
Cave or tunnel	CV	Cave or natural cavity
	TUNR	Tunnel, rudimentary
	TUNS	Tunnel, sophisticated
Urban or civil works	SUBS	Substructure or basement
	CWKS	Civil works, sewers, subways, aqueducts
Underground facility	UGS	Shallow underground bunkers
	DUG	Deep, underground, hardened

3-87. Table 3-3 describes the codes associated with the typological attributes of a subterranean space. The typological attributes are function (data field "F"), hazard (data field "H"), infrastructure (data field "I"), accessibility (data field "A"), and mobility (data field "M")

Table 3-3. Typological attribute classification codes

Element	*Code*	*Description*
Function (F)	C2	Command and control
	PRD	Production
	STOR	Storage
	MOV	Movement or conveyance
Hazard (H)	E	Environmental
	P	Enemy personnel
	M	Toxic or WMD materiel
Infrastructure (I)	T	Transportation
	V	Ventilation
	P	Electrical power
	W	Running water
	D	Discharge, sewer
	C	Communications
Accessibility (A)	MECH	Mechanical breach
	EXP	Explosive or ballistic breach
	TH	Thermal breach
	HE	Heavy engineer equipment
Mobility (M)	R	Restricted
	S	Semi-restricted
	U	Unrestricted, may support vehicles
Legend: WMD—weapons of mass destruction		

3-88. Based on the codes used in the example shown in figure 3-11, Red Rock underground facility is a deep, underground facility (structural classification), which serves a command and control purpose (function). The greatest hazard to U.S. forces is enemy personnel (hazard). The facility also has ventilation, electrical power, running water, sewer discharge, and communications (infrastructure). The unit requires thermal cutting to breach (accessibility), and the facility has a combination of semi-restricted and unrestricted passageways (mobility).

Review Available Assets and Identify Resource Shortfalls

3-89. The commander and staff examine additions to and deletions from the current task organization, command and support relationships, and status (current capabilities and limitations) of all units. From this analysis, staffs determine if they have the assets needed to complete all essential, specified, and implied tasks.

3-90. Subterranean operations present unique challenges that may require units to request additional capabilities external to the battalion or even BCT. Mission analysis, combined with doctrinal guidance for allocation, drives the requests for specific equipment or enablers. See chapter 6 for additional information on enabling organizations and their capabilities. Examples of enablers that can support subterranean operations are—

- Military working dog teams (detection of explosives and threat personnel).
- EOD teams (detect, locate, access, identify, diagnose, render safe, recover, exploit, and dispose of WMD and explosive hazards; has robotic capabilities).
- Combat engineers (breaching, clearing earthen material).
- CBRN units (detection, classification, and transportation of WMD or hazardous material, decontamination of personnel and equipment).
- Information collection and cyberspace assets (site analysis and exploitation).
- MP (forensics, site exploitation, securing and processing of detainees).
- Electronic warfare assets (jamming of enemy communications).
- Additional transportation assets.
- Coordination with joint, special operations forces (SOF), interagency, or multinational elements.

3-91. Examples of specialized equipment that may be required for attacking a underground facility are—

- Robotics.
- Air quality and CBRN sensors.
- Ballistic shields.
- Infrared and white lights.
- Breaching equipment.
- Additional communications equipment.
- Self-contained breathing apparatus.

3-92. The staff pays particular attention during mission analysis to comparing available breaching assets with anticipated breaching requirements. Breaching assets may include specially trained personnel, explosives, or breaching equipment such as cutting torches. The movement and maneuver, protection and intelligence staff sections collaborate to develop an estimate of how many breaches are required, at underground facility portals and inside of the facility. Planners also estimate the personnel, munitions, and equipment required for each anticipated breach. The staff compares the estimated requirements with the available resources and presents the results to the commander in the mission analysis brief.

3-93. The commander or S-3 requests additional breaching assets from their higher headquarters if the number of anticipated breaches exceeds the available resources. If the analysis indicates sufficient resources for the required number of breaches, the staff develops an additional friendly force information requirement to monitor the status of breaching assets. The commander and staff may develop criteria that if met, triggers requesting additional breaching assets from their higher headquarters to avoid unplanned culmination, which is the point where friendly forces within the facility have reached their maximum effectiveness and cannot continue without additional resources. Figure 3-11 shows an example of a decision support matrix that reflects this.

Movement and Maneuver Estimate: The BCT has sufficient capacity to conduct 35 breaches of 3" steel or less.

Intelligence Estimate: Clearance of UGF will require 19 breaches of 3" steel or less.

Example Task Force Commander Decision Point

Decision Point	Decision	Criteria / Conditions	Action	Supporting CCIR
#3	Request additional breaching assets?	***If*** an undetermined number of required breaches remain ***and, if*** organic breaching capacity is below 50%	***Then*** request additional assets from higher headquarters	#2, #5

Legend:

BCT= brigade combat team
CCIR= commander's critical information requirement
"= inches
#= number
%= percent
UGF= underground facility

Figure 3-11. Decision support matrix for breaching assets, example

Determine Constraints and Limitations

3-94. The commander and staff identify constraints placed on their command. A constraint is a restriction placed on the command by a higher command (FM 6-0). Commanders may place constraints based on resource limitations within the unit, such as the number of available robotics platforms. Physical characteristics of the operational environment, such as the number of avenues of approach to an underground

facility, may also impose constraints. It is critical that the staff identifies specific constraints and limitations that the underground facility or subterranean system places on their unit.

Planning Considerations for Attacking an Underground Facility

3-95. The subterranean environment is unique and presents challenges not found in other environments. The following lists are common considerations, organized by warfighting function, to weigh when planning and preparing for subterranean operations:

- Command and control:
  - Managing enablers and span of control.
  - Reduced situational awareness underground.
  - Redundant methods for subterranean to surface communications.
  - Positioning of command and control systems to support surface and subterranean operations.
  - Rules of engagement.
  - Branches and sequels based on operations inside the underground facility.
  - Deception operations.
- Movement and maneuver:
  - Operational timeline.
  - Underground facility umbilicals (external life support) to target.
  - Presence of multiple underground facilities (a facility complex).
  - Enemy maneuver forces exiting the underground facility to fight on the surface.
  - Enemy attack from unexpected direction (undetected portals).
  - Go or No-Go criteria for entrance of the underground facility.
  - Portal sizes (vehicular or personnel only).
  - Composition and location of obstacles surrounding the underground facility.
  - Composition and likely location of obstacles within the underground facility.
  - Number of breaches required at the underground facility (portal and internal barricades).
  - Number and size of portals requiring breaching.
  - Requirements for a combined arms breach to defeat surface level defenses.
  - Personnel and equipment required to identify, mark, and neutralize explosive hazards.
  - Prioritization and positioning of engineer assets.
  - Assessment of underground facility structural integrity before and after assault.
  - Other options for entry (ventilation shafts or other umbilicals).
  - Method of securing the surface surrounding the underground facility.
  - Required shaping operations.
  - Organic breaching capabilities and estimated number of breaches required.
  - Site exploitation requirements.
  - Contingency plans (mass casualty event, tunnel collapse, personnel extraction, contamination release).
  - Mission abort or transition criteria.
  - Culmination points for subordinate units (surface and subterranean).
  - Weapons effects and hazards (surface and subterranean).
  - Authorities granted to the BCT (or battalion) related to counter-WMD activities and tasks.
  - Transition of operations to specialized EAB, special operations, or interagency assets.
- Intelligence:
  - Purpose of the underground facility.
  - Structural integrity of the underground facility.
  - Function of the underground facility.

- Umbilicals (external life support) that are critical to underground facility function.
- Presence of decoy or dummy underground facilities.
- Priorities for site exploitation.
- External defenses or supporting security elements of the underground facility.
- Known or suspected CBRN or toxic industrial chemical hazards.
- Nearby civilian infrastructure.
- Civilians or noncombatants working in the underground facility.
- Available information collection assets to support reconnaissance of the underground facility.
- Portals, adits, and other potential entry points into the subterranean system.
- Road infrastructure and other avenues of approach that lead to the underground facility.
- Key terrain within the underground facility, such as stairwells and elevators.
- Likely explosive and environmental hazards.

- Fires:
  - Structural destruction versus functional containment of the underground facility.
  - Umbilicals (external life support) that fires can target.
  - Fire support coordination measures.
  - Modified high payoff target list and attack guidance matrix.
  - Munitions effects on known or suspected CBRN or WMD.
  - Proximity of civilian infrastructure to the underground facility.
  - Assessment of successful fires effects against the underground facility.
- Protection:
  - Detainee holding, processing, and transportation requirements.
  - Required survivability operations, specifically the ability to monitor air quality.
  - Positioning of air and missile defense assets.
  - Fratricide avoidance (surface and subterranean).
  - Detection and classification capabilities for CBRN and toxic industrial chemicals and materials.
  - Mitigation of known or suspected CBRN or toxic industrial chemical or material hazards.
  - Location of decontamination assets such as the emergency personnel decontamination station.
  - Guidance for maximum exposure times to toxic industrial chemicals and materials, WMDs, radiation, smoke, or other subterranean hazards.
  - Ability to monitor for CBRN contamination before, during, and following breaching operations.
  - Clearing of downwind hazard areas at all designated points of breach.
  - Mitigation of subterranean hazards in regards to explosions, breaches, and weapons fire.
  - Impacts of explosive or weapons effects on CBRN material stability. For example, disrupting the underground facility's electrical power supply may disable systems that maintain CBRN material stability. Explosives and weapons also affect the atmospheric environment for the clearing forces.
  - Commander's critical information requirements (CCIR) for WMD characterization and analysis.
- Sustainment:
  - Surface and subterranean sustainment support plan.
  - Method of subterranean sustainment support.
  - Requisition of nonorganic specialized subterranean equipment and associated timelines to include oxygen supplies for breathing devices.
  - Anticipated duration of the operation and associated sustainment requirements.
  - Subordinate unit abilities to self-sustain without resupply (surface and subterranean).
  - Ability of surrounding terrain to support sustainment convoys or aerial resupply.
  - Priority and positioning of medical support assets.

- Sustainment requirements associated with decontamination operations or MOPP gear exchange.
- Medical supplies required to treat likely injuries common in the subterranean environment to include overpressure, asphyxiation, crush injuries, CBRN contamination, and psychological.

Identify Critical Facts and Develop Assumptions

3-96. Base plans and orders on facts and assumptions. Commanders and staffs gather facts and develop assumptions as they build their plan

3-97. Assumptions take on additional significance when planning to attack an underground facility. In most cases, the ability to obtain an accurate understanding of an underground facility's interior is extremely limited. Information such as number and size of rooms, number and length of corridors, internal security measures, and overall layout of the underground facility is usually unavailable during planning. Commanders and staffs must plan during COA development for multiple contingencies related to actions inside of the underground facility.

Begin Risk Management

3-98. *Risk management* is the process to identify, assess, and control risks and make decisions that balance risk cost with mission benefits (JP 3-0). During mission analysis, the commander and staff focus on identifying and assessing hazards. The commander and staff pay particular attention to hazards that are unique to the subterranean environment, how they influence mission execution, mission abort, and mission transition criteria (see chapter 1 for additional information on specific subterranean hazards). The commander and staff develop control measures to mitigate these hazards during COA development.

Explosive Breaching Hazards in a Subterranean Environment

3-99. The hazards associated with explosive breaching in confined spaces are unique to the subterranean and urban environments and deserve special consideration during planning. Explosive breaching inside of enclosed spaces creates excessive overpressure, peak overpressure, and impulse pressure compared to those not within a confined space. These three pressures are described in the following list:

- Overpressure is the pressure resulting from the blast wave of an explosion. It is positive when it exceeds atmospheric pressure and negative during the passage of the wave when resulting pressures are less than atmospheric pressure.
- Peak overpressure is the maximum value of overpressure at a given location, usually experienced at the instant the blast wave reaches that location.
- Impulse pressure is the duration of the raised positive pressure.

3-100. All of these various types of pressure can create dangerous and potentially lethal effects for Soldiers inside of the tunnel during a detonation. The size of the breaching charge, distance from the charge, and the size and construction material of the confined space (tunnel or room) all influence the level of pressure generated by the detonation. (See appendix A for additional information about types of blast injuries.)

3-101. When explosive breaching inside of the underground facility or subterranean network, the initiation point for the breach should be outside and away from any portal of the underground area. Soldiers must take additional care in oxygen rich environments, such as in a laboratory, as a thermobaric effect creates an oxygen-depleted environment and may weaken structural members inside of an underground facility. Figure 3-12 depicts the effects of an explosive breach in a 10-foot-by-10-foot tunnel compared to the same detonation in a free field environment (sensors recording the data were 83 meters from the point of detonation in both cases).

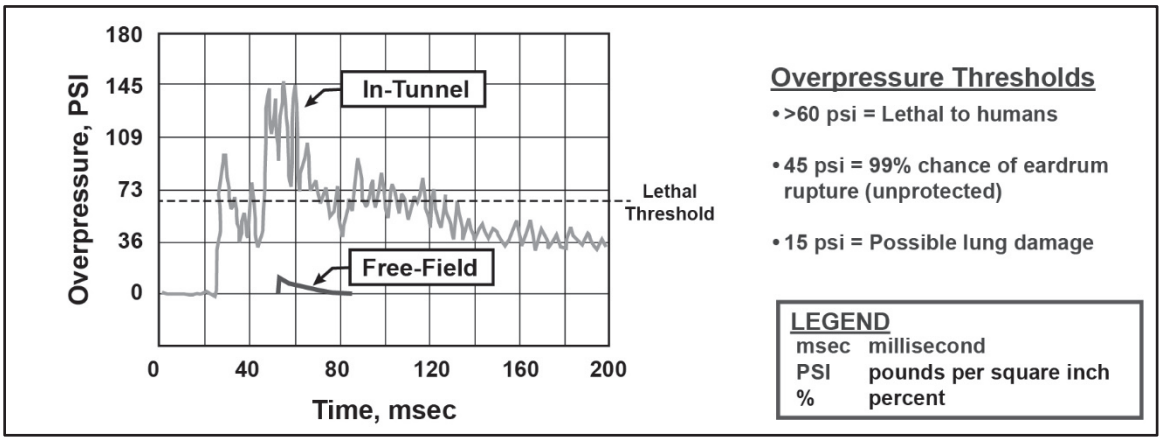


Figure 3-12. Blast effects in open air and enclosed spaces, example

Develop Initial Commander's Critical Information Requirements and Essential Elements of Friendly Information

3-102. CCIR is an information requirement identified by the commander as being critical to facilitating timely decision-making. CCIR fall into one of two categories: priority intelligence requirements and friendly force information requirements.

3-103. A priority intelligence requirement is an intelligence requirement, stated as a priority for intelligence support that the commander and staff need to understand the adversary or the operational environment. Examples of information that support COA development for attacking an underground facility include—

- Size of the underground facility.
- Location of the underground facility.
- Function of the underground facility.
- Number and location of portals and ventilation shafts.
- Types of barricades at portal locations.
- Determining if the underground facility is self-contained or relies on external support (power, ventilation, water, and so forth).
- Identifying if the underground facility is isolated or connected to other underground facilities as part of a complex.
- Identification of terrain or enemy that can affect the objective area.
- Identification of external (internal if possible) defenses that support the underground facility.

3-104. A friendly force information requirement is information the commander and staff need to understand the status of friendly force and supporting capabilities. With respect to subterranean operations, friendly force information requirement frequently focuses on the availability and readiness of critical enabler units such as engineers, CBRN reconnaissance, and EOD.

Develop the Initial Information Collection Plan

3-105. It is crucial to begin or adjust the information collection effort as early as possible to help answer information requirements necessary in developing effective plans. Due to the complexity and unknown nature of most underground facilities, staffs employ all available ground, air, and electronic collection assets across multiple domains to answer priority intelligence requirement and inform COA development. (Refer to FM 3-55 for additional information on information collection and assessing collection.)

3-106. Underground facilities and subterranean networks are frequently camouflaged and difficult to detect without specialized information collection assets that are not organic to BCTs. However, BCT and battalion elements can observe some of the indicators listed below. Examples of these indicators include the following:

- Ventilation shafts.
- Portals.
- Steam.
- Antennas.
- Roads or vehicle tracks that appear to "disappear" into a terrain feature.
- Surface support structures or umbilicals (electrical power lines or stations, storage buildings, and so forth).
- Tailings (earthen material removed by tunneling).
- Access control points (gates).
- Surface level defenses (bunkers, obstacles, trenches, and so forth).
- Camouflage netting or similar materials.
- Mechanical sounds (generators).

Develop Initial Themes and Messages

3-107. Themes and messages support operations and military actions. Commanders and their units coordinate what they do, say, and portray through themes and messages. Underground facilities may be near or, in some cases, located within populated areas. The public affairs officer and military information support element assist BCT and battalion S3s in developing themes and messages as required in support of the attack of an underground facility.

Develop a Proposed Mission Statement

3-108. A *mission statement* is a short sentence or paragraph that describes the organization's essential tasks, purpose, and action containing the elements of who, what, when, where, and why (JP 5-0). The who, where, and when of a mission statement are straightforward. The what and why are more challenging to write and can confuse subordinates if not stated clearly.

3-109. It is important to use appropriate tactical mission tasks when developing a mission statement. This helps clarify the what for subordinate elements.

3-110. The why provides the mission's purpose—the reason the unit is to perform the task. This puts the task into context by describing the reason for performing it.

Present the Mission Analysis Briefing

3-111. The mission analysis briefing informs the commander of the results of the staff's analysis of the situation. Staff assumptions and estimates are of particular importance when planning an attack on an underground facility or subterranean network. This helps the commander understand, visualize, and describe the operation.

Develop and Issue Initial Planning Guidance

3-112. Commanders provide planning guidance along with their initial commander's intent. Planning guidance conveys the essence of the commander's visualization. The initial planning guidance outlines an operational approach—a description of the broad actions the force must take to transform current conditions into those desired at end state (JP 5-0). It broadly describes when, where, and how the commander intends to employ combat power to accomplish the mission within the higher commander's intent.

3-113. Planning guidance for subterranean operations includes the typical information but also addresses subterranean specific factors. Examples include required shaping operations, acceptable risk levels (surface and underground), allocation of subterranean-specific enablers, and contingency planning guidance.

Issue Warning Order #2

3-114. Immediately after the commander gives the planning guidance, the staff sends subordinate and supporting enabler units WARNORD #2. It contains, at a minimum—

- The approved mission statement.
- The commander's intent.
- Changes to task organization.
- The unit area of operations (sketch, overlay, or some other description).
- CCIRs and essential elements of friendly information.
- Risk guidance.
- Priorities by warfighting functions.
- Military deception guidance.
- Initial information collection plan.
- Specific priorities.
- Updated operational timeline.
- Movements.

3-115. Timely issuance of WARNORD #2 is key to initiating information collection, beginning reorganization, and preparation of specialized personnel or equipment, and enabling subordinate unit planning.

STEP 3 – COURSE OF ACTION DEVELOPMENT

3-116. A COA is a broad potential solution to an identified problem. During COA development, planners use the mission statement, commander's intent, planning guidance, and various products developed during mission analysis. Planners develop different COAs by varying combinations of the elements of operational art, such as phasing, lines of effort, and tempo.

3-117. When planning to conduct an attack of an underground facility, surface and subterranean operations require deliberate and detailed planning. Commanders initiate surface operations first and they continue while the subterranean operations are underway. Planners must consider sequencing of actions that allow for a transition from executing only surface operations to executing surface and subterranean operations simultaneously. An example phasing construct for an attack of an underground facility is outlined in the following list:

- Phase I – Reconnoiter the Surface Objective. Phase I begins immediately upon receipt of the mission and includes reconnaissance of the underground facility or subterranean network as well as the surrounding terrain. The information collection plan utilizes all available information collection assets across all available domains (land, air, maritime, space, and cyberspace) to produce a holistic understanding of the surface environment. These assets may cross-cue each other for more detailed information collection. Reconnaissance objectives should include avenues of approach that support friendly forces, enemy forces that can influence the objective area to include prepared defenses, potential points of entry to the underground facility or subterranean network such as portals, ventilation shafts, or umbilicals, and tentative positions for friendly forces.
- Phase IIa – Move to and Isolate the Surface Objective. Phase IIa begins when units cross their line of departure and is complete when the unit establishes the outer cordon. It is important to note that the units frequently make contact with enemy forces prior to reaching their objective, often in the form of prepared defenses. Commanders and staffs must anticipate the requirement to execute one or multiple combined arms breaches to allow units to continue maneuver and establish blocking positions.
- Phase IIb – Consolidate and Reorganize the Surface Objective. In most cases, the unit has fought several significant surface-level engagements to establish the outer cordon. The purpose of Phase IIb is to allow for casualty evacuation, recovery of damaged or destroyed equipment, and other actions that may be necessary to set the conditions to initiate subterranean operations. Task organization may adjust during this phase to transition specialized enablers, such as combat engineers or the CBRN reconnaissance platoon, from the security force to the assault force. The assault force occupies their assault positions during this phase.
- Phase IIIa – Locate and Isolate a Point of Entry. During Phase IIIa the assault force attacks to defeat enemy surface-level defenses in the immediate vicinity of the underground facility or subterranean network and establishes the inner cordon. The assault force assesses all visible

portals and selects a point of breach. The assault force commander appropriately positions and prepares all critical enablers and command and control systems prior to transitioning to the next phase. Surface-level forces must remain prepared for an enemy counterattack either from surface forces or from unidentified portals throughout all phases.

- Phase IIIb – Breach and Secure a Foothold. The assault force commander ensures that all conditions are set, requests approval from the task force commander, and initiates the breach. The assault force is prepared to conduct multiple breach attempts if the initial attempt is unsuccessful, or if there are multiple barricades in-depth at the point of breach. The clearing force enters the underground facility or subterranean network following a successful breach and establishes a foothold. Once the unit secures a foothold, the clearing force assesses the air quality and tactical situation.
- Phase IIIc – Clear the Subterranean Objective. During this phase, the clearing force moves deliberately through the underground facility or subterranean network. The clearing force leader monitors the progress of the clearing force to guard against overextension and culmination. The assault force commander is prepared to provide additional combat power to the clearing force leader if the underground facility or subterranean network is larger than anticipated. Surface-level units continue to improve their blocking positions as part of the outer cordon. Sustainment assets reposition to support clearing operations.
- Phase IV – Site Exploitation. Conduct site exploitation for potential intelligence value. If the objective is a WMD site, specialized technical enablers, such as a CBRN response team, conduct the exploitation. Maneuver units provide security, logistics support, and command and control of the exploitation operation. Available transportation assets are in high demand during this phase. In addition to routine resupply operations, these assets are required to evacuate captured equipment, detainees, and potentially WMD materials.
- Phase V – Consolidate, Reorganize, and Transition. Consolidation and reorganization activities are necessary for all participating units. Pay special attention to recovery of the clearing force. During this phase, the unit conducts resupply, maintenance, recovery, and gains a status of personnel, equipment, and key weapons systems. The main command post issues a fragmentary order with instructions for subordinate units. Units make required changes to task organization during this phase for future operations. Units request resupply of damaged or destroyed subterranean equipment.

Note. The phasing construct depicted above is an example technique. Commanders and staffs organize operations appropriately to fit their mission's specific tactical circumstances.

Assess Relative Combat Power

3-118. Combat power is the total means of destructive, constructive, and information capabilities that a military unit or formation can apply at a given time. To assess relative combat power, planners initially make a rough estimate of the maneuver units' force ratios two levels below their echelon. Planners then compare friendly strengths against enemy weaknesses, and vice versa, for each element of combat power. With respect to subterranean operations, planners also consider how the restrictive nature of subterranean spaces may favor the defending or attacking forces.

Generate Options

3-119. Based on the commander's guidance and the initial results of the relative combat power assessment, the staff generates options. In developing COAs, staff members determine the doctrinal requirements for each proposed surface and subterranean operation, including doctrinal tasks for subordinate units. For example, an initial breach requires a breach force, a support force, and an assault force.

3-120. Once the staff has identified requirements, they develop decisive, shaping, and sustaining operations for each COA (if using the decisive-shaping-sustaining operational framework). Develop the decisive operation first and nest it with the higher headquarters' concept of the operation.

3-121. Planners develop shaping and sustaining operations to support subterranean missions. Isolation of the underground facility, preparatory fires, planned resupply of subterranean forces, and processing of detainees are examples of shaping and sustaining operations that are required during an attack of an underground facility. Some required shaping operations might exceed the capacity of a BCT. Staffs coordinate with higher headquarters or liaison officers to request and integrate EAB, SOF, and interagency capabilities as needed. (See chapter 6 for additional information on enablers not organic to the BCT.)

Array Forces

3-122. After determining the decisive and shaping operations and their related tasks and purposes, planners determine the relative combat power required to accomplish each task. Planners array friendly forces starting with the decisive operation and continuing with all shaping and sustaining operations. During this step, planners do not assign missions to specific units; they only consider which forces are necessary to accomplish their task. The initial array identifies the total number of units needed and identifies possible methods of contending with the enemy.

Develop a Broad Concept

3-123. The broad concept concisely expresses the how of the commander's visualization, summarizes the contributions of all warfighting functions, and eventually provides the framework for the concept of operations. It presents an overall combined arms idea that accomplishes the mission. While developing the broad concept, staffs also define expected relationships with joint, interagency, multinational, or special operations elements within the area of operations.

3-124. Planners select control measures, including graphics, to control surface and subterranean subordinate units during an operation. This can prove challenging when planning for subterranean operations due to the large number of unknowns inherent in subterranean spaces. Planners must consider that an underground facility may be substantially larger and more complex than the staff's initial estimates. Commanders and staffs must maintain the flexibility to add or change planned graphic control measures for subterranean operations.

3-125. When planning for critical subterranean assets and enablers such as command and control systems, ambulance exchange points, and decontamination sites, staffs must weigh the risks associated to these elements from potential CBRN exposure and other threats from the site against the benefits of a quick response to the clearing force. Asset and enabler management around the subterranean system require a significant and deliberate planning effort to quickly and efficiently support the clearing force, yet at the same time minimize the consolidation of friendly forces in a concentrated surface area that could provide the enemy with a tactical opportunity.

3-126. Planners at the BCT and battalion levels consider how to sequence assets in and out of the subterranean system. Unlike surface operations, movement within an underground facility is extremely constrained. Once clearing operations have begun, the tunnel or corridor associated with the point of breach is the only means to reach the surface. This single line of communication must accommodate follow-on forces, casualty evacuation, communications, and resupply. Failure to synchronize the movement of personnel and assets into or out of the underground facility can lead to substantial congestion in the tunnel and increased friction for the executing unit.

3-127. Resource intensive mission requirements such as heavy breaching equipment, contact with WMD materials, or specialized information collection, may require BCTs to transition some operations to EAB, SOF, or interagency elements. Planners coordinate and plan these transitions in advance. Order of movement, triggers for employment, physical location of link up or transition, and associated support requirements are examples of prior coordination with external assets. (See ATP 3-90.40 for additional information on countering WMD.)

Assign Headquarters

3-128. After determining the broad concept, planners create a task organization by assigning headquarters to groupings of forces. Staffs consider the unit types and the ability of that headquarters to control those units.

Planners pay special attention to the organization of low density or specialized units that directly support subterranean operations to include breaching, CBRN detection, casualty evacuation, and site exploitation.

3-129. Planning to conduct a deliberate attack of a underground facility or known subterranean network requires a large number of specialized enablers such as EAB engineers, CBRN response teams, EOD teams, military working dogs, MP, interpreters, and in some cases, Interagency partners. Commanders and staffs weigh requirements such as tempo, physical location during the operation, battlefield functions, and risk when deciding how to task organize a large number of enablers. The techniques listed in the following bullet list are examples of methods to task organize to support a mission's unique requirements:

- Assign all enablers to battalions. In this approach, each enabler is assigned to support a specific battalion headquarters. The advantage of this technique is that each enabler is controlled by and reports to a designated headquarters. The disadvantage is that transitioning low-density, critical enablers that must support multiple battalions to different locations on the battlefield may become cumbersome during operations.
- Retain enablers under BCT control. This technique retains control of some or all of the enablers at the BCT level. The advantage of this approach is that low-density, critical enablers report directly to the BCT headquarters, which may improve situational understanding. The disadvantage is that managing the employment of enablers creates an additional burden on the BCT commander and staff.
- BCTs create an enabler headquarters. This technique assigns a battalion headquarters (such as the brigade engineer battalion) to control any enablers that are not task organized to other battalions. The battalion assigned to control these enablers is responsible for their movement, security, and sustainment support. The enabler headquarters provides requested enabler capabilities to the point of need on the battlefield as directed by the BCT headquarters. When using this technique, a single headquarters consolidates and manages the enablers and provides them as needed using an "arms room" technique. The BCT prefers this technique when they expect to encounter and clear large, complex underground facilities. The disadvantage is that this technique places substantial strain on the battalion designated as the enabler headquarters in terms of command and control and sustainment requirements.

3-130. Subterranean operations are demanding physically and psychologically. Repeated exposure to operations in a subterranean environment can create a cumulative toll on individuals and units. Commanders and staffs consider which units have recently conducted subterranean operations and exercise judgment when assigning units to execute these missions.

Contingency Planning

3-131. Part of developing each COA is conducting analysis of potential contingencies that may occur and impacts they may have on the overall operation. It is important not to waste valuable time examining every potential outcome of the planned operation. However, the unique and hazardous nature of the subterranean environment demands that planners consider specific sets of circumstances. Examples of subterranean contingencies include—

- Hasty (unanticipated) breaches. Some underground facilities have a weather door (easy to breach) followed by a security door that may require specialized breaching assets.
- Tunnel collapse.
- Emergency evacuation of the underground facility.
- Tactical call out.
- Combination of civilians and enemy combatants within the underground facility and associated rules of engagement implications.
- Mass casualty event.
- CBRN and other toxic chemical or material release.
- Detainees.
- Flooded tunnel or area.
- Lost communications between surface and subterranean.

3-132. Planners develop mission abort or transition criteria based on the commander's guidance for acceptable risk. These criteria may dictate a complete abort of the mission or may dictate that personnel evacuate the underground facility until conditions inside are within the risk tolerance. The most common mission abort criterion, without specialized equipment, is the deterioration of air quality. Collapses of a tunnel, a mass casualty event, or release of CBRN material are other criteria often used. Staffs may develop multiple criteria for a single mission.

Planning for Contact with Weapons of Mass Destruction Materials

3-133. During planning and execution, the possibility of the unit encountering WMDs or their precursor materials presents additional complexities to the mission. Staffs must understand these additional requirements and incorporate them into all developed COAs.

3-134. When encountering underground facilities that may have WMD, commanders and staffs clearly describe expectations for the subordinate units. The three types of exploitation activities that can be directed are described in the following list:

- Site assessment. A site assessment detects WMDs and related materials, delivery systems, and technologies. A site assessment requires less time and resources than site characterization or site exploitation.
- Site characterization. Site characterization is a complete description and inventory of personnel, equipment, material, and information discovered during exploitation. It is an in-depth processing of the site and requires more time.
- Site exploitation. Site exploitation is a time, resource, and capability intensive task. It is a series of activities to recognize, collect, process, preserve, and analyze information, personnel, and material found while conducting of operations. Site exploitation requires additional enablers that are not organic to the unit to exploit data, information, and materials obtained during the operation.

Note. See ATP 3-90.40 for more considerations pertaining to countering WMD and site exploitation.

3-135. Unit staffs must analyze available specialized units to determine if additional resources are required to meet the directed level of exploitation. Planners must also identify command or support relationships for each enabling unit, as well as any conditions that would dictate a change to those relationships.

3-136. Planners ensure that all developed COAs include means to allow the commander to accomplish the following:

- Establish tight access controls at sensitive sites.
- Coordinate with enablers to establish the correct sequence of actions for site exploitation.
- Mitigate risks to the force after the site is secure.
- Use trained and equipped experts for site exploitation.
- Provide feasible support to the sensitive site exploitation team.
- Secure and safeguard captured personnel, material, documents, and electronic data for exploitation.
- Maintain control of the site until the mission is complete.
- Implement information operations and public affairs contingency plans.

3-137. When a unit identifies a WMD site, command and support relationships may change; however, the senior maneuver commander retains control of the overall operation. The maneuver commander oversees the initial assessment of the site and provides command and control, security, communications, and logistical support for exploitation and other elimination activities. The commander is responsible for mission execution and success until relieved by a follow-on force. Table 3-4 depicts a crosswalk of those countering WMD activities using the joint construct and corresponding typical combined arms tasks and activities for maneuver, technical enablers, and follow-on forces.

Table 3-4. Countering of weapons of mass destruction crosswalk

Countering Weapons of Mass Destruction		*Tasks of Maneuver Forces*	*Technical Tasks of Enablers*	*Tasks of Follow-on Forces*
Understand the environment		IPB IC Reconnaissance Security Observe-preserve-report Identify-presumptive	Reconnaissance Assess Characterize Identify-field confirmation CAO	Attribute Predict Identify-definitive
Cooperate and support partners		Partner Augment Coordinate Security force assistance Unified land operations Synchronize Civil-military operations	Synchronize	Synchronize
CD3	Control	Movement to contact Attack Cordon and search Security operations Relief in place Envelope Area defense Interdict	Disable Troop movement Reconnaissance Assess Characterize	SME consultation
	Defeat Disable Dispose	Tactical site exploitation Employ fires Block an enemy force Secure an area or route Employ forensic tools	Identify-field confirmation Translations CAO Packaging of hazardous material Controlled transport of samples Transition	Troop movement Civil-military cooperation Attribute Disable Exploit Degrade Hazardous material disposal Identify-definitive Destruction
Safeguard the force and manage consequences		Risk reduction Force protection CBRN defense Decontamination (immediate/operational) Contamination avoidance Route reconnaissance Sustainment	Mitigate Force health protection Health service support Decontamination (thorough) CBRN response ICBRN-R	Sustain Support ICBRN-R
Note. This figure provides a representative list of potential tasks and is not all-inclusive.				
Legend: CAO – civil affairs operations; CBRN – chemical, biological, radiological, and nuclear; CD3 – control, defeat, disable, dispose; ICBRN-R – international chemical, biological, radiological, and nuclear-response; IC – information collection; IPB – intelligence preparation of the battlefield; SME – subject matter expert				

Develop Course of Action Statements and Sketches

3-138. The S-3 prepares a COA statement and supporting sketch for each COA. The COA statement clearly portrays how the unit accomplishes the mission. The COA statement briefly expresses how the unit conducts

the combined arms concept for surface and, to the extent possible, subterranean operations. The sketch provides a picture of the movement and maneuver aspects of the concept, including the positioning of forces. The sketch addresses the exterior and interior layout of the underground facility to the extent known. Together, the statement and sketch cover the who (generic task organization), what (tasks), when, where, and why (purpose) for each subordinate unit.

STEP 4 – COURSE OF ACTION ANALYSIS (WAR-GAMING)

3-139. COA analysis enables commanders and staffs to identify potential difficulties, coordination friction points, and probable consequences of planned actions for each COA. It may require commanders and staffs to revisit parts of a COA as discrepancies arise. The commander, staff, and other available partners (joint, interagency, multinational, or SOF) may change an existing COA or develop a new COA after identifying additional events, tasks, requirements, or problems. War-gaming results in refined COAs, a completed synchronization matrix, and decision support templates and matrixes for each COA.

List All Friendly Forces

3-140. The commander and staff consider all units that can be committed to the operation, paying special attention to support relationships and constraints. This may include informal coordination relationships with interagency partners. The friendly forces list remains constant for all COAs.

List Assumptions

3-141. The unknown nature of subterranean operations requires a number of assumptions that the commander and staff review for continued validity and necessity. Record and use assumptions in re-assessing the operation's overall risk.

List Known Critical Events and Decision Points

3-142. A critical event is an event that directly influences mission accomplishment. A decision point is a point in space and time when the commander or staff anticipates making a key decision concerning a specific COA (JP 5-0). Generally, the commander aligns a decision point to a specific CCIR.

3-143. The commander and staff must anticipate that critical events and decision points may change throughout the course of subterranean operations. Examine branch plans and sequels during war-gaming to address different sets of potential conditions underground.

3-144. The list below is decision points considered during the planning process for attacking an underground facility. Some examples of potential decision points are listed below:

- Breach at a secondary portal if the first breach is unsuccessful.
- Request employment of special operations or interagency assets.
- Contact with CBRN or toxic industrial chemicals and materials within the underground facility.
- Evacuate the underground facility.
- Employment of additional forces inside of the underground facility.
- Underground facility is larger or more complex than anticipated.

Select the War-gaming Method

3-145. Three recommended war-gaming methods exist: belt, avenue-in-depth, and box. All three methods are suitable for war-gaming surface operations. Usually, the box method is the most preferred for subterranean operations. The box method allows staffs to focus on known or suspected critical areas within the underground facility. (See FM 6-0 for additional information about war-gaming methods.)

War-game the Operation and Assess the Results

3-146. The staff considers all possible forces, including templated enemy forces outside the area of operations that can influence the operation. The staff evaluates each friendly move to determine the assets

and actions required to defeat the enemy at that point. The staff continually considers branches to the plan that promote success against likely enemy counteractions or potential civilian reactions.

3-147. The commander and staff consider how to create conditions for success, protect the force, and shape the operational environment. During the war game, staff officers perform a risk assessment for their functional areas for each COA.

3-148. An effective war game for an attack of an underground facility results in the commander and staff refining, identifying, analyzing, developing, and determining several effects.

3-149. The commander and staff refine or modify as follows:

- Each COA, to include identifying branches and sequels, that become on-order or be-prepared missions.
- The locations and times of decisive points above and below ground.
- The enemy event template and matrix for both surface and subterranean areas.
- The task organization, including anticipated changes by phase. This is especially critical if elements transition control from surface to subterranean units or vice versa.
- Control measures and updated operational graphics that allow for flexibility with respect to unknown subterranean areas.
- CCIR by phase for both surface and subterranean operations.

3-150. The commander and staff identify as follows:

- Key terrain, known (surface) or assumed (subterranean).
- Likely times and areas for enemy use of WMD and friendly CBRN defense requirements.
- Potential times or locations for committing the reserve or quick reaction force.
- The most dangerous and most likely enemy COAs.
- Locations for the commander and command posts to control and synchronize surface and subterranean operations with additional emphasis on enabler management.
- Critical events above and below ground.
- Requirements for support of each warfighting function.
- Hazards, assessing their risk, developing control measures for them, and determining residual risk.
- The coordination required for integrating and synchronizing joint, interagency, multinational, and SOF involvement.

3-151. The commander and staff develop as follows:

- Decision points in subterranean operations.
- A synchronization matrix for surface and subterranean operations.
- A decision support template and matrix.
- The information collection plan and graphics.
- Themes and messages as required.
- Fires, protection, and sustainment plans and graphic control measures.

3-152. The commander and staff determine as follows:

- The requirements for military deception and surprise.
- The timing for concentrating forces and starting the attack.
- The movement times and tables for critical assets, including information systems nodes and specialized subterranean equipment and personnel.
- Mission abort criteria for subterranean operations.
- The estimated duration of the entire operation and each critical event.
- The projected the percentage of enemy forces defeated in each critical event and overall.
- The percentage of minimum essential tasks that the unit can or must accomplish.
- The targeting requirements in the operation, to include identifying or confirming high-payoff targets and establishing attack guidance.
- The allocation of assets to subordinate commanders to accomplish their missions.

- The requirements for and assets necessary to conduct site exploitation of the underground facility.
- The likely requirements for detainee holding, transportation, medical care, and processing.

STEP 5 – COURSE OF ACTION COMPARISON

3-153. The COA comparison starts with all staff members analyzing and evaluating the advantages and disadvantages of each COA from their perspectives. Staff members each present their findings for the others' consideration. Using the evaluation criteria developed before the war game, the staff outlines each COA, highlighting its advantages and disadvantages. Comparing the strengths and weaknesses of the COAs identifies their advantages and disadvantages with respect to each other. (See FM 6-0 for additional information.)

3-154. During mission analysis, the commander bases the evaluation criteria and associated weights developed on the staff's analysis and their vision for the operation. For these operations, it is advisable for the commander to place more weight on the risks associated with the subterranean environment, and the ability of a unit to synchronize operations on the surface and in the subterranean environment simultaneously, than other factors.

STEP 6 – COURSE OF ACTION APPROVAL

3-155. After the decision briefing, the commander selects the COA and issues the final planning guidance. The final planning guidance includes a refined commander's intent (if necessary) and new CCIRs to support execution. The guidance includes any additional guidance on priorities for the warfighting functions, orders development, rehearsals, and preparation. This guidance includes priorities for resources needed to preserve freedom of action and ensure continuous sustainment of both surface and subterranean operations.

3-156. Commanders include the risk they are willing to accept in their final planning guidance. This guidance uses staff assessments, along with the commander's experience and judgment, to address risks associated with the subterranean environment. Commanders obtain the higher commander's approval to accept any risk that might jeopardize accomplishing the higher commander's mission.

STEP 7 – ORDERS PRODUCTION, DISSEMINATION, AND TRANSITION

3-157. The staff prepares the order or plan by turning the selected COA into a clear, concise concept of operations and the required supporting information. The COA statement becomes the concept of operations for the plan. The COA sketch becomes the basis for the operations overlay. If time permits, the staff may conduct a more detailed war game of the selected COA to more fully synchronize the operation and complete the plan. The staff writes the operation order (OPORD) using the Army's OPORD format. (See FM 6-0 for additional information.)

PREPARE

3-158. Commanders and leaders prepare their units to conduct an attack of an underground facility in a number of ways. Synchronize surface and subterranean operations through rehearsals, which are critical and require the largest amount of time and effort. Integrating enablers, conducting precombat checks, and refining command and control processes are also key points of preparation.

INTEGRATE ENABLERS

3-159. Attacking an underground facility often requires specialized capabilities that are not organic to the BCT or battalion. Once received, commanders and staffs have a responsibility to integrate these enabling units to ensure mission success. EOD, CBRN, engineers, MP, and other enabling units must fully understand their roles within the concept of operations, the commander's intent, and envisioned end-state. They must also understand specified command and support relationships. When transitioning support from one unit to another, they must receive unit SOPs. The large number of enablers typically involved in subterranean operations can quickly overwhelm commanders; therefore, consider and account for span of control when integrating enablers. Staffs have a responsibility to understand what support enabler units require, such as security, equipment, or other resources to achieve their battlefield function. Facilitate this understanding through thorough integration, coordination, and rehearsals prior to execution.

3-160. The location or specific function of an underground facility may require the involvement of joint, interagency, multinational, or special operations partners. Units request most specialized functions through EAB. Once units receive these enablers, staffs conduct coordination and integration with external agencies as required synchronizing surface and subterranean operations.

PRECOMBAT CHECKS

3-161. Leaders conduct precombat checks at all echelons to ensure the mission readiness of key personnel and equipment. Commanders and leaders conduct or direct precombat checks of specialized subterranean equipment to prepare for an attack on an underground facility. Examples of critical subterranean equipment may include the following:

- Breaching equipment.
- Ballistic shields.
- Lights (visible and infrared).
- Night vision and illumination devices.
- Primary and redundant methods of communication.
- Breathing apparatus.
- CBRN decontamination and protective equipment.
- Atmospheric, CBRN, and other sensors.
- Ladders.
- Ropes.
- Site exploitation materials.
- Mapping and marking kits.
- Explosive hazard detection equipment.

REHEARSALS

3-162. Rehearsals are a key part of preparation for all operations. The unknown or unseen variables of the subterranean environment make rehearsals the most critical portion of preparation for attacking an underground facility. Leaders incorporate specialized subterranean equipment into rehearsals at every opportunity. Critical actions or factors that commanders, leaders, and staffs consider including in rehearsals are—

- Actions on enemy contact, both on the surface and within the underground facility.
- Isolation of the underground facility.
- Breaching.
- Explosive hazard detection, marking, neutralization.
- Hazards associated with weapons effects (surface and subterranean).
- Reaction to enemy counterattack.
- Task organization changes, specifically for critical enablers.
- Unit transitions.
- Reporting requirements and methods (includes mapping of the underground facility).
- Site exploitation.
- Detainee holding and processing.
- Evacuation of casualties from underground.
- Contingencies, such as—
  - Tunnel collapse.
  - Mission abort or transition criteria.
  - Loss of critical enabler capability.
  - CBRN or toxic industrial chemical release.
  - Mass casualty event.
  - Personnel recovery.

COMMAND AND CONTROL

3-163. Command and control processes and updating staff estimates continues throughout the course of the operation. The staff continues to collect and analyze information to assist in refining the commander's visualization. The staff communicates any updates or changes to subordinate units through fragmentary orders.

Execute the Information Collection Plan and Issue Fragmentary Orders

3-164. Initiate the information collection plan as soon as possible, ideally by the end of step 2 of the MDMP (mission analysis). The staff continues to actively manage and re-direct information collection assets during preparation as the unit receives information to answer priority intelligence requirement. Analyze new information, update the plan, and communicate to subordinate units through fragmentary orders, as required. Critical focus areas for updates include—

- Changes to enemy forces near the underground facility.
- Newly identified portals, ventilation shafts, obstacles, or barricades.
- Presence of CBRN materials or toxic materials.
- Changes to the scheme of maneuver.
- Changes to task organization.
- Changes to required resources.

Transition from Plans to Current Operations

3-165. One of the last events to occur during preparation is the transition of responsibility for synchronizing the operation from the plans to current operations staff sections. Planners conduct a detailed transition brief to ensure current operations personnel understand—

- Mission and commander's intent.
- Concept of the operation (surface and subterranean).
- Graphic control measures.
- Triggers and necessary conditions.
- Task organization to include specialized enablers.
- Decision points and anticipated subterranean decision points.
- Ongoing information collection operations.
- Contingencies.

EXECUTE

3-166. Commanders and leaders execute an attack of an underground facility by synchronizing all warfighting functions and domains in time, space, and purpose on the surface and underground. Key to this effort is flexibility to adapt to unforeseen challenges and circumstances that develop during the attack and exercising tactical patience when required.

3-167. The complexity of attacking an underground facility or subterranean network requires the consistent descriptions for key leaders. These positions perform critical functions during the attack of an underground facility. Functional leader descriptions include the following:

- Task force commander, who is the overall mission commander and is responsible for both surface and subterranean operations. Usually a BCT or battalion commander.
- Security force commander, who is responsible for all or a portion of the outer cordon. The task force can have multiple security force commanders that report to the task force commander. As an example, each battalion commander that is responsible for a portion of a BCT's outer cordon is a security force commander.
- Assault force commander, who is responsible for establishing the inner cordon, breaching, and clearing of the underground facility.
- Clearing force leader, who is the senior leader underground and is responsible for controlling all clearing operations, marking, and mapping of the underground facility. The clearing force is a

subordinate element of the assault force. The clearing force leader takes direction from and reports to the assault force commander.

RECONNAISSANCE OF THE OBJECTIVE

3-168. The S-3 and S-2 continue to employ information collection assets such as the Cavalry squadron, battalion scout platoon, UAS, signals intelligence, and fixed wing aviation to increase the fidelity of information at the underground facility and of the surrounding terrain. Staffs present any new information to the task force commander that could result in an adjustment to the concept of operations. Critical information may include identification of new portals, ventilation shafts or umbilicals, additional underground facility surface defenses or obstacles, or the presence of enemy forces in position to conduct a counterattack. The focus of information collection efforts may shift once the inner cordon is established.

MOVEMENT TO AND ISOLATION OF THE OBJECTIVE

3-169. Movement to the objective begins when the unit has completed their preparation and crosses the line of departure. The unit isolates the objective by establishing outer and inner cordons, and positioning all supporting assets to set the conditions necessary to begin the attack.

Establish the Outer Cordon

3-170. After crossing the line of departure, security forces move towards the underground facility using prescribed movement techniques and formations. They are prepared for enemy contact before reaching the probable line of deployment. Security forces are those assigned to establish the outer cordon and blocking positions, and usually are the first to make contact with enemy maneuver forces or prepared defensive positions such as bunkers and trenches.

3-171. Once a unit makes contact with the enemy, they execute the appropriate battle drills integrating indirect fires, aviation assets, and combat engineers where possible. If an integrated network of defensive positions with supporting obstacles protects the underground facility, one or multiple combined arms breaches may be necessary.

3-172. Security forces continue to maneuver until they reach their assigned blocking positions. The security forces integrate reconnaissance and security elements such as the Cavalry squadron or battalion scout platoon into the outer cordon or assign a separate security task. Subordinate elements report when occupying blocking positions and immediately begin improving them within their capabilities to prepare for an enemy counterattack. Units complete the outer cordon when all blocking positions are established.

Establish the Inner Cordon

3-173. The assault force has the responsibility of establishing the inner cordon and orienting on the underground facility. The assault force moves to its assault position while the security forces are maneuvering to their blocking positions or after the security forces establish the outer cordon. The assault force commander may choose to employ multiple assault positions based on the locations and dispersion of known underground facility portals and ventilation shafts.

3-174. Once at the assault position (or positions), the assault force commander conducts final confirmation checks with subordinate elements. These checks ensure that all subordinate elements have identified their assigned attack by fire or support-by-fire positions and that all personnel and equipment are prepared to establish the inner cordon. Depending on the functional purpose of the underground facility, the assault force may include interagency, multinational, or SOF elements.

3-175. The assault force commander reports to the task force commander when all conditions are set, requests permission to establish the inner cordon, and proceeds as directed. The assault force moves to their attack by fire or support-by-fire positions and orients on all known portals or ventilation shafts. Assault force elements suppress or destroy remaining surface-level defenses. The assault unit integrates supporting indirect fire, aviation, and electronic attack assets as required. The inner cordon is established when all assault force elements have occupied assigned attack by fire or support-by-fire positions and are prepared to execute either a tactical call out or breach of the facility.

3-176. Higher headquarters may assign assault force elements with the responsibility to target umbilicals to disrupt life support functions such as electrical power or ventilation inside of the underground facility. Task force commanders weigh the advantages of applying pressure to enemy forces inside with the risk of creating dangerous conditions for U.S. forces that enter the facility by disrupting critical life support systems and potentially systems that stabilize WMD materials.

Position Critical Assets

3-177. The task force headquarters establishes conditions for the attack on the underground facility by directing the positioning of critical assets either simultaneously with or following the establishment of the inner cordon. Before initiating subterranean operations, it is critical that elements such as CBRN teams, engineers, medical assets, and EAB, SOF, or interagency elements are in position. Indirect fire assets may also move to support shifting priorities of fire. These assets may move independently or with a task organized headquarters.

ACTIONS ON THE OBJECTIVE

3-178. Actions on the objective for attacking an underground facility at a minimum include clearing the facility, site exploitation, and detainee operations. Frequently, the attacking unit is required to conduct one or multiple breaches to gain access to the underground facility.

Tactical Call Out Option

3-179. The assault force commander may choose or be directed to execute a tactical call out before attempting to breach the underground facility as a method of force protection. This technique reduces the risk to U.S. forces by potentially avoiding having to enter the underground facility while in contact with the enemy, and by reducing the chance of CBRN or toxic material release (if present). Use military information support elements and interpreters to assist in a tactical call outs.

3-180. There is no guarantee that the underground facility is free of enemy combatants even if enemy forces respond to the tactical call out and exit the facility. A sophisticated enemy may leave some elements in the underground facility to ambush friendly forces. The assault force commander remains prepared to direct the clearing force to enter and clear the underground facility even if surrendering enemy personnel state that the facility is clear.

3-181. Task force commanders may decide to target and disrupt underground facility life support systems, such as electrical power or ventilation systems, as a method of applying pressure to enemy forces underground. When possible it is useful to avoid permanently disrupting underground facility life support. The assault force commander reactivates underground facility life support, prior to breaching, if the tactical call out fails. This can minimize dangerous environmental conditions for U.S. forces within the underground facility.

Breach and Secure a Foothold

3-182. The assault force commander prepares to conduct a breach if a tactical call out is not executed or if the call out fails. It is critical to conduct a final conditions check of all clearing force elements (breaching, assaulting, and supporting) prior to executing the breach. The assault force commander and subordinate leaders ensure that the following nodes, personnel, and equipment are appropriately positioned and prepared prior to initiating the breach:

- Marshalling and donning areas.
- Breach elements.
- Demolition charges.
- Assault elements.
- Ballistic shields.
- Thermobaric munitions.
- Robotics.
- Air quality sensors.

- Mapping and marking kits.
- CBRN reconnaissance teams and sensors.
- Emergency personnel decontamination station.
- EOD teams.
- Night vision, illumination, and other sensory equipment.
- Command post.
- Casualty collection points (CCPs).
- Enemy prisoner of war collection point.
- Civilian collection point.

3-183. Units do not establish critical nodes such as command posts, CCPs, and marshalling areas directly outside of, or on the axis of, the targeted portal. In the event of a detonation or CBRN release within the underground facility, the effects such as blast waves and toxic material follow the path of least resistance out of the facility. Units must consider prevailing wind patterns when establishing these nodes for the reasons listed above. Figure 3-13 depicts a unit establishing critical nodes off the portal's axis and considering the prevailing wind direction.

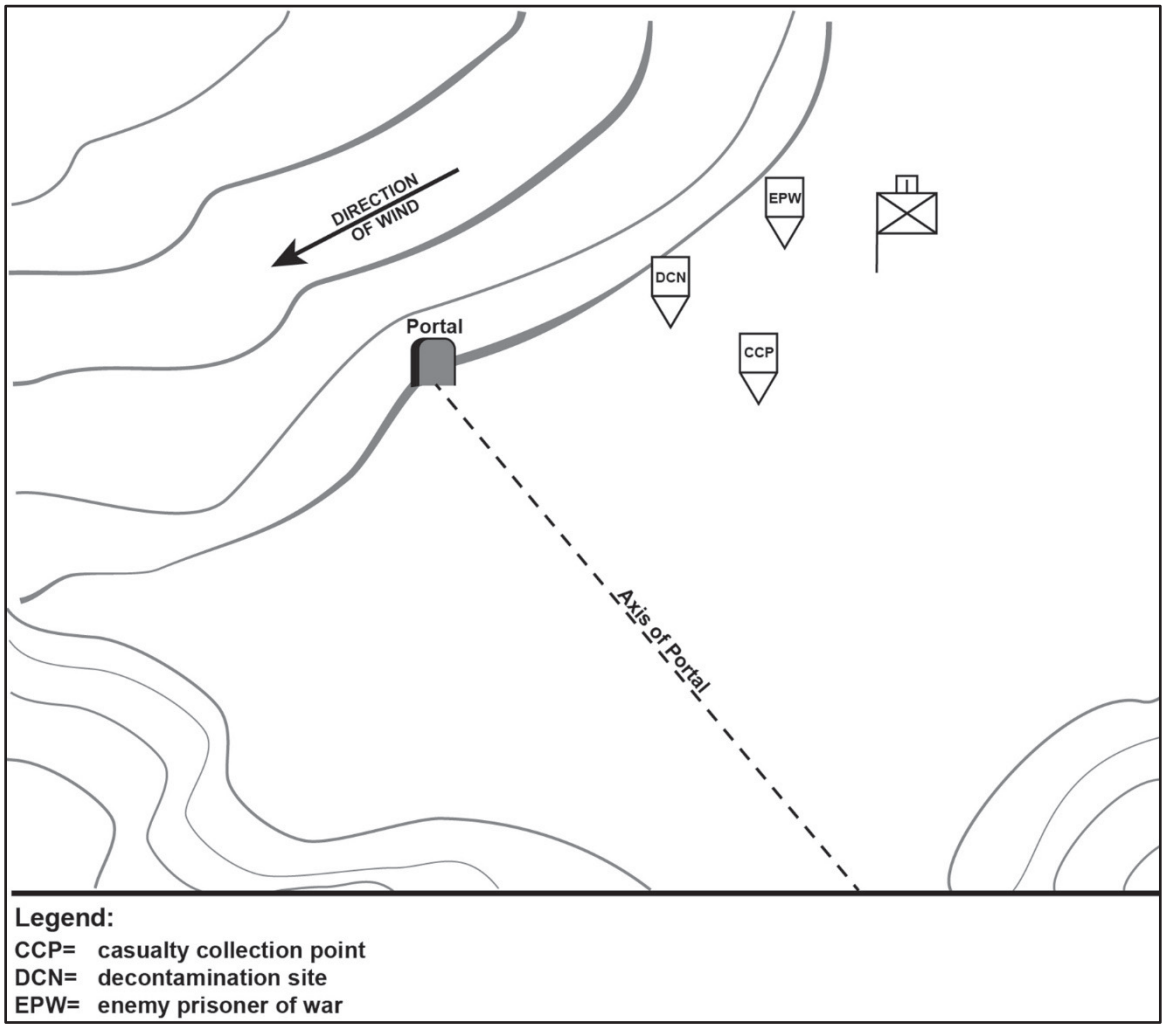


Figure 3-13. Off axis node establishment, example

3-184. Military demolitions may destroy enemy subterranean ammunition and explosive caches. When operations involve the demolition of ammunition and explosive caches in subterranean spaces, a serious earth

debris event known as flyrock is possible. A flyrock event propels debris, primarily rocks and large amounts of soil on the surface, above a large underground explosion. Particle acceleration resulting from escaping gases of the explosion and rock spall may result in high velocities of heavy debris, potentially traveling long distances.

3-185. The unknown construction of portal barricades presents a challenge for breach elements in terms of determining charge size and placement. A technique for determining portal door composition is to fire a single penetrating round, such as the M2 Bradley's 25-millimeter armor piercing, at the lower left or lower right corner of the portal door. Breach elements inspect the point of impact to determine material construction (steel only, steel and concrete, and so forth) and thickness of the door. When using armor piercing rounds, the assault force must be aware of the hazardous effects of depleted uranium when conducting these inspections. High explosive munitions such as multipurpose antitank rounds and tube launched, optically tracked, wire-guided missiles can potentially damage the structural integrity of tunnels. Units should avoid these munitions when possible.

3-186. The assault force prepares to conduct multiple breaches to gain access to the underground facility. Many underground facilities have multiple doors at each portal to control access. The weather door (exterior) is usually lighter in construction and easily reduced. Engineers design security doors (interior) to resist reduction attempts and may require a different breaching method than the weather door. (See chapter 6 for additional information on breaching.)

3-187. The assault force commander decides whether to conduct a single breach of the underground facility or whether to conduct multiple breaches at different portals. If electing to breach at multiple locations, the assault force commander must also decide whether to execute the breaches simultaneously or sequentially. Commanders consider the advantages and disadvantages to both approaches when making this decision.

3-188. Breaching at a single portal consumes fewer resources than breaching at multiple portals. Breaching at a single portal is also easier for the assault force commander to control. The disadvantage of this approach is that it allows enemy forces to focus their defensive efforts on a single avenue of approach (tunnel). When conducting a single breach, the clearing force executes a combination of breach and clear at the designated portal.

3-189. Breaching at multiple portals can create an advantage for friendly forces by presenting the enemy with multiple dilemmas. Using this technique as a means of deception may be key to a unit's success. Multiple entries into the underground facility or subterranean network can lead enemy forces to believe that they must fight in multiple directions. Additionally, breaching at multiple portals provides options for the assault force commander if enemy resistance is higher than expected on the primary direction of attack. The disadvantage of this approach is that conducting multiple breaches consumes additional personnel and resources. It is also more challenging for the assault force commander to control, thereby increasing the risk of fratricide.

3-190. Commanders emplace control measures when conducting multiple breaches simultaneously. When using this approach, it is crucial that only one breaching unit continues forward movement after securing a foothold (breach and clear). All other breaching units secure a foothold but do not continue forward movement (breach and hold). Restricting the forward movement of all but one unit reduces the risk of fratricide from two or more clearing force elements moving through an unfamiliar facility from different directions.

3-191. If friendly forces suspect an underground facility contains WMD or precursor materials, the unit conducts CBRN reconnaissance prior to initiating a destructive method of reduction (ballistic, thermal, or explosive). The assault force must use integrated enablers to test for contamination prior to and immediately following the breach. Testing for CBRN contamination continues throughout the clearing operation.

3-192. The assault force commander initiates the portal breach once all conditions have been set. Clearing force elements enter the facility to secure a foothold and react to enemy contact using the appropriate battle drills. The clearing force leader ensures that assault elements do not overextend and jeopardize the foothold. The foothold is secure once initial enemy contact has been defeated, the air quality assessed as acceptable, and the area cleared of explosive hazards.

3-193. The assault force commander remains in communication with all elements of the inner cordon. Enemy forces or noncombatants may flee the underground facility through other portals following the initial

breach. Inner cordon elements engage or detain enemy personnel and noncombatants in accordance with the rules of engagement.

Clear the Underground Facility

3-194. Once the unit secures the initial foothold, the assault force commander directs the clearing force leader to initiate clearing the underground facility. Clearing elements conduct an initial assessment of the air quality and, if possible, lead with robotic platforms to reduce the risk to Soldiers of enemy contact, booby traps, explosive hazards, or environmental hazards. The clearing force continually assesses their environment for air quality and CBRN contamination. Elements clear the underground facility deliberately and mark corridors and intersections as they move to facilitate rapid evacuation of the underground facility if required. (See chapters 4 and 5 for additional information on clearing techniques within an underground facility.)

3-195. The clearing force leader carefully monitors the progress of the clearing force to avoid unplanned culmination. To the extent possible, the leader employs additional forces prior to reaching the culmination of the clearing force, which should be a planned and recognizable point in the operation. The underground area that the clearing force can control without augmentation can vary based on enemy resistance, the number of intersections, room size, and other factors. The clearing force leader requests additional personnel from the assault force commander if the size of the underground facility exceeds the clearing force's capacity. The assault force commander considers span of control issues when deciding whether to provide additional combat power to the clearing force leader or whether to place a more senior leader underground to control the expanded clearing operation.

3-196. The underground facility may be considerably larger and more complex than initially estimated. Additional rooms, casualties, and multiple levels within the underground facility can all increase the demand for the number of required clearing force personnel. Circumstances may arise where the assault force has multiple subordinate unit leaders underground simultaneously which requires the presence of the assault force commander to maintain command and control. As an example, during a battalion operation, a company commander (assault force commander) may have two platoons (clearing force) inside of the underground facility.

3-197. The amount of combat power committed to clearing the underground facility combined with the repositioning of a key leader potentially creates a decision point for the task force commander. When directed, the assault force commander moves inside of the underground facility and the task force commander considers either redistributing combat power from the outer cordon or requesting additional forces from their higher headquarters. Figure 3-14 depicts an example decision, support matrix for this decision during a battalion attack of an underground facility.

Example Task Force Commander Decision Point				
Decision Point	**Decision**	**Criteria / Conditions**	**Action**	**Supporting CCIR**
#7	Shift combat power from the outer cordon?	***If*** UGF is too large for a single platoon to clear ***and,***	***Then*** authorize assault force commander (C Company) to enter the UGF ***and,***	#4
		If assault force commander (C Company) requests permission to move inside of the UGF	***Then*** adjust task organization to move one platoon from outer cordon (A Company) to assault force (C Company)	

Legend:
#= number
CCIR= commander's critical information requirement
UGF= underground facility

Figure 3-14. Decision support matrix for adjusting combat power

3-198. Both the assault force commander and clearing force leader closely monitor the status of breaching assets such as specially trained personnel, explosives, and breaching equipment. The assault force commander provides periodic assessments to the task force commander regarding remaining breach capability, and recommends requesting additional breaching assets if the estimated remaining breaches exceed available resources.

3-199. The clearing force leader attempts to locate the underground facility's control room and reports to the assault force commander if successful. Depending on the sophistication of the underground facility, units may be able to use control rooms to unlock or open doors or turn life support systems on or off. Units may be able to turn on or off a public address or closed-circuit television system. The assault force commander considers which underground facility systems to manipulate and directs the clearing force leader accordingly. Use interpreters to identify labels for specific controls.

3-200. Assault force commanders and clearing force leaders should expect to have intermittent and potentially slow communications between surface and subterranean elements. Communications require more resources (runners, wire, or retransmission sites) as the clearing force moves farther inside of the underground facility.

3-201. It is critical that task force and assault force commanders exercise patience during underground facility clearing operations. Clear underground facilities or subterranean systems deliberately. Events such as deterioration of air quality or loss of visibility due to dust and smoke can require the clearing force to evacuate and wait for conditions to improve.

3-202. The clearing force may encounter WMD or their precursor materials depending on the function of the underground facility. The clearing force members should be familiar with international markings for CBRN materials to the greatest extent possible. The clearing force leader requests CBRN reconnaissance assets once in contact with suspected WMDs unless other procedures are directed. Additionally, the assault force commander considers repositioning of decontamination assets (such as the emergency personnel decontamination station), based on the anticipated risk of the tactical situation.

3-203. Contact with confirmed WMD material by the clearing force requires initiation of a report to EAB. CBRN enablers conduct site assessment, characterization, and mitigation to enable small-scale countering of WMD. If the site scope is beyond the capacity of CBRN enablers, the unit may transition a portion of the operation to EAB, SOF, or interagency personnel for rendering safe, remediation, and removal. Units synchronize and closely control transitions to specialized external enablers, which mitigate disruptions to the larger operation. Support requirements for nonorganic assets may require the repositioning or reallocation of BCT elements or resources. (See ATP 3-90.40 for additional information on countering WMD.)

3-204. The clearing force leader directs subordinate elements to begin mapping the underground facility once tactically feasible. (See chapter 5 for mapping techniques.) The clearing force leader provides a completed map of the underground facility to the assault force headquarters once complete.

3-205. The task force commander and security force commanders may have to react to an enemy counterattack while the assault force still has clearing elements within the underground facility. The task force commander weighs the unit's ability to defeat the enemy counterattack and the importance of remaining tasks within the underground facility when deciding whether to extricate the clearing force. The task force commander repositions command and control systems as required and may request additional support from their higher headquarters to defeat the counterattack.

3-206. The assault force commander closely monitors the status of clearing force operations with respect to sustainment requirements. Units consume water, ammunition, batteries, medical supplies, and specialized equipment at a high rate while clearing an underground facility. Resupply of these items in large quantities for both surface and subterranean operations creates challenges for limited distribution assets across the task force. The task force executive officer (XO) or support operations officer reprioritizes supply and distribution assets supporting the assault force as required.

3-207. The assault force XO coordinates with the S-3 to prioritize and synchronize resupply movements into the underground facility. Synchronization of movements into and out of the underground facility for maneuver, resupply, and casualty evacuation elements is critical to avoid congestion of the single line of communication (tunnel) associated with the breached portal.

Detainee Operations

3-208. Clearing an underground facility often produces detainees, sometimes in large numbers, which can have a negative impact on a unit's momentum if not properly executed. The clearing force leader moves detainees out of the underground facility and transitions control to the assault force headquarters as soon as tactical circumstances permit. Segregate enemy prisoners of war and civilians at different collection points when possible. The assault force commander evaluates and determines whether additional personnel are required to secure detainees or to provide medical treatment.

3-209. Detainees can potentially provide valuable information concerning the underground facility structure, layout, purpose, and defenses. The assault force commander initiates tactical questioning of detainees as soon as possible. MP or military intelligence personnel can facilitate questioning if available. Once the initial questioning is complete, evacuate detainees to the task force headquarters for additional questioning and processing. This may require the task force executive officer, support operations officer, or S-4 (battalion or brigade logistics staff officer) to reprioritize transportation assets within the task force. See FM 3-63 for more information on detainee operations.

Site Exploitation

3-210. Once cleared, the assault force commander initiates site exploitation of the subterranean system. Vehicles may transport captured equipment if an appropriate sized portal exists. Carbon monoxide from vehicle exhaust can quickly rise to dangerous levels if the underground facility ventilation system is inoperable or insufficient to remove the vehicle exhaust gases. The assault force commander conducts a risk assessment and determines if vehicle use is acceptable. A staging area outside of the facility supports organization and transportation of captured equipment to higher headquarters.

3-211. Certain materiel within the underground facility may require specialized expertise to identify. The task force commander considers providing military intelligence, signal, EOD, and CBRN personnel to assist

in identification and classification of sensitive materiel. Interpreters may be required to identify documents and other items within the underground facility. Site exploitation of underground facilities with a WMD purpose may require interagency, multinational, or SOF personnel.

3-212. During site exploitation, the task force main command post issues a WARNORD to all subordinate elements in preparation for transition. Minimum guidance to subordinate elements includes—

- Updated operational timeline.
- Changes to graphic control measures.
- Changes to mission or scheme of maneuver.
- Changes to task organization.
- Changes to priorities of fires.
- Directed consolidation and reorganization activities.

CONSOLIDATION, REORGANIZATION, AND TRANSITION

3-213. Higher headquarters may direct the task force to maintain security of the underground facility, or conduct a battle handover with a relieving unit. If conducting a battle handover, the task force conducts the minimum consolidation and reorganization necessary for movement and prepares to depart the underground facility.

3-214. If remaining at the underground facility, the task force XO supervises all consolidation and reorganization efforts. Critical areas across the task force include casualty evacuation (CASEVAC), critical classes of supply, and operational readiness of key vehicles and weapons systems. Pay specific attention to the recovery of the clearing force and other personnel that operate inside of the underground facility. CBRN decontamination operations may be required.

3-215. The task force XO works in conjunction with the support operations officer or S-4 to manage transportation assets across the area of operations. Competing priorities for transportation assets may include resupply of friendly forces, movement of captured materiel to higher echelons for analysis, and evacuation of detainees.

3-216. All subordinate units release or receive elements as required during consolidation and reorganization to support directed task organization changes. The task force either departs the underground facility once task organization adjustment is complete or maintains security of the underground facility.

3-217. The following vignette describes a BCT attacking an underground facility. This includes the associated planning, reconnaissance, security, clearance, and site exploitation of the facility.

CONDUCT AN ATTACK OF AN UNDERGROUND FACILITY

3/88 IBCT is assigned to a JTF that has been conducting large-scale combat operations across varying terrain. At DTG XXX, the JTF headquarters designates 3/88 IBCT as the JTF main effort and directs them to conduct an attack to seize Objective Eagles, an underground facility suspected of containing CBRN material. The 3/88 IBCT staff begins the MDMP immediately and develops the following mission statement:

3/88 IBCT conducts an attack to seize Objective Eagles no later than DTG XXX to deny WMD capabilities to enemy forces.

The JTF headquarters task organizes the following additional assets to 3/88 IBCT to support the attack of Objective Eagles:

OPCON:
1 x military police (MP) platoon
1 x engineer company (Sapper)
1 x composite truck company (medium tactical vehicles and palletized loading systems)
2 x air defense platoons (Avengers)

Tactical Control:
3 x EOD teams
1 x chemical platoon (decontamination)

Direct Support:
2 x CH-47 heavy lift helicopters
8 x UH-60 utility helicopters
6 x AH-64 attack helicopters

2-53 IN is identified as the assault force and the BCT main effort. 1-53 IN and 3-53 IN are designated as security forces and establish the outer cordon east and west of Objective Eagles. 2-72 CAV establishes a screen north of PL Steel as part of the outer cordon. Figure 3-15 depicts 3/88 IBCT's task organization for the operation.

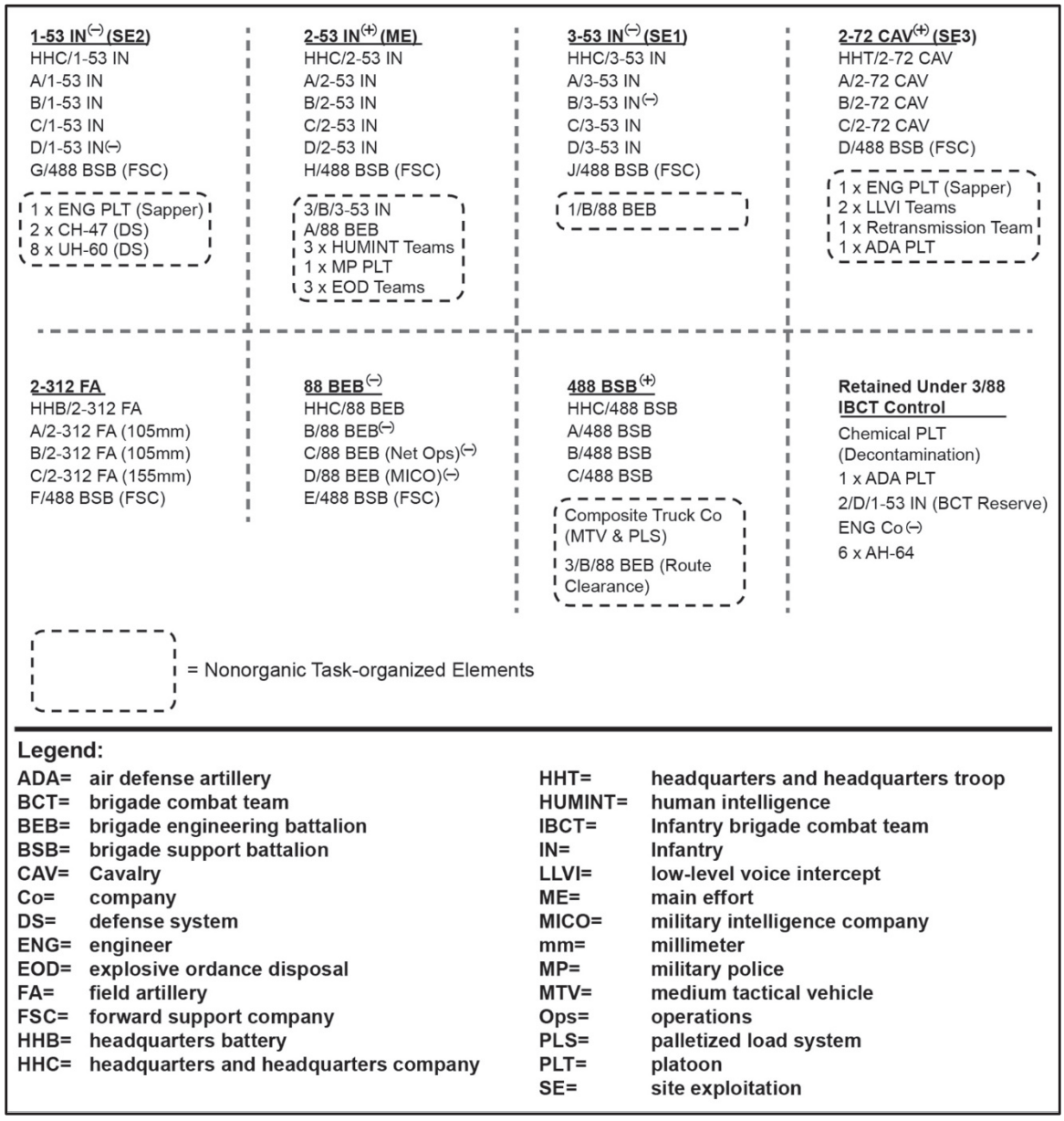


Figure 3-15. 3/88 Infantry brigade combat team task organization

The 3/88 IBCT S-2 assesses that the enemy is defending Objective Eagles with an understrength dismounted infantry battalion that is supported by a 152-mm artillery battery and a platoon of air defense artillery. Figure 3-16 depicts the situation template for the area of operations.

Figure 3-16. Enemy situation template

3/88 IBCT initiates their information collection effort during the MDMP. 2-72 CAV is directed to conduct a zone reconnaissance to PL Steel and an area reconnaissance of Objective Eagles, identify landing zones west of PL Iron, and provide guides on Route Portland for 2-53 IN. 3/88 IBCT's UAS are in direct support of 2-72 CAV for this phase of the operation.

2-72 CAV crosses their line of departure at DTG XXX with three troops abreast and one UAS over-watching Objective Eagles. By DTG XXX 2-72 CAV has initiated their area reconnaissance of Objective Eagles and has conducted the following actions:

Identified Route Portland is clear of enemy as far north as PL Tin.

Engaged and forced the displacement of enemy at the intersection of Routes Boston and New York.

Engaged and destroyed one enemy infantry platoon west of PL Iron.

Identified a suitable landing zone west of PL Iron.

At DTG XXX, one UAS is destroyed by enemy air defense artillery in the vicinity of Objective Eagles. The enemy ADA is targeted and destroyed by fixed-wing aviation assets. 2-72 CAV emplaces guides on Route Portland at PL Tin, confirms three underground facility portal locations, and establishes their screen north of PL Steel.

At DTG XXX, 3/88 IBCT begins movement towards Objective Eagles. 3-53 IN moves 10 km dismounted and begins occupying blocking positions east of PL Brass. B/3-53 IN engages and destroys enemy infantry on Route Boston south of PL Steel.

1-53 IN initiates an air assault at DTG XXX with one company and the battalion tactical command post. C/2-312 FA (155 mm) provides initial suppression of enemy air defenses and provides direct support to 1-53 IN until the air assault is complete. 1-53 IN closes the battalion on the landing zone by DTG XXX and moves to occupy their blocking positions. A/1-53 IN engages and destroys two enemy infantry squads south of PL Steel and the outer cordon is established at DTG XXX. Figure 3-17 depicts establishing the outer cordon.

Figure 3-17. 3/88 Infantry brigade combat team outer cordon established

The insertion of 1-53 IN's second company is the trigger for 2-53 IN (assault force) to begin their truck movement towards Objective Eagles. 2-53 IN begins movement of their initial company north on Route Portland and successfully conducts link up with guides from 2-72 CAV in the vicinity of PL Tin. The last company from 2-53 IN arrives at DTG XXX. The 2-53 IN commander receives an information update from the 2-72 CAV guides and directs the companies to occupy their assault positions.

Both A and B Companies from 2-53 IN engage and destroy multiple enemy dismounted infantry squads during movement to their assault positions. By DTG XXX, all three of 2-53 IN's rifle companies have reached their assault positions and established attack-by-fire positions. All portal doors are confirmed to be closed. C/2-53 IN (clearing force) has visual contact with one bunker immediately outside of the southern portal (point of breach). The 2-53 IN tactical command post moves with their additional task organized assets to establish in the vicinity of C Company's position.

3/88 IBCT begins positioning critical support assets simultaneously with 2-53 IN's movement towards the assault positions. 2-312 FA sequentially occupies position areas for artillery 1, 2, and 3. 88 BEB collocates with the 3/88 IBCT main command post and prepares the remaining engineer platoons to support the assault force as required. 488 BSB establishes a forward logistics element (FLE) in the vicinity of the 3/88 IBCT main command post with additional water, robotics, CBRN equipment, demolitions, and medical assets (evacuation and treatment). The 3/88 IBCT tactical command post establishes north of PL Tin with the chemical platoon (decontamination), an ADA platoon, and BCT reserve (2/D/1-53 IN). The remaining UAS and priorities of fire shift to support the security forces making up the outer cordon. Figure 3-18 shows the disposition of 3/88 IBCT prior to initiating the breach of Objective Eagles.

Legend:
EOD= explosive ordnance demolition OBJ= objective PAA= position area for artillery PL= phase line
RTE= route SPT= support TAC= tactical operations center

Figure 3-18. Inner cordon and supporting assets established

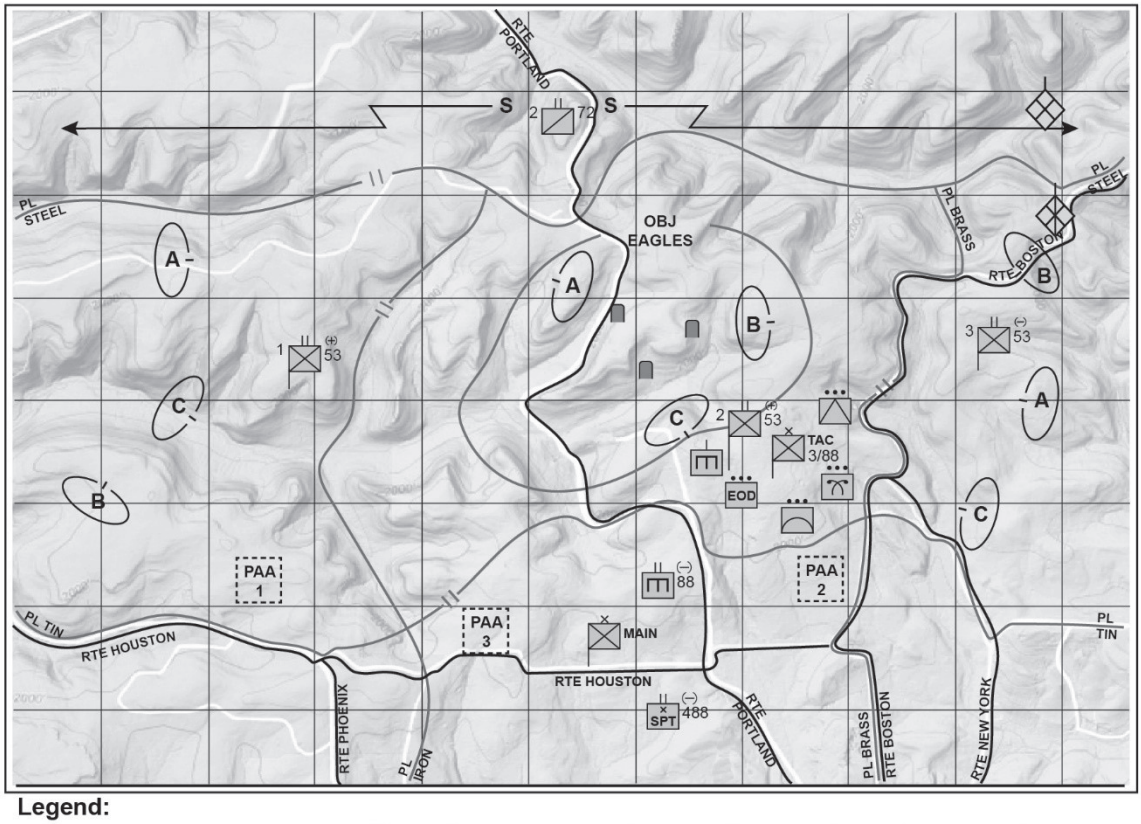
The 3/88 IBCT commander (task force commander) confirms that all conditions are set across the BCT and directs the 2-53 IN commander to initiate the breach of the southern portal. C/2-53 IN (clearing force) destroys the bunker outside of the southern portal with support from D/2-53 IN (antitank) and begins moving into position. They rapidly establish the company command post, CCP, and marshalling area outside and off-axis of the portal entry while breaching and assaulting elements of the clearing force move into position.

Engineers from A/88 BEB initiate the breach at DTG XXX and squads from 2/C/2-53 IN enter the underground facility to secure a foothold. After the clearing force has entered, a second door (security door) is identified 20 meters farther down the corridor. The A/88 BEB engineers conduct a second breach, which requires multiple attempts. Once through the security door, the clearing force leader reports that they have defeated initial enemy resistance, the foothold is secure, the underground facility has functioning electrical power, and that the air quality has been assessed as acceptable. The C/2-53 IN commander directs the clearing force to proceed with clearing the underground facility.

Shortly after the initial foothold is secured, A/2-53 IN observes the northwestern portal door open and approximately 30 enemy Soldiers begin to flee the underground facility. The A Company commander determines that no civilians are present and directs the company to engage. A/2-53 IN captures four enemy prisoners of war and begins to administer medical treatment.

The clearing force leader reports to the C/2-53 IN commander that the underground facility control room has been located. Using an interpreter, the clearing force is able to identify the appropriate controls and open the vehicular door at the southern portal. The clearing force leader also reports that at least 20 enemy soldiers are visible on a closed-circuit television system, and that a second platoon will likely be required to complete the clearing operation. The C Company commander issues a WARNORD to one of the rifle platoons outside the underground facility and reports to the 2-53 IN commander.

At DTG XXX, the 3/88 IBCT main command post receives nearly simultaneous contact reports from 2-72 CAV and 3-53 IN. 2-72 CAV reports that they are in contact with a dismounted infantry company near the eastern flank of their screen. 3-53 IN is in contact with at least one motorized infantry company on Route Boston. Both units report receiving a heavy volume of sustained indirect fire and significant casualties. Figure 3-19 depicts the enemy contact.



Legend:
EOD= explosive ordnance demolition OBJ= objective PAA= position area for artillery PL= phase line
RTE= route SPT= support TAC= tactical operations center

Figure 3-19. Enemy counterattack

The 3/88 IBCT commander recognizes these actions as a coordinated enemy counterattack, considers the ability of the 2-53 IN to rapidly evacuate Objective Eagles, and directs the following actions: “Adjusted priorities of fire are counterbattery followed by 2-72 CAV calls for fire. The 2 x AH-64s on station are now in direct support of 3-53 IN. Once the AH-64s have to re-arm, direct the close air support (2 x F-16s) to drop to the 3-53 IN’s fires net. Employ the reserve (2/D/1-53 IN). They are under tactical control to 3-53 IN now. Send a WARNORD to the BSB that they should be prepared to receive and triage casualties.”

The 3/88 IBCT commander assesses that the BCT will have difficulty defeating another counterattack and requests additional resources from the JTF operations officer. The JTF allocates 2 x A-10s to 3/88 IBCT immediately and task organizes a Stryker Infantry company to the BCT. The Stryker Infantry Company is expected to arrive at Objective Eagles in 3 to 4 hours.

At DTG XXX, the clearing force leader reports to the C/2-53 IN commander that 14 rooms have been cleared, an unknown number of rooms remain, the clearing force has sustained six casualties, and that additional personnel are required to continue clearing the underground facility. The C Company commander reports that the current clearing force has culminated to the 2-53 IN commander and requests permission to personally enter the underground facility with a second platoon. The 2-53 IN commander approves the request and designates the C Company commander as the clearing force leader.

The C/2-53 IN commander moves inside of the underground facility with the radio telephone operator and an additional Infantry platoon. The C Company commander receives an information update and directs the new platoon to continue clearing Objective Eagles. The C Company first sergeant supervises the casualty evacuation effort and coordinates with the company XO who is controlling the company command post outside of the underground facility.

The clearing force encounters substantial enemy resistance as they clear the remainder of the underground facility and sustains eight additional casualties. After all known enemy resistance has been defeated, the clearing force leader (C Company commander) identifies a door that is significantly heavier than others inside of the facility. After checking facility schematics taken from the control room, the clearing force leader suspects that WMD material may be behind the door and decides not to conduct an explosive breach.

The clearing force leader uses a runner to report the unusual door to the 2-53 IN commander and requests additional engineers and equipment to conduct a mechanical breach. The assault force commander concurs with the clearing force leader’s recommendation and directs A/88 BEB to provide the requested personnel and equipment.

Simultaneous to the clearing of Objective Eagles, 488 BSB begins to reposition additional assets from the brigade support area (BSA) to the FLE to more efficiently support the operation. Their first priority is to establish the forward aid station. This is followed by vehicle recovery assets and additional classes of supply. Whether 3/88 IBCT is told to continue to secure Objective Eagles after it has been seized is a decision point for the BSB commander to move the remainder of the BSA forward.

A/88 BEB confirms that the underground facility ventilation system is still operational and conducts the mechanical breach as directed using a combination of battery powered saws and hydraulic spreader-cutters. The room behind the door contains racks of artillery munitions that the clearing force leader suspects contain chemical weapons. The C Company commander directs continuous monitoring of CBRN detection sensors and requests CBRN reconnaissance and EOD support from the assault force commander.

The CBRN reconnaissance platoon from 88 BEB enters the room and determines that the munitions do contain chemicals but that none are present in the air. One of the attached EOD teams inspects the munitions for damage and anti-handling devices. The EOD team leader concurs that the munitions are chemical devices but that all appear to be undamaged.

The 3/88 IBCT tactical command post reports the status of the chemical munitions to the JTF and that Objective Eagles is secure. The JTF operations officer directs 3/88 IBCT to be prepared to receive an interagency team that will ensure all chemical weapons have been rendered safe and that will supervise packaging and loading of the munitions if required. A/3-26 IN (Stryker) arrives at DTG XXX and is immediately designated as the BCT reserve.

The 2-53 IN commander directs the clearing force leader to initiate site exploitation of Objective Eagles and requests support from the 3/88 IBCT S-2 section. The 2-53 IN commander also requests support from the composite truck company (OPCON to 3/88 IBCT) to move 32 enemy prisoners of war and in anticipation of moving captured materiel from the underground facility for additional exploitation. Finally, the 2-53 IN commander directs the clearing force leader to complete a detailed map of the underground facility. This map is passed to the 3/88 IBCT headquarters for analysis and distribution to the JTF.

The JTF headquarters directs 3/88 IBCT to maintain security of Objective Eagles for an additional 72 hours to allow for site exploitation and inspection of the underground facility and chemical munitions by interagency teams. This directive triggers 3/88 IBCT to begin consolidation and reorganization activities, and to move the remainder of the BSA forward. The BCT retains control of A/3-26 IN (Stryker) until directed to move from Objective Eagles.

ASSESS

3-218. Commanders and leaders at all levels conduct continuous assessments throughout the course of an operation. Assessments of friendly and enemy forces intensify during transitions as units prepare for future operations.

Friendly Forces

3-219. Leaders first strive to obtain an accurate status of their units. Status of wounded personnel, mission essential equipment, and levels of supply are paramount to understanding a unit's condition and estimating available future combat power. In particular, commanders and staff identify specialized subterranean equipment, such as robotics or ballistic shields that is available for operations.

3-220. Leaders also conduct formal or informal after-action reviews with their subordinates. Commanders and subordinate leaders examine their unit's actions to include breaching, movement within the underground facility, casualty evacuation, and sustainment and update of the appropriate SOPs when possible.

Enemy Forces

3-221. Commanders and staffs assess enemy forces to anticipate their tactics and methods of defending the underground facility. The task force intelligence staff examines materiel captured from the underground facility for analysis. Intelligence analysts work with interpreters or linguists to inspect codebooks, schematics, maps, and other documents from the underground facility. Certain items such as machinery or WMD materials may require technical experts not organic to the task force.

3-222. Intelligence teams use reports, maps, and other products developed by the assault force to build a holistic assessment of the underground facility. Analysts may choose to use the underground facility graphic technique described earlier as a means to communicate this assessment as shown in figure 3-10, page 3-26. Task force staffs submit their analysis and assessments to their higher headquarters.

3-223. Commanders, leaders, and staffs record and reference their assessments when planning future subterranean operations. They exercise caution in relying solely on these assessments, as underground facilities are rarely identical.

Chapter 4
Company and Platoon Subterranean Operations

Leaders must carefully plan and coordinate subterranean operations. Detailed planning enables success of the operation while a lack of planning often directly correlates to failure. Leaders of company and smaller units use TLP as a framework, to develop plans, orders, preparations, and to develop strict control measures that mitigate command and control challenges associated with subterranean operations. Commanders and leaders ensure their subordinates understand their intent. Clear understanding of intent leads to the success of the plan during execution.

SCOPE OF THE COMPANY AND PLATOON FIGHT

4-1. The characteristics of company and platoon operations in a subterranean environment include uncertainty, confusion, and unclear expectations. An inability to orient themselves coupled with an unpredictable enemy creates seemingly overwhelming conditions for Soldiers and leaders. Additionally, the subterranean fight challenges these units to develop situational understanding for their higher headquarters through detailed battle tracking and mapping of the underground facility. Commanders may impose limitations on weapon systems or explosives used to prevent damage to critical components of the underground facility such as ventilation systems, electronics, or control equipment for high payoff targets or sensitive targets. Commanders ensure subordinate leaders have received the relevant training, are provided a clear intent, have been empowered to make the necessary decisions in a timely manner, and have the required enablers to achieve success in this difficult environment.

4-2. While developing plans for operations in areas with known or suspected underground facilities, leaders stress the requirement for security. Unit plans account for characteristics of a noncontiguous area of operations to ensure subordinate elements establish and maintain security. Understanding that enemy elements may emerge from previously undiscovered or hastily developed portals is an important security consideration for every Soldier. Commanders may be inclined to orient forces in a linear fashion, toward known threats. However, in area where the enemy is likely operating underground, the enemy's capability to achieve surprise and mass through subterranean operations may require a noncontiguous security approach.

4-3. When the enemy is operating in a subterranean environment, companies and platoons are expected to fight and perform tactical tasks at the same level of proficiency whether above or below the surface. To do this requires considerable planning, rehearsal, and discipline in execution. Tunnels and underground facilities pose a series of challenges, to include anti-personnel booby traps in entrances and doorways, poor ventilation and lack of oxygen, improvised explosive devices rigged to collapse hallways or tunnels around Soldiers, and CBRN weapons, or devices.

COMPANY AND PLATOON TACTICAL TASKS

4-4. During subterranean operations, companies and platoons have three primary tactical mission tasks, which are breach, bypass, and clear. A *tactical mission task* is the specific activity performed by a unit while executing a form of tactical operation or form of maneuver. It may be expressed in terms of either actions by a friendly force or effects on an enemy force (FM 3-90-1). This chapter describes and discusses these tasks.

4-5. When describing tactical tasks, commanders must describe the what and the why of a mission statement. The commander and the subordinate must have a clear understanding of the what and why of the operation. Commanders must clearly describe the task and purpose to aid in developing understanding for subordinates. Clearly describing the mission and the intent provides subordinates with confidence when navigating uncertain and complex situations in subterranean operations.

Breach

4-6. *Breach* is a tactical mission task in which the unit employs all available means to break through or establish a passage through an enemy defense, obstacle, minefield, or fortification (FM 3-90-1). (Refer to ATP 3-90.4 for more detailed information concerning breaching.) Companies and platoons can expect to conduct multiple breaches when operating in the subterranean environment. These breaches usually occur at the entrance of the underground facility and then, depending on the size and type, at subsequent points inside the facility. Breaching techniques include mechanical, ballistic, thermal, and explosive. Chapter 6 discusses these methods in more detail.

4-7. The relevant factors, circumstances, and considerations for breaching vary greatly between the surface level and the subterranean environment. While on the surface, units have access to a larger variety of techniques to conduct a breach. These methods may include ballistic breaching with a heavy weapon system, using a vehicle to pull or push open a security door, or using a recovery vehicle's torch to cut through a door. Subterranean breaches pose unique challenges and restrictions, the most important of which is the overpressure danger from explosives. Other limitations to consider when breaching underground include a lack of vehicle support, inability to observe the other side of the breach, and other environmental factors as discussed in chapter 1.

Bypass

4-8. *Bypass* is a tactical mission task in which the commander directs the unit to maneuver around an obstacle, position, or enemy force to maintain the momentum of the operation while deliberately avoiding combat with an enemy force. (See FM 3-90-1 for more information.) When possible, bypassing a subterranean network or underground facility is ideal due to the time and resources required for attacking, clearing, or seizing. Commanders establish bypass criteria to support their intent.

Clear

4-9. *Clear* is a tactical mission task that requires the commander to remove all enemy forces and eliminate organized resistance within an assigned area (FM 3-90-1). Clear is a personnel and resource intensive task, particularly in a subterranean environment. Depending on the size of the facility, companies and platoons can generally accomplish this task at organic strength. They may request additional enablers, through their higher headquarters, that increase the capability and capacity of the organizations assigned to this mission.

OTHER TASKS

4-10. In addition to the primary tasks described above, commanders and staff may assign companies or platoons seven tasks if provided the necessary enablers. However, subterranean facilities of any significance frequently require additional forces. The seven tasks are listed below:

- Contain.
- Cordon and search.
- Destroy.
- Interdict.
- Isolate.
- Neutralize.
- Seize.

4-11. The principles and techniques discussed throughout this chapter apply to all three categories of subterranean systems as described in chapter 1. However, due to their complexity, most of this chapter revolves around category 3, subterranean systems. Leaders should adjust their selected approach based on the category, size, scope, and complexity of the subterranean environment with which the unit comes into contact.

MITIGATING CONTACT WITH UNDERGROUND FACILITIES

4-12. Due to the high risk, Soldiers must avoid entering and fighting in a subterranean environment when possible. When expecting their subordinate units to make contact with subterranean systems, commanders provide specific guidance that outlines their intent, entry criteria, and acceptable risk. Units use the following four steps when encountering subterranean systems: Find, assess, mitigate, and continue mission. The five most common methods or tasks by which units can mitigate a subterranean system are bypass, neutralize, control, contain, and clear. The following paragraphs describe the commander's guidance and the steps to take when encountering subterranean systems in more detail.

COMMANDER'S GUIDANCE

4-13. Company commanders establish clear guidance for subordinate leader actions when they expect to come into contact with an underground facility. This guidance is in the form of engagement, disengagement, bypass, and entry criteria. Each of these are described below:

- Engagement criteria. Describes the conditions when a subordinate element should engage an enemy force.
- Disengagement criteria. Sets the conditions for when an element should break contact with the enemy. It allows subordinate leaders latitude while reducing the risk of being decisively engaged by a superior force.
- Bypass criteria. Sets the conditions when decisive enemy engagement should be avoided, usually for the sake of time. These criteria also apply to underground facilities.
- Entry criteria. Sets the initial requirements for subordinate units to enter an underground system without receiving a direct order. These criteria should be very narrow in scope and well-defined to ensure subordinate leaders do not create a situation that results in the larger organization committing to an operation it is not prepared for, potentially at the expense of other missions.

4-14. Cumulative time in subterranean environments includes both psychological and physical effects. Leaders must plan to monitor Soldiers for claustrophobic and physiological effects such as breathing, circulation, heat exhaustion, and dehydration. Leaders should preplan scheduled wellness checks and report results back to commanders. In possible CBRN environments where Soldiers are wearing protective gear, rigorous steps should be taken to prevent heat casualties and dehydration. These environments place extreme psychological stress on Soldiers as well. These topics are further discussed in chapter 7 and appendix A.

4-15. Subterranean environments may offer little protection from enemy direct fire. Leaders must mitigate this exposure through careful planning, backbriefs, and rehearsals during which all Soldiers must show an absolute understanding of their task and purpose. Minimizing exposure while moving through doorways, hallways, and openings should be practiced so as to become routine. To avoid exposure to enemy fire or during tactical halts, leaders make use of available cover. The wisest action may be to reposition back to the last cleared area that affords protection. While this may sacrifice terrain, reducing exposure may be the most prudent action.

4-16. The final consideration a commander must plan for is exposure to enemy action. While waiting for higher guidance, relying on runners for communication, or deciding on a COA, troops potentially remain exposed allowing enemy forces familiar with the underground facility to reposition and counter the effects of friendly forces. Within the time allowed, planning should include contingencies and potential enemy counter reactions. Due to the challenges of the subterranean environment, leaders and Soldiers should anticipate relying on the higher commander's intent through the early stages of a subterranean operation. Situation reporting and additional guidance from higher may be slow and intermittent throughout the operation.

FIND

4-17. Companies make initial contact with an underground facility through direct fire contact with enemy forces or through visual contact of entry portals or ventilation shafts. The type of contact dictates the approach the unit takes. Units in direct fire contact report and execute the appropriate battle drills to reduce the threat while maintaining freedom of maneuver. Units maneuvering near a subterranean system always assume they

are in visual contact with the facility. The facilities use redundant methods to provide situational awareness and it is unlikely that an approaching force can counter this.

4-18. Units in visual contact with an underground facility establish an overwatch position and take steps to prevent enemy forces fixing them. By doing this, leaders gain the flexibility to conduct a tactical pause, report to the higher headquarters, and determine whether the facility meets any of the criteria discussed above. The company conducts an area reconnaissance to determine more information about the facility as described in chapter 3. Information gained feeds into the higher commander's assessment and ultimately their decision of how to mitigate the facility.

4-19. During the area reconnaissance, units look for indications of potential portal locations. These indicators include but are not limited to the following:

- Worn places on trees used as handholds.
- A small trail (much like a game trail) through brush into a clump of small trees.
- Cut trees.
- Limbs tied near the treetop to conceal the use of a tunnel from aircraft.
- A slight depression in or around a group of small trees.
- Air holes.
- Smoke.
- Mechanical sounds from generators.
- Dead or discolored vegetation.
- Soil discoloration.
- Ventilation shafts. Thermal devices aid in their identification.

ASSESS

4-20. Base the commander's assessment on information collected during the reconnaissance. The assessment sets the stage for the actions the organization takes to mitigate the effects of the underground facility and its portals. Company commanders make their recommendation based off of the following considerations:

- Capabilities of organic and attached subordinate elements.
- Required enablers to accomplish mitigation.
- Established engagement, disengagement, bypass, and entry criteria.
- Impacts and risks to the originally assigned mission.

MITIGATE

4-21. Normally, the BCT or battalion commander has five options to mitigate an underground facility as discussed in chapter 3. These are bypass, neutralize, control, contain, and clear. The criteria discussed above and the operational concept of the higher headquarters, influence these options. Companies must be prepared to receive tasks associated with each of the following potential options. See chapter 3 for a detailed discussion of mitigation options.

Bypass

4-22. Companies and platoons can conduct the task of bypass without any additional augmentation. Within the bypass option, companies can expect to receive the task of establishing attack by fire or support-by-fire positions to fix specific portals to prevent the enemy from interfering with the main body of the friendly element. This fixing force ensures the enemy cannot limit the freedom of movement of bypassing friendly forces. Once the main body has moved through the area, the fixing force either conducts a battle handover with a follow-on force or breaks contact and provides updated reports to their higher headquarters. If bypass is insufficient, the company should recommend either neutralizing or controlling the enemy facility to their higher headquarters.

4-23. Though generally not advised, companies may bypass a subterranean system without establishing an overwatch position. Commanders base this decision on the need to maintain momentum towards previously

established objectives. Higher headquarters establishes criteria for this action. When a maneuvering unit meets bypass criteria, the leader reports the location of the portal and continues with the previously assigned mission.

Neutralize

4-24. *Neutralize* is a tactical mission task that results in rendering enemy personnel or materiel incapable of interfering with a particular operation (FM 3-90-1). When given this task, companies can expect to provide overwatch and blocking positions on all known portals into the subterranean system. Use direct, indirect, and joint fires to ensure the enemy subterranean facility is unable to influence the main body as it continues to maneuver to the original objective. Place blocking positions on likely enemy avenues of approach to ensure the enemy cannot influence the main body's maneuver to the objective. If neutralize is ineffective or insufficient, the company should recommend transitioning to either the control or contain options.

Control

4-25. The control option places elements in assault by fire or support-by-fire positions around each identified entry portal. The company expects seize or secure tasks associated with each portal assigned. The company should request breaching assets due to the expectation to defeat surface defenses while maneuvering to the portals. If control is ineffective, the company should recommend transitioning to either contain or clear options.

Contain

4-26. The contain option focuses on functionally sealing the portals to surround the enemy and prevent them from withdrawing their forces for use elsewhere. The company should expect to receive enablers to assist in sealing the entry portals and ventilation shafts. The commander task organizes the company into a security element (responsible for establishing a cordon) and a sealing element (responsible for sealing each of the identified entry portals and ventilation shafts). Commanders may establish multiple elements to isolate multiple portals and ventilation shafts. Leaders closely monitor the sequence of events and tempo of the operation so each of these elements remains synchronized.

4-27. The security element establishes support by fire or blocking positions oriented on one or multiple entry portals or ventilation shafts. These portals and shafts have the effect of isolating the individual enemy positions and enable the sealing element to conduct their tasks.

4-28. The sealing element uses explosives to collapse the portal, engineer support to block the entrances with earthen material, or welding equipment to seal the identified portals and ventilation shafts thereby rendering them inoperable. Leaders inspect each location to ensure that it is secured and sealed.

4-29. Once each location is sealed, the sealing element withdraws allowing the security element to do the same. All elements report their progress and move to the next location. Once complete at all identified locations, the security element conducts an additional area reconnaissance to verify they have effectively contained the enemy within the facility. If contain is not sufficient or appropriate, the security element may have to consider a more time and resource intensive option to mitigate the facility.

Clear

4-30. The option to clear is the most time and resource intensive of the five options. The remainder of this chapter discusses planning and executing a deliberate clearing operation. When conducting a hasty clearing operation, companies should follow the same planning factors under a condensed timeline.

4-31. Companies have the ability to conduct a partial clearing operation based on the entry and disengagement criteria established by their higher headquarters. If met, entry criteria allow a unit to enter a facility. Commanders and their subordinate leadership ensure they do not commit their higher headquarters into an operation without prior coordination and preparation.

CONTINUE MISSION

4-32. After mitigating the effects of a subterranean system or its portals, the company consolidates and reorganizes. As part of this task, the company provides an updated situation report to the higher headquarters.

The update includes all information gained about the facility such as estimated dimensions, number of entry portals and ventilation shafts. This information is also provided to the unit assigned the task to provide overwatch of the facility. The company reports any requirements needed to complete the originally assigned mission to include adjustments to timelines and whether they are still mission capable.

4-33. Below is a vignette that reinforces the concepts discussed previously. The vignette demonstrates the contain option as a method to mitigate an underground facility encountered during a movement to contact operation.

As 4/21 IBCT was conducting a movement to contact between PL Florida and PL Montana, 7/84th Cavalry Squadron reported finding indicators of an underground facility. Most underground facilities appeared to be used as communication nodes and possibly to store materials. Typical enemy presence was reported as a platoon of regular forces divided into three squads: a security squad, a patrol squad, and a communications squad.

5/235th IN Battalion was maneuvering north in sector along AXIS Lion in a battalion wedge with A Company in front. During the course of the movement, first platoon received sporadic small arms fire, which quickly ceased. The company increased their dispersion and resumed movement using bounding overwatch. As the lead squad from first platoon completed their second bound, they came under heavy machine gun fire from a fortified position. First platoon responded effectively with suppressive fire enabling the lead squad to break contact. During mission preparation, the battalion S-2's intelligence update stated indicators of underground facilities included roving guards and fixed machine gun positions as external defenses. Consequently, the commander halted the company and conducted a leader's reconnaissance to confirm the presence of the underground facility. The commander found the fortified machine gun position and identified an entry portal on a hillside approximately 20 meters north of the machine gun position. The portal appeared to be large enough for personnel and was constructed of metal. There were no signs indicating chemical or hazardous material inside. A double strand, wire obstacle surrounded the portals and fortified position. Further reconnaissance using thermal devices revealed two ventilation shafts 50 meters to the west of the personnel portal (see figure 4-1).

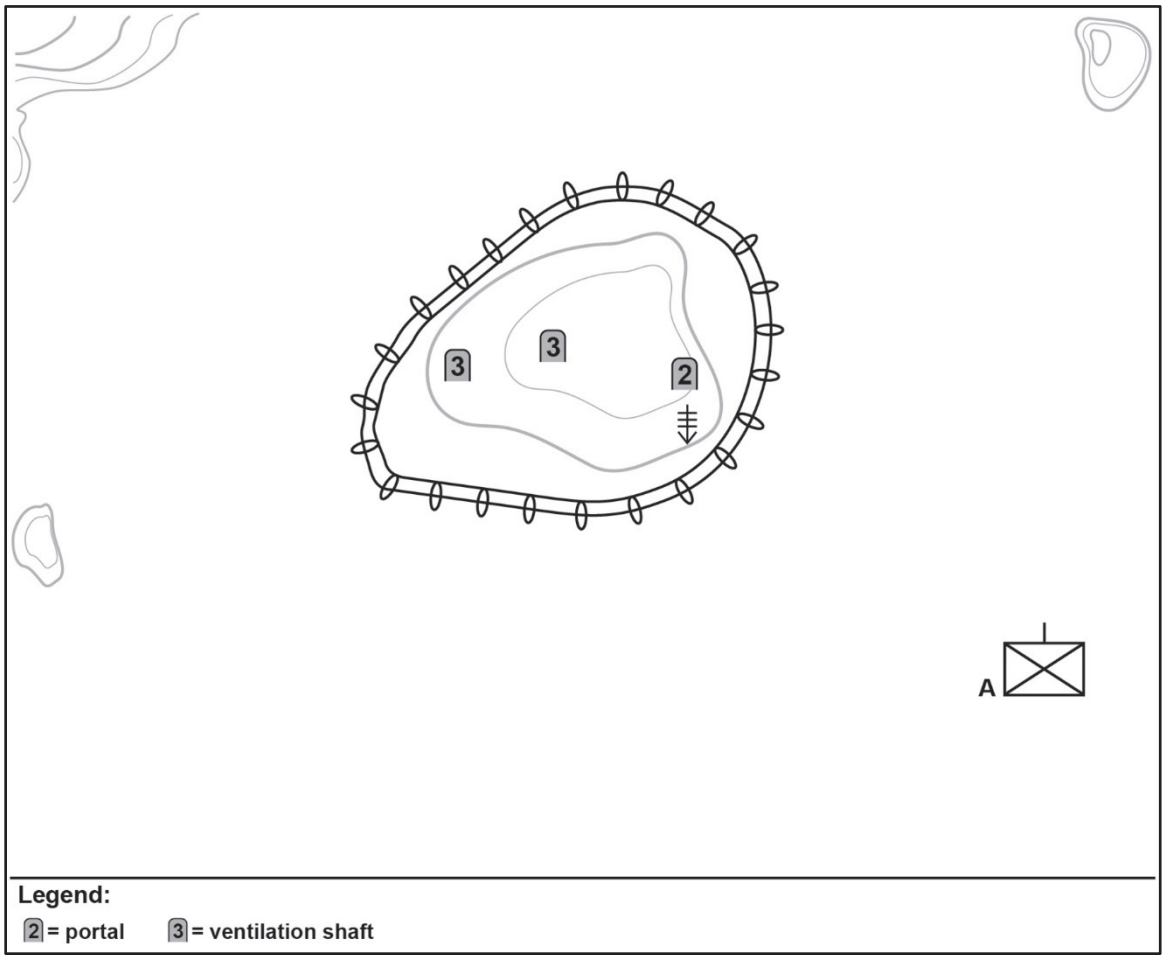


Figure 4-1. Situation

The company commander reviewed all of the information and recommended to the battalion commander to mitigate the effects of the underground facility by containing the entry portals. The battalion commander agreed with the company commander and ordered the company to start the necessary preparations. The company commander requested engineer assets to assist in sealing the underground facility. The battalion commander approved the asset request. During the leader's reconnaissance, the commander left a security element comprised of the first platoon leader and one of their squads and returned to the company.

Once back with the company, the commander identified the following key tasks:

- Conduct breach of a wire obstacle.
- Destroy a bunker.
- Seal all portals to render them inoperable.
- Inspect portal seals for desired effect.
- Coordinate movement between portals.
- Conduct a battle handover.

The commander adjusted the company's task organization into a support force tasked with preventing the enemy from influencing the breach operation, a breach force tasked with conducting the breach and reducing the obstacle, and an assault force tasked with exploiting the breach and assaulting the bunker. The support force consisted of first platoon and the company mortar section. Their purpose was to suppress the enemy, prevent enemy influence on the reduction area, and to control obscuration fires. The platoon had priority of artillery fires throughout the duration of the breach. The breach force consisted of second platoon. Their purpose was to reduce, proof, and mark the lane through the obstacle, provide local security on the near side and far side of the obstacle, and assist the passage of the assault force through the created lane. The assault force was third platoon. Their purpose was to destroy the bunker (far side objective) and provide reinforcing fires for the support force.

The commander sent the remainder of first platoon to establish the support-by-fire position 1A and move the mortars to a mortar firing point, second platoon to establish support-by-fire 2A, and third platoon to an objective rally point south of second platoon's position. Once each subordinate element reported in position, the commander initiated the breach with a linear, artillery smoke target to obscure the point of breach. Simultaneously support-by-fire 1A began suppressing the enemy machine gun position with direct fire and mortar fire, which enabled second platoon to maneuver forward to secure the point of breach. Second platoon then conducted a mechanical breach of the wire obstacle and established a passage lane. Second platoon then proofed and marked the passage lane allowing third platoon to initiate their assault of the far side objective.

Third platoon conducted movement from their objective rally point through the passage lane and into their assault-by-fire position. Once the platoon was set, first platoon shifted their direct and indirect fires. Third platoon initiated their assault and destroyed the bunker. Once complete, the platoon consolidated, reorganized, and started to clear the remainder of the objective. (See figure 4-2.)

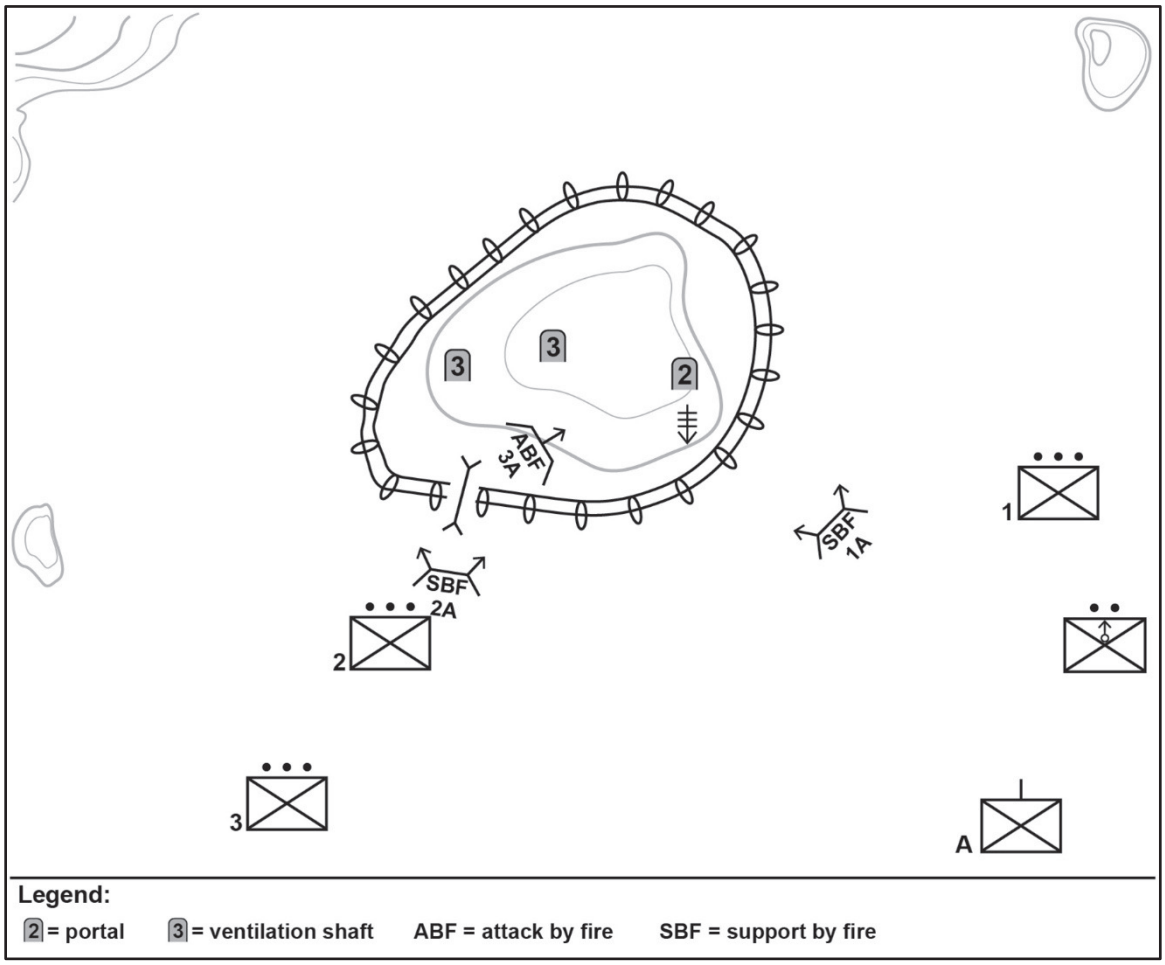


Figure 4-2. Blocking the third portal

Once complete with destroying the bunker, the company adjusted the task organization into a security element tasked with securing the entry portals and ventilation shafts, and a sealing element tasked to block the portals. The security element consisted of first and third platoons and the company mortars. Their purpose was to clear the objective and deny the enemy freedom of maneuver so the sealing element could move to the portals. The sealing element consisted of second platoon whose purpose was to prevent the enemy from exiting the underground facility. Meanwhile the first platoon leader continued to conduct reconnaissance to identify attack-by-fire positions that covered each portal. The commander decided to seal the portals sequentially to maintain the greatest control. Sealing simultaneously was another option that would have been faster but reduced control. Second platoon provided their own local security and remained vigilant for enemy contact including indirect fire, direct fire, and booby traps.

With the task organization adjustment complete, the company transitioned from destroying the bunker to the assigned mission of containing the underground facility. Second platoon established a linkup point while waiting for the engineer assets to transition from their previously assigned mission. First platoon maintained overwatch of the objective. Third platoon cleared the area inside the wire, identifying and placing security elements on all identified entry portals and ventilation shafts of the underground facility. During their clearing task, third platoon identified the locations of two entry portals that were previously unidentified. Once complete, third platoon established support-by-fire 3A, 3B, and 3C to fix the enemy. An engineer squad from the brigade engineer battalion conducted linkup with second platoon and conducted hasty mission preparation. (See figure 4-3.)

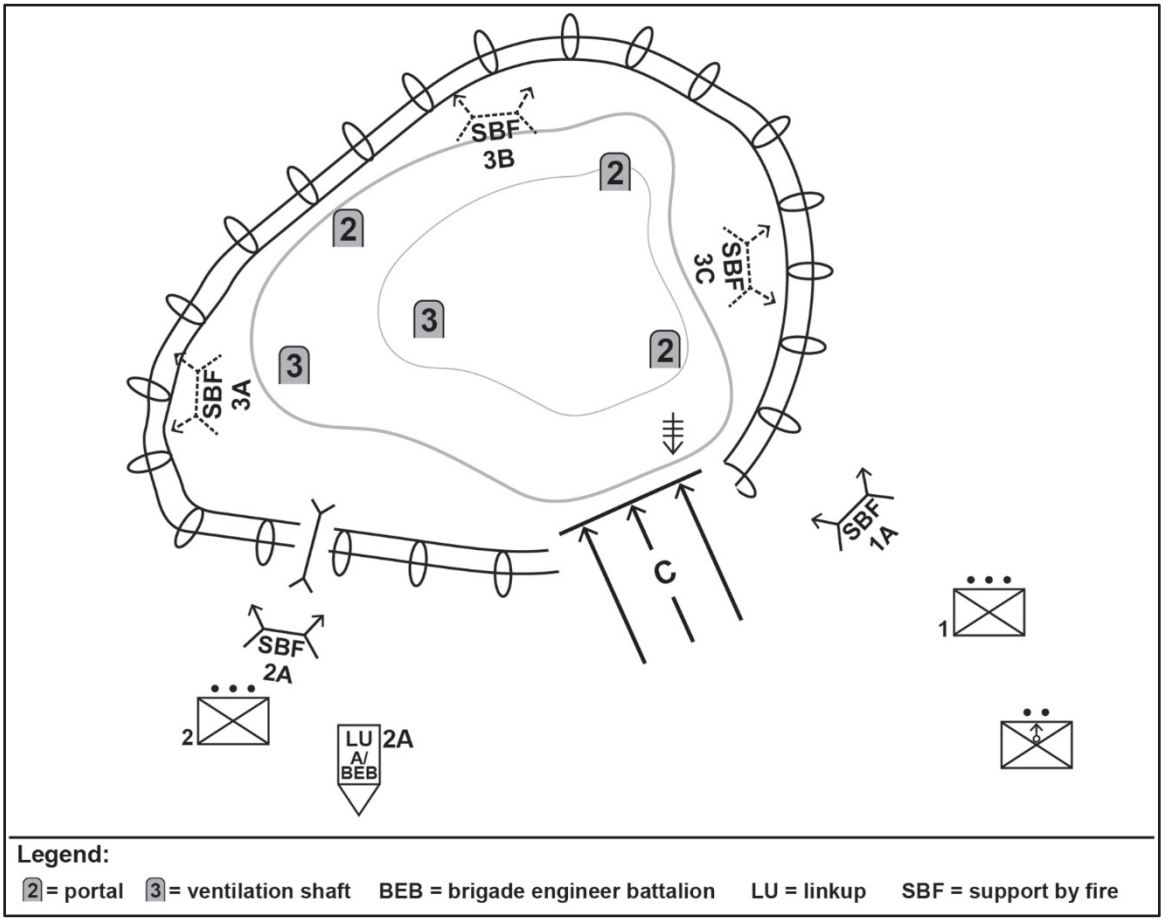


Figure 4-3. Fix the underground facility

Second platoon conducted movement from support-by-fire 2A to the furthest west ventilation shaft. The platoon planned to seal the underground facility from west to east due to the location of the entry portals and ventilation shafts. The engineer squad collapsed the ventilation shaft with a demolition charge.

As second platoon began to move to the next ventilation shaft, the company came under a mortar attack. The company reacted to the indirect fire and one Soldier from second platoon was wounded. Third platoon evacuated the casualty to the company CCP as second platoon prepared to set the charge in the ventilation shaft. The commander realized that second platoon assumed the enemy could not influence them and directed them to maintain as much dispersion as possible to avoid the threat of indirect fire while accomplishing the mission. The commander considered the possibility that personnel inside the tunnel might be calling for fire on their position and decided to move first platoon to an overwatch position on the north side of the underground facility to observe any undetected portals in the event that the enemy might observe or flee from a concealed portal.

Second platoon set explosive charges in the material surrounding the western most entry portal and detonated them to bring debris down in front of the portal. The engineer squad utilized their earth moving equipment to block the next portal with an earthen barricade. The platoon then moved to the eastern most entry portal and blocked it using explosives. Second platoon then reported completion of sealing the underground facility's entry portals. (See figure 4-4.)

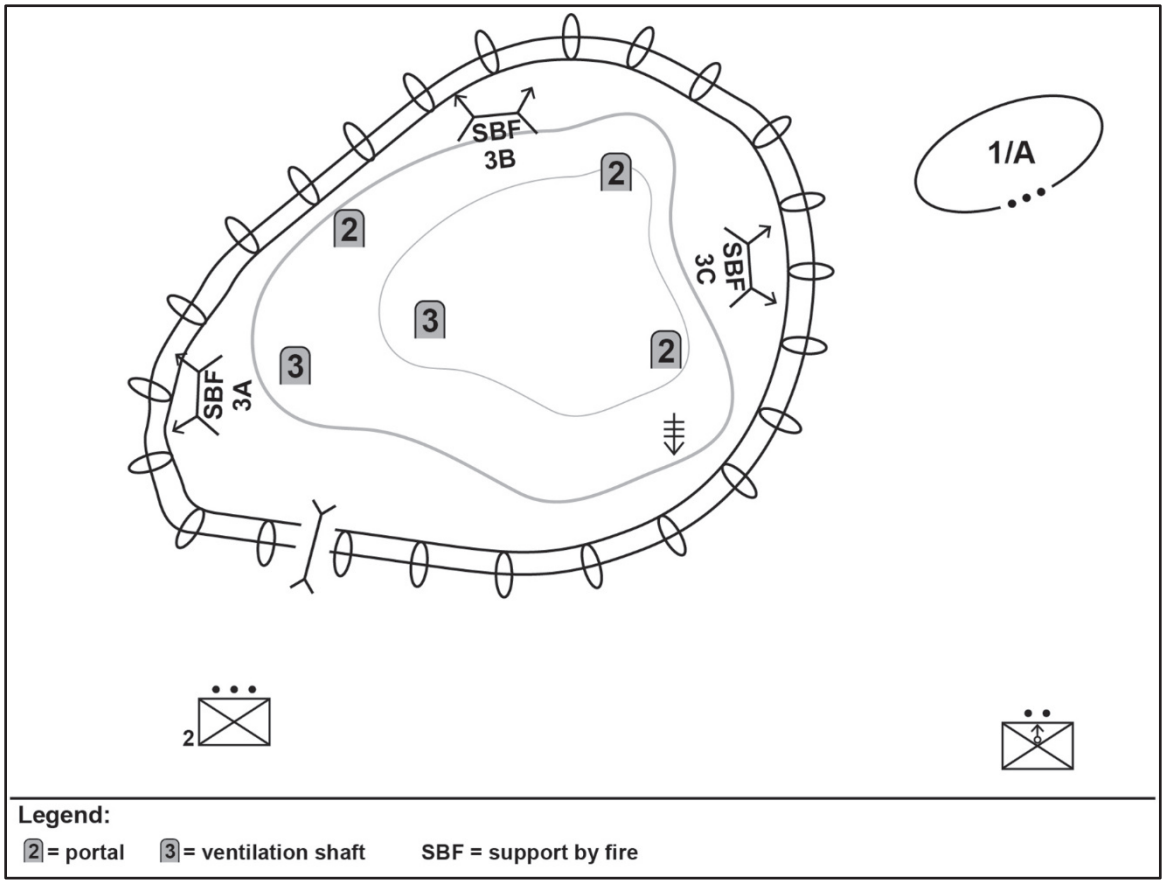


Figure 4-4. Contain the underground facility

As the engineer team completed their work, the BCT reserve Infantry company arrived with an engineer reconnaissance team to assume responsibility for the underground facility. Third platoon conducted a sweep of the area to ensure there were no remaining portals and then withdrew from the objective followed by the engineer squad and second platoon. Each platoon returned to its objective rally point and the engineer squad remained to assist the reserve Infantry company and the engineer reconnaissance team. The commander conducted a thorough battle handover with the reserve Infantry company commander passing information such as exact location of portals and shafts, portal and shaft construction, portal type, method of sealing, concerns regarding sealing, enemy activity observed while sealing, method for unsealing, and recommended overwatch positions. The commander reported completion of the sealing operation to the battalion headquarters and resumed movement to contact.

OPERATIONS PROCESS

4-34. *Planning* is the art and science of understanding a situation, envisioning a desired future, and determining effective ways to bring that future about (6). Planning begins an analysis and assessment of mission variables (METT-TC) and the operational environment, with particular emphasis on the enemy situation. Planning involves understanding and framing the problem and envisioning the set of conditions that represent the desired end state. Based on higher commander's guidance, planning includes formulating one or more suitable COAs to accomplish the mission. Once a commander chooses a plan, refinement of that plan continues during preparation and execution activities. The commander relies on intuition, experience, and input from subordinate leaders to integrate activities when circumstances dictate.

4-35. The four activities that encompasses the operations process activities are plan, prepare, execute, and assess, which are described below:

- Planning generates a COA that is feasible, timely, and nested with the higher commander's intent.
- Preparation consists of activities performed by units to improve their ability to execute a mission.
- Execution is putting a plan into action by applying combat power to accomplish the mission.
- Assessment is the continuous monitoring and evaluation of the current situation.

STEPS OF TROOP LEADING PROCEDURES

4-36. The TLP are a dynamic process used by small-unit leaders (company and troop level and their subordinate elements) to analyze a mission, develop a plan, and prepare for an operation. These procedures enable leaders to maximize available planning time while developing effective plans and preparing their units for a mission. Risk management supports the eight steps of TLP (ATP 5-19). The sequence of the steps is not rigid. Leaders modify the sequence to meet the mission, situation, and available time. Leaders may choose to complete some steps concurrently while others may be continuous throughout the mission. The troop leading procedure steps are listed below:

- Step 1. Receive the mission.
- Step 2. Issue a warning order.
- Step 3. Make a tentative plan.
- Step 4. Initiate movement.
- Step 5. Conduct reconnaissance.
- Step 6. Complete the plan.
- Step 7. Issue the order.
- Step 8. Supervise and refine.

4-37. Normally, the first three steps (receive the mission, issue a WARNORD, and make a tentative plan) occur in order. However, Soldiers base the sequence of subsequent steps on the situation. The tasks involved in some steps may occur several times. The last step, supervise and refine, occurs throughout. Units may

perform these steps simultaneously or in an order different from listed above. The following information concerning the TLP is refined to focus on the subterranean environment. Conduct all steps, even in abbreviated forms if necessary. As such, the suggested techniques are oriented to help a leader quickly develop and issue an OPORD. (Refer to FM 6-0 for more information.)

PLAN

4-38. Company and platoon leadership utilize the TLP framework when planning and preparing for subterranean operations. Planning for a subterranean operation begins one of two ways. The first is receipt of the mission from the higher headquarters. The second is when a unit makes contact with a subterranean system while conducting other operations. When units make unplanned contact with a subterranean system, they should conduct hasty planning on a condensed timeline utilizing the same framework. The information below lays out a company's deliberate planning process using the TLP framework for a mission to attack to clear an underground facility.

RECEIVE THE MISSION

4-39. Company commanders start the TLP process when they receive a WARNORD or OPORD from their higher headquarters to clear an underground facility. Leaders assess the situation using the operational and mission variables and allocate the time available to planning and preparing for the mission. An initial assessment includes identification of necessary enablers and specialty equipment not resident in the company. Typically, after receiving an OPORD, leaders conduct a confirmation brief to their higher commander to ensure they understand the commander's intent and concept of operations. The leader obtains clarification on any portions of the higher headquarters plan as required.

ISSUE THE WARNING ORDER

4-40. As soon as leaders complete their initial assessment and develop the mission timeline, they issue a WARNORD to subordinate elements. The WARNORD includes as much detail as possible, but at a minimum the information listed below:

- General location of the underground facility.
- Initial task organization, location of attachments, and expected link up time and location.
- Preparation priorities for entering the underground facilities.
- Special team requirements to include breaching, clearing, and support teams.
- The initial operational timeline.
- When and where the commander issues the OPORD.

MAKE A TENTATIVE PLAN

4-41. Once commanders issue the WARNORD, they develop a tentative plan. This step includes conducting mission analysis, COA development, analyzing COAs, and COA comparison and selection. An example of a phasing construct for clearing an underground facility mission is outlined below:

- Phase I – Reconnaissance of the surface objective.
- Phase IIa – Move to and isolate of the surface objective.
- Phase IIb – Consolidate and reorganize the surface objective.
- Phase IIIa – Locate and isolate the point of breach.
- Phase IIIb – Breach and secure a foothold.
- Phase IIIc – Clear the subterranean objective.
- Phase IV – Site exploitation.
- Phase V – Consolidate, reorganize, and transition.

4-42. As previously stated, the availability of facility maps greatly contributes to situational understanding, planning, and battle tracking at the command post as well as execution on the objective. Commanders should plan to validate existing maps and, if necessary, create maps on site depending on the availability of enablers and mission requirements. If able to create maps on site, have a plan to transmit those maps to the CP and

higher headquarters. Additionally, commanders should request maps and architectural drawings of manmade structures from their higher headquarters.

Mission Analysis

4-43. Mission analysis starts with the initial assessment developed during step 1. This assessment continues incorporating the mission variables of METT-TC. Mission analysis for subterranean operations places emphasis on the variable of terrain and weather, troops and support available, and time available.

Analysis of Terrain and Weather

4-44. Leaders analyze the five military aspects of terrain using the memory aid OAKOC: observation and fields of fire, avenue of approach, key terrain, obstacles, and cover and concealment. Due to the nature of the subterranean environment, leaders potentially may only have access to information about the external terrain surrounding the subterranean system.

4-45. Commanders plan the layout of the external nodes to facilitate actions in the subterranean facility. The layout includes, but is not limited to command post area, CCP, detainee collection point, civilian collection point, marshalling, and equipment donning area, and recovery area. Each of these locations should not be directly in line with the tunnel entrance, which reduces the probability of collateral damage from debris or enemy influence from inside the entrance.

4-46. Units need to modify movement techniques to account for the restrictive nature of the subterranean environment. Generally, movement techniques while in a subterranean system are similar to moving through buildings in an urban environment. However, in the tightest of corridors platoons can expect to be limited to a column or file while conducting movement. Modifications in these extremely narrow hallways may include condensing spacing between Soldiers to maximize the use of ballistic shields, using robots to gain space and time and if possible, establishing overwatch positions that are effective without becoming masked by the moving element.

Note. Lead Soldiers use ballistic shields when moving down a long, very narrow corridor. While they may be used in other situations, they are not designed to be carried by all the Soldiers in the formation and may impede the rapid clearing of rooms and wider hallways in a subterranean system.

4-47. Leaders make assumptions and develop information requirements due to the lack of available information about the tunnel or facility. A leader develops information requirements, which allows the leader to confirm or deny assumptions made during planning. Additionally, a commander establishes CCIR, which they expect to drive a decision during the operation. Not only do these information requirements help clarify the situation, they often assist with answering the intelligence requirements of the next level higher. The leader must understand the higher headquarters information collection plan and their responsibilities within that plan.

4-48. In addition to confirming assumptions, leaders build information requirements that assist the clearing force and expand the understanding of the subterranean system. Examples are locating control panels that operate the entry portals, locating the control room that operates the entire facility, maps, or other markings that identify the locations of key infrastructure systems or functions of the facility, and danger or warning signs.

4-49. Communication between Soldiers working at surface and subterranean levels can expect to be sporadic at best. Radio communications do not work well underground and units can expect many challenges trying to communicate in a subterranean environment. Subterranean environments frequently prevent the use of radio communications. The reasons for this are many but include radio signal attenuation (loss of signal strength) caused by the effect of tunnels, corridors, levels, and walls on the radio signal. Even when a signal is present, the operational range is constrained. In many cases, patrols operating underground may be unable to talk to anyone above ground or even among one another. Several options exist to improve communications including—

- Soldiers may leverage existing wiring and metal construction (for example, pipes, and railings) to provide communications connectivity between the surface and subterranean.

- Landline phones are an option, but they can limit mobility and are less flexible than radio communications.
- Wire. If available, units may run communication wire to coordination points and use field phones (TA-312 or TA-1 with a DR-8 reel) to communicate with the surface. Units can expect a logistics challenge to maintain a stock of WD-1 communication wire.
- Repeater Stations. If repeater stations are available, or if a unit has radio repeaters, then the unit should use them. If needed, send a team to a specific location to function as a repeater.
- Relay runner. The best way to communicate may be by messenger, sometimes in addition to a wired communications system. Depending on the size of the underground facility, pass information from control point to control point.
- Hand and arm signals. Underground facilities can be very noisy, and protective equipment makes voice communications difficult. Hand and arm signals may enhance communications.

Analysis of Troops and Support Available

4-50. Analyzing troops and support available is the most important aspect of mission analysis. The analysis includes the status of subordinate elements, attached enablers, and specialty equipment required to accomplish the assigned mission.

4-51. Leaders review the status of their subordinate elements. This analysis includes the Soldiers' morale, experience, training, and the strengths and weaknesses of subordinate leaders. These factors assist leaders during COA development.

4-52. Enablers are essential to the success of clearing operations due to the unique challenges identified during terrain and weather analysis. Example of enablers include—

- CBRN elements.
- Combat engineers.
- EOD teams.
- Military police.
- Military working dog teams.

4-53. Tailor the individual equipment for Soldiers conducting subterranean operations to meet the requirements of the mission. Chapters 5 and 6 discuss suggested equipment for individual Soldiers and teams conducting subterranean operations. The results of this analysis determine if leaders have all of the necessary personnel and equipment to accomplish the assigned tasks.

Analysis of Time Available

4-54. Analysis of time available starts with the timelines identified by the higher headquarters and developed above during step 1. This step includes the leader's ability to visualize, in time and space, the execution of subordinate element and enabler tasks and anticipated enemy actions. This includes all critical events and rehearsals prior to mission execution.

Course of Action Development

4-55. The assessment developed during mission analysis feeds into COA development. Leaders have determined there are multiple missions and tasks that can accomplish the assigned mission of clearing an underground facility providing the leaders with the ability to develop two to three COAs that favor different characteristics of offensive operations and are consistent with the immediate higher commander's intent. To develop each COA, leaders start with the identified end state and reverse plan back to the start point. Expected tasks to be included are—

- Establish attack by fire and support-by-fire positions.
- Conduct reconnaissance.
- Establish blocking position.
- Conduct tactical call-out.
- Conduct breach.
- Conduct detainee operations.

- Establish and operate CCPs.
- Conduct command post operations.
- Conduct site exploitation.
- Conduct forward or rearward passage of lines.
- Conduct resupply operations.

Analyze Relative Combat Power

4-56. Leaders determine whether the unit can mass enough combat power to defeat the enemy force through a relative comparison of combat power. This includes friendly and enemy forces' ability to concentrate and mass forces within the severely restrictive confines of the subterranean environment. It is a particularly difficult process within the subterranean environment due to the significant amount of unknown information; therefore, leaders use assumptions when analyzing combat power. Leaders conduct a troop-to-task analysis to determine if they have enough combat power and to estimate when they need to request additional follow-on forces from the higher headquarters.

Generate Options

4-57. Leaders brainstorm different ways to accomplish the mission. They determine the doctrinal requirements for the operation, including the tactical tasks normally assigned to subordinates. Doctrine gives leaders a commonly understood framework from which to develop COAs.

4-58. Next, leaders identify the sequencing of events to achieve specific results to accomplish the mission, which helps leaders determine the required tasks and the amount of combat power to apply at a decisive point. After identifying tasks, leaders next determine the purpose for each task. There is normally one primary task for each mission. The unit assigned this task is the main effort. Assign other tasks that support the accomplishment of the primary task as the supporting efforts.

Develop an Initial Concept of Operations

4-59. The initial concept of operations expresses how the leader pictures the operation unfolding from start to finish which establishes the foundations for the concept of the operation. The concept describes in sequence each assigned task to show how they fit into the overall plan. This is challenging when planning subterranean operations due to the amount of unknown information regarding the size and scope of the underground facility. Leaders build flexibility and adaptability into the plan to allow adjustments as the mission unfolds. Finally, leaders develop the graphic control measures to graphically depict the concept of operation, reduce the risk of fratricide, and synchronize the task and purpose of the main and supporting efforts.

Assign Responsibilities

4-60. Leaders assign subordinate elements with responsibilities identified in the concept of operations forming the basis of the task organization. Proper task organization facilitates planning for subterranean operations allowing subordinate elements to change by phase of priority. Based on the amount of unknown information, leaders need to plan for multiple task organization transitions during the execution of the operations. Typically, these transitions occur between the fight to the objective, the conduct of the initial breach, and the execution of clearing operations within the subterranean system.

4-61. The complexity of attacking an underground facility or subterranean system requires the consistent description of key leaders within the organization. These positions fill critical roles during the attack of a subterranean system. Chapter 3 describes the following positions as well. Functional leader descriptions include the following:

- Task force commander, who is the overall mission commander and is responsible for both surface and subterranean operations. Usually a BCT or battalion commander.
- Security force commander, who is responsible for all or a portion of the outer cordon. The task force can have multiple security force commanders that report to the task force commander. As an example, each battalion commander that is responsible for a portion of a BCT's outer cordon is a security force commander.

- Assault force commander, who is responsible for establishing the inner cordon, breaching, and clearing of the underground facility.
- Clearing force leader, who is the senior leader underground and is responsible for controlling all clearing operations, marking, and mapping of the underground facility. The clearing force is a subordinate element of the assault force. The clearing force leader takes direction from and reports to the assault force commander.

Contingency Planning

4-62. Planning for contingencies is part of COA development. The thoroughness of this process is determined by the time available and should include all likely contingencies. Contingencies include the following:

- During the breach. Contingencies include—
  - Enemy at breach location.
  - Open breach.
  - Portal opens while attempting breach.
  - Failed breach.
  - Structural failure of portal after breach.
  - Receiving enemy fire at breach (internal, external, and indirect).
  - Explosive hazards located in and around breach.
- Inside the subterranean system. Contingencies include—
  - CBRN contamination.
  - Soldiers trapped in a confined space.
  - Mass casualties.
  - Explosive hazards.
  - Emergency evacuation.
  - Fire in tunnel.
  - Flooded tunnel.
  - Lost communication with underground element.
  - Low oxygen or reduced air quality.
  - Missing Soldier.
  - Tunnel collapse.
  - Detainee operations to include a mix of civilian and enemy personnel.

Prepare a Course of Action Statement and Sketch

4-63. Each COA that a leader develops has a corresponding COA statement. The COA statement describes all of the specific actions required for operational success from start to finish.

ANALYZE COURSES OF ACTION

4-64. For each COA, leaders think through the operation from start to finish. They compare each COA with the enemy's most probable COA. The enemy's most probable COA is what the enemy is most likely to do given friendly forces' actions. The leader visualizes a set of actions and reactions. The object is to determine what can go wrong and which decision the leader must make as a result. These decision points are where leaders have the ability to change the COA based on emerging information or unanticipated enemy action. Each decision point has indicators that influence the decision, usually tied to CCIR. Examples of potential decision points are—

- Radiation sensor detects high levels of radiation coming from within the facility at the initial point of the breach.
- Clearing force has 70 percent of their combat power securing static positions (control points) and need additional forces to continue moving forward.
- Clearing force has found a Level 3 security door inside the facility that is beyond their capability to breach.

COURSE OF ACTION COMPARISON AND SELECTION

4-65. Leaders compare COAs by weighing the advantages, disadvantages, strengths, and weaknesses of each, as noted during the war game. They decide which COA to execute based on this comparison and on their professional judgment. They take into account—

- Speed of mission accomplishment.
- Expected risks to broader mission, personnel, and equipment.
- Information gained during initial reconnaissance.
- Subordinate unit capabilities, enablers, and experience.
- Posturing of the force for future operations.

INITIATE MOVEMENT

4-66. Leaders conduct movement as directed by higher headquarters or once they have gathered the requisite information and cannot continue mission planning without movement. An example of this would be task organizing attached enablers and organic capabilities within the formation to prepare for the expected mission.

RECONNAISSANCE

4-67. Conducting a reconnaissance is a crucial element of the TLP. Conducting a reconnaissance allows the leader to see the terrain around the objective and layout positions for the security elements and the assembly area. The reconnaissance seeks to confirm or deny information requirements developed during mission analysis and the assigned tasks from the higher headquarters. The company conducts reconnaissance itself or via an external element such as the battalion scout platoon or an UAS.

COMPLETE THE PLAN

4-68. Leaders take the results of the reconnaissance and apply them to the selected COA. Leaders use this completed plan to develop the OPORD, using the five-paragraph format from FM 6-0. Leaders complete all overlays, sustainment requirements, and final coordination with adjacent units and higher headquarters.

ISSUE THE OPERATIONS ORDER

4-69. Leaders should gather all subordinate element leadership to issue the order including representation from all enablers to ensure full understanding. The OPORD includes all required overlays and graphics. Leaders use a sand table, detailed sketch, maps, and other products to depict the area of operations and situation. Once issuing the OPORD, leaders establish a designated location and time for subordinate elements to conduct their confirmations briefs to ensure they fully understand—

- The commander's intent, mission, and concept of operation.
- Their assigned tasks and associated purposes.
- The relationships between their mission and those of other units in the operation.

4-70. Commanders and platoon leaders usually determine limits of advance by establishing control measures associated with the terrain. Higher headquarters may also establish limits of advance in addition to engagement, disengagement, and entry criteria. During subterranean operations, leaders must think in terms of time and space in addition to criteria tied to combat capabilities and physical limitation when determining limits of advance, engagement, disengagement, bypass, and entry criteria.

4-71. The size and scope in some underground facilities can be vast. In some circumstances, hallways or tunnels may extend for miles. Commanders develop a contingency plan for such circumstances and coordinate with higher headquarters. It may be more feasible to pass through another unit than operate at such an extended distance.

4-72. Subterranean operations are time and manpower intensive. Security concerns preclude hasty movement and the requirement to leave security elements to establish control points at each intersection, which quickly drains combat power from units. Commanders and leaders develop a minimum percentage or

criteria for successfully continuing and report their status in a timely fashion in anticipation of notifying higher headquarters of their strength prior to reaching their culmination point.

4-73. Subterranean operations and underground facilities generally do not follow linear patterns. Units can quickly find themselves widely dispersed. Commanders and leaders must include in their plans anticipated difficulties in command and control and develop contingency communication plans. Commanders must establish clear reporting criteria and guidance so clearing force leaders and their subordinates understand and can identify when they are reaching their culmination point. Identify the point at which the clearing force cannot continue without additional forces—the culmination point—early to provide time for the assault force commander to commit additional forces to the operation and maintain momentum without a significant pause.

Supervise and Refine

4-74. As part of continual assessment, leaders monitor subordinate element mission preparations throughout the TLP. Supervision allows leaders to refine the plan and provide additional guidance to ensure subordinate leaders understand the concept of operations.

PREPARE

4-75. *Preparation* are those activities performed by units and Soldiers to improve their ability to execute an operation (ADP 5-0). The preparation for a subterranean mission is as important as the planning aspect due to the large amount of unknown information about the subterranean system. Preparation allows leaders to empower subordinate elements to make the correct decisions that affect the outcome of the mission. Preparation consists of, but is not limited to integrating enablers, precombat checks and inspections, rehearsals, and sustainment preparations.

Integration of Enablers

4-76. Task organized enablers participate in all the aspects of mission preparation and rehearsal to ensure they are fully integrated into the supported unit's plan. Supporting enablers understand the mission, commander's intent, and their role. Leaders discuss the unit's SOPs, tasks and associated purposes, and proper communication techniques. When linking up with their supported unit, enablers must brief their capabilities, limitations, and other relevant information to ensure the unit understands how to properly plan for and use their capabilities. In addition to participating in supported unit rehearsals, enablers should provide feedback through after-action reviews once the mission is complete.

Precombat Checks and Inspections

4-77. Precombat checks and precombat inspections are crucial to the success of missions. Leaders may not delegate these checks and inspections below the team leader level. They ensure the Soldier is prepared to execute the required individual and collective tasks supporting the mission. Checks and inspections are part of the TLP that protect against shortfalls and oversights that may endanger Soldiers' lives and jeopardize the execution of a mission. These checks and inspections include the specialty equipment designed for operating in the subterranean environment. For further discussion on the equipment, refer to chapter 6.

Rehearsals

4-78. Rehearsals are practice sessions conducted to prepare units for an upcoming operation or event. They are essential in ensuring thorough preparation, coordination, and understanding of the commander's plan and intent. Leaders should never underestimate the value of rehearsals. Where possible, units conduct rehearsals in the environment where they expect the actions to take place. During rehearsals, leaders incorporate specialty equipment and, at a minimum, rehearse actions on the objective and anticipated friction points. Below is a list of rehearsals that should be considered:

- Breaches at surface and subterranean levels. These include actions taken when the breach is successful, the breach is unsuccessful, or the breach significantly damages the structure around the portal.
- Actions when receiving direct fire contact while subterranean.

- Actions on the objective while underground to include movement, clearing, and reading air quality monitors.
- Donning procedures for MOPP gear, self-contained breathing apparatus, and powered air-purifying respirator.
- Conducting entry procedures for closed doors, checking for possible contamination prior to entry, continuous monitoring and testing for CBRN hazards, and assessing air quality.
- Establishing a control point.
- Casualty evacuation procedures and changes to buddy aid while subterranean.
- Mapping and marking of the subterranean system.
- Actions taken when the unit is near their culminating point, but there is still more tunnel to clear including passage of lines with follow-on forces.
- Finding, marking, and neutralizing explosive hazards.
- Emergency evacuation criteria and procedures.
- Conducting resupply to elements underground including movement of supplies in confined spaces.
- Detainee operations to include civilian and enemy personnel.
- Reacting to a CBRN hazard.

4-79. One of the best ways to ensure precombat checks and precombat inspections are complete and thorough are with full-dress rehearsals. These rehearsals, run at combat speed with communication and full battle equipment, allow the leader to envision minute details, as they occur in the area of operation. Prior to conducting night operations, units conduct rehearsals at night as well. Precombat checks and precombat inspections include dialog on the mission, Soldiers' understanding of the task and purpose of the mission, commanders' intent, and the Soldiers' responsibilities in the scheme of maneuver. The Soldiers know the latest intelligence updates, rules of engagement, medical and casualty evacuation procedures, and sustainment requirements.

4-80. Units have multiple options to simulate subterranean environments if the physical space is unavailable prior to execution. One option is to utilize any existing structures near the assembly area. If doing so, units need to create blackout conditions or simulate conditions as much as possible.

4-81. The commander uses well-planned, efficiently run rehearsals to accomplish the following:

- Reinforce training and increase proficiency in critical tasks.
- Reveal weaknesses or problems in the plan, leading to additional refinement of the plan or development of additional branch plans.
- Integrate the actions of subordinate elements and enablers.
- Confirm coordination requirements between subordinate and adjacent units.
- Improve each Soldier's understanding of the concept of the operation, the direct fire plan, anticipated contingencies, and possible actions and reactions to various situations that may arise during the operation.
- Ensure subordinate leaders are prepared to execute in their leaders' absence.

SUSTAINMENT PREPARATIONS

4-82. Company XOs, first sergeants, platoon sergeants, and supply sergeants focus on resupplying, maintaining, and issuing supplies or specialty equipment to support subterranean operations. Sustainment assets and supplies move or reposition as required including building pre-configured loads of critical supplies or subterranean specific equipment to support specific elements. Examples of this include building bundles of breaching materials or chemical lights, batteries, and flexible handcuffs for clearing teams. Some of these materials should be available to subordinate elements to use as part of their rehearsals. The company XO coordinates for movement of these from the assembly area to the marshalling area.

EXECUTE

4-83. *Execution* is the act of putting a plan into action by applying combat power to accomplish the mission and adjusting operations based on changes in the situation. (ADP 5-0) In execution, commanders and

subordinate leaders translate the plan into actions by their units. They apply combat power to seize, retain, and exploit the initiative to gain and maintain a position of relative advantage. In the subterranean environment, it is important commanders provide subordinate leaders with the maximum latitude to take advantage of situations and meet the commander's intent. Commanders continually assess operation, using information from subordinate leaders. Assessing the operation allows the commander to develop contingencies and make adjustments that reinforce success while avoiding pitfalls. An example of a phasing construct for clearing an underground facility mission is outlined below:

- Phase I – Reconnaissance of the surface objective.
- Phase IIa – Move to and isolate of the surface objective.
- Phase IIb – Consolidate and reorganize the surface objective.
- Phase IIIa – Locate and isolate the point of breach.
- Phase IIIb –Breach and secure a foothold.
- Phase IIIc – Clear the objective.
- Phase IV – Site exploitation.
- Phase V – Consolidate, reorganize, and transition.

PHASE I – RECONNAISSANCE OF THE SURFACE OBJECTIVE

4-84. Leaders weigh the advantages of conducting a leader's reconnaissance personally as opposed to relying on information supplied from higher headquarters. Commanders should request maps and architectural drawings of manmade structures from their higher headquarters. They attempt to answer information requirements that may confirm or deny assumptions made in their tentative plans. Units may conduct reconnaissance in different ways. An effective technique is to task organize a reconnaissance patrol with leaders from each subordinate element. There should be sufficient personnel to establish overwatch on the objective but the patrol must be small enough to move undetected. The reconnaissance patrol either returns to the company's location or meets the company at a designated linkup point. At times, higher headquarters may task the scout platoon or other battalion assets to conduct reconnaissance in support of the company's mission.

4-85. Reconnaissance elements confirm or deny the presence of subterranean systems. Indicators of the presence of subterranean systems may include ventilation shafts, sinkholes, subterranean vibrations, digging sounds, and mechanical sounds to include those from generators and other industrial equipment. Thermal optics can assist in the identification of some of these indicators.

4-86. Additional indicators associated with the presence of subterranean systems are not always obvious. Human behavior can be just as valuable in locating and identifying underground systems in the area of operation. The terrain itself may provide clues to the presence of tunnels and underground facilities. The reconnaissance also confirms or denies the presence of an entry portal or shaft and has the potential for locating previously unidentified points of entry that may influence the plan.

PHASE IIA – MOVEMENT TO AND ISOLATION OF THE SURFACE OBJECTIVE

4-87. The movement to the objective consists of two actions. The first action is the security force attacks the surface objective to clear it of enemy forces and identifies all confirmed or suspected entry portals. The second action is the security force establishes the outer cordon to isolate the objective. Based on the size of the operations, leaders can expect to receive tasks related to either of these actions.

Attack to Clear the Surface Objective

4-88. The security force, under the direction of the security force commander, crosses the line of departure and conducts movement to their assigned positions to carry out their assigned tasks. These elements utilize movement techniques as directed to gain contact with the enemy using the smallest unit possible under the expectation of gaining and maintaining contact with the exterior security element of the subterranean system. The security force employs combined arms maneuver integrated with fire support assets (indirect, fixed, and rotary wing) to eliminate all threats while clearing the objective. As the security force progresses, it identifies

locations of confirmed or suspected entry portals and passes that information to the assault force. The security force then transitions to the outer cordon once the objective it cleared.

Establishing the Outer Cordon

4-89. The security force quickly moves to, and establishes, their assigned blocking positions to minimize the enemy's ability to influence the assault force.

4-90. Platoon leadership ensures each Soldier understands their duties and responsibilities related to the occupation of the blocking position. Once set in position, leaders verify that each element of their blocking position has established sectors of fire, ensure they are interlocking, and cover the assigned portal, ventilation shaft, or other terrain. Leaders immediately correct any deficiencies in the blocking position. (See ATP 3-21.8 for more information on blocking positions.) Once complete, platoon leadership reports an updated status to the company CP.

4-91. The CP receives all reports and status updates. These include updated unit locations and dispositions. The commander assesses these locations to ensure they achieve the intended purpose. The security force continues to perform the necessary functions to ensure the identified objective are isolated to maximize the probability of the assault force's success to include establishing link up and passage points.

PHASE IIB – CONSOLIDATE AND REORGANIZE THE SURFACE OBJECTIVE

4-92. In addition to traditional consolidation and reorganization tasks, units must place additional emphasis on security due to potentially hidden portals that would allow the enemy to make surprise attacks. When establishing security, the unit should designate an element to provide over watch to the interior as well.

4-93. Communications and reporting should include current status and situation report items and include an anticipated time when the unit is ready to transition to the next phase of subterranean operations. Report any equipment or critical shortages to higher immediately.

4-94. Conduct redistribution and resupply based on the requirements for the next phase of the mission. For example extra ammunition to over watch positions and clearing teams, and special equipment to breaching teams. While administering immediate medical care commanders consider the impact of casualties on the tactical plan especially that of key leaders lost. Move enemy prisoners or detainees for interrogation as quickly as possible to gain information on the subterranean system.

PHASE IIIA – LOCATE AND ISOLATION OF THE POINT OF BREACH

4-95. When attempting to locate a suitable breach site, commanders and leaders conduct reconnaissance, point of breach analysis, and isolate the target. These three steps are described in detail in the following paragraphs.

Reconnaissance

4-96. First, the unit must conduct a thorough reconnaissance of the area. After establishing security, the commander divides the area into subsequent zones for subordinate units. They also designate or reiterate the indicators Soldiers should look for, as discussed above in the mitigating contact paragraphs, 4-12 through 4-37. Ventilation shafts, portals, doors, and openings do not determine the full layout of an underground facility; however, they do provide the initial information for building a tentative map.

4-97. Once their reconnaissance is complete, the assault force establishes attack by fire or support-by-fire positions at each point of breach. These elements assist in isolating the actual point of breach from any other entry portals that could influence friendly forces. Leaders at these locations conduct the same actions described above in the outer cordon.

Analysis

4-98. Commanders determine the best site to breach by evaluating several factors. Usually the overriding factor in determining breach sites is ease of entry. A technically challenging entry delays or stops operational tempo and provides the enemy time and space to react.

4-99. Selecting a single point of breach is the preferred method. Terrain considerations that provide multiple points of breach located in relative close proximity as opposed to a single point provide multiple options in the event of initial breach failure.

4-100. Commanders also need to consider the terrain area around the point of breach. For example, breaching a portal on the side of a cliff may prevent casualty collection sites, marshaling areas, and command posts from setting up off axis from the point of breach. Consider vehicle access when breaching into a facility that may require removal of large amounts of equipment such as a potential WMD site. It may be easier to breach in a remote location, clear the facility, and then open the vehicle access doors. These are only a few of the considerations that commanders must consider.

Establishing the Inner Cordon

4-101. The commander identifies the point of breach at the identified entry portal. The breach and assault elements of the assault force continue their movements to their assigned attack by fire positions. During their movement, the elements can expect to make contact with the remaining enemy forces that were not isolated by the security force. Upon arriving to their assigned positions, they conduct last minute checks to ensure they are set in position and prepared to execute their mission. The inner cordon is established and the point of breach is isolated.

Initial Actions on the Objective

4-102. Prior to conducting a breach of the underground facility, the assault force commander determines if a tactical call out is appropriate. The preferred method is always enemy capitulation, which minimizes risk to friendly forces, equipment, and the facility itself. A tactical call out allows enemy forces and civilians the opportunity to surrender and vacate the underground facility. If this technique is employed but ineffective, the assault force commander recommends to the task force commander to commence with the breach. A tactical call out may remain an option during subsequent breaches. Whether a breach or tactical call out technique is employed, all actions should focus on rendering a facility incapable of protecting enemy forces, concealing enemy movement, or denying the facilities capabilities to the enemy.

Tactical Call Out

4-103. The call out technique assists in removing personnel from a subterranean system prior to committing friendly forces, much the same as a unit would prior to entering a building or in a small village. The tactical call out provides the enemy and civilians in the area an opportunity to leave an area or surrender prior to an attack. It provides maximum force protection, augments the information operations plan, and may provide leads to future targets. Using robots, mounted with a speaker, can assist in a tactical call out. The use of military information support elements, military intelligence elements, and interpreters facilitates the success of this technique.

4-104. If the task force commander decides to disrupt life support systems, teams start sealing all directed entry portals and ventilation shafts. This may force the occupants of the facility to leave or surrender, greatly reducing the risk to friendly forces. Ideally, friendly forces have the ability to restore life support to the underground facility prior to entering the facility.

4-105. During clearing operations, the clearing force may find situations and circumstances where cutting life support to a specific area is ideal. Control of the facility's control room facilitates this option. These situations may include disrupting the areas behind closed blast doors, large branches of tunnels or drifts, or multiple room complexes.

Step One. Containment

4-106. Ensure all known entry portals, ventilation shafts, and possible escape routes are covered. The security force and elements from the assault force in the blocking positions and support-by-fire positions provide this cover.

4-107. Electrical power to the facility may be important to leave connected and in good repair. While cutting the power could be a means to drive an enemy out of the subterranean area, the subterranean facility may use

power for environmental control systems that keep CBRN and other dangerous hazards stable. Additionally, electrical power typically powers the ventilation systems. Functioning ventilation systems reduce the requirement for environmental sustainment equipment during the subterranean operation.

Step Two. The Call Out

4-108. Use loudspeakers or local citizens to communicate with anyone inside the tunnels. Request everyone exit the facility. During this process, search and detain all individuals to ensure they no longer pose a threat to friendly forces. Robotics may help extend the reach of communications with the personnel in the facility; thereby reducing risk to friendly forces.

Step Three. Detainee Handling

4-109. Upon capture, process detainees using the search, silence, segregate, speed, safeguard, and tag technique. Using this technique ensures Soldiers and detainees are not harmed and detainees are properly controlled and accounted for until custody is transferred. For time-sensitive information, employ tactical questioning techniques to obtain valuable information about threats, booby-traps, or other personnel inside tunnels, structures, or facilities. This information may be critical to mitigate risks to Soldiers and may inform decisions about how to clear the objective.

Step Four. Clear the Objective

4-110. Remember not everyone may have come out, and anyone remaining inside may resist. One technique is to ask or direct the senior ranking detainee to escort Soldiers into the facility. If using this technique, Soldiers must protect the detainee from harm. The senior detainee may be able to assist the unit with identifying critical facility controls. Be aware of the detainees' demeanor. They may seem nervous, but watch for signs of deception. Maneuver slowly and deliberately.

PHASE IIIB – BREACHING AND SECURING A FOOTHOLD

4-111. If a tactical call out is not feasible or is unsuccessful, the breaching phase of the operation begins when the assault force commander has reported the inner cordon established and conditions are set to conduct the breach. Breaching and securing a foothold consists of three actions. The first action is to establish the external nodes outside the entry point. The second action is conducting the initial breach of the underground facility. The third action consists of gaining entry to the underground facility, establishing an internal foothold in the facility, and testing air quality.

Site Occupation and External Foothold

4-112. The assault force reduces any obstacles blocking direct access to the door (examples include blast berms). The assault force builds up the assembly area outside the facility and begins staging elements in the marshalling area in preparations for entering the facility. The assault force commander and subordinate leaders ensure the following nodes, personnel, and equipment are positioned and prepared prior to initiating the breach:

- Locations to include: marshalling and donning areas, command post location, casualty collection, enemy prisoner of war, and civilian collection points.
- Equipment to include demolition charges, ballistic shields, thermobaric munitions, robotics, and air quality sensors.
- Special teams to include CBRN reconnaissance and EOD teams.

4-113. Do not establish nodes, collection points, or marshalling areas directly outside of, or on the axis of, the planned breach site. Events such as a detonation, CBRN hazard release, blast waves, flyrock, secondary fragmentation, and toxic material release may follow the path of least resistance out of the facility. Consider prevailing wind patterns when establishing these nodes for the reasons listed above.

Initial Breach

4-114. Initial breaching is the systematic and planned creation of a lane through a minefield or a clear route through a barricade or fortification. When conducting an initial breach of an underground facility, leaders designate the point of breach at the location that is the most lightly defended or the easiest to access. One of the techniques is to identify the personnel access portals. Usually, personnel access portals are an easier point for a breach due to their size and construction. Once visually identifying the point of breach, the assault force commander performs an analysis of the immediate area around the identified point. This analysis determines the placement of the command post; casualty, civilian, and detainee collection points; the emergency personnel decontamination station, and the marshalling area for follow-on forces and enablers. Place these locations off-axis and up wind from the entry portal to prevent disruption by explosive shockwaves, subsequent internal breaches, or enemy forces and civilians exiting the subterranean system.

4-115. Once this assessment is complete, the assault force commander maneuvers the subordinate elements into their assigned positions and task organizes them into a breaching configuration. This includes the support, breach, and assault forces as described below:

- Support force positions to prevent the enemy from interfering with the breaching operation and the area directly around the entry portal. The leaders of the support element conduct movement to the designated position utilizing proper movement techniques to maximize protection afforded by the terrain while occupying their positions. Leaders verify sectors of fire ensuring they are interlocking and covering the intended terrain. Leaders should immediately correct any deficiencies in the support by fire. Leaders report they are set in position when all preparations have been complete.
- Breach force consists of security and reduction elements as listed below:
  - The security element suppresses or eliminates any enemy on the near side of the breach.
  - The reduction element reduces the obstacle using either a mechanical, ballistic, thermal, or explosive method. The equipment available and the degree of fortification determine the breach method that is used.
- Assault force consists of the initial set of clearing elements that enter the underground facility to establish the foothold. The primary purpose of the assault force is to attack through the created point of breach, seize terrain on the far side of the breach, and eliminate any enemy directly in the vicinity of the point of breach.

Note. The task organization names for conducting the breach are not to be confused with the terms used for the larger operation such as security, assault, and clearing force.

4-116. The breach force and assault force move into their attack by fire, support by fire, or assault positions utilizing the same types of movement techniques as discussed above. These elements should be prepared to engage any enemy that emerges from the point of breach. The leaders of each of these elements should conduct one last check to ensure essential equipment is ready. The leaders report to the assault force commander that conditions are set to conduct the breach, as described above in site occupation, paragraphs 4-112 and 4-113. The assault force commander should take a tactical pause to review all supplied information and verify the breach criteria has been met. The breach force leader contacts the assault force commander to receive approval to conduct the breach and reduce the obstacle.

4-117. Once the approval is given, the reduction element moves up to the point of breach and uses a mechanical, ballistic, thermal, or explosive method to create an opening large enough to pass Soldiers through as follows:

- Mechanical includes techniques like connecting a chain to a vehicle and pulling the door open or using a tool and prying the access door open.
- Ballistic includes using a shotgun to blow the hinges or latching device off, or using antitank or armor piercing munitions to create a hole in the door. When using high explosive weapons, consider the possibility of the round failing to function correctly, which may complicate the breach.
- Thermal includes the use of torches or plasma cutters to melt a portion of the door.
- Explosive includes using shaped demolition charges to cut a hole through the door.

Breach Assessment

4-118. Units must exercise caution when entering the subterranean environment following a successful breach. In addition to potential enemy resistance, the breach may compromise the tunnel's structural integrity, the enemy may have employed explosive hazards or booby traps within the underground facility, or the air quality may have deteriorated below acceptable levels. Leaders must consider these factors when planning entry into the underground facility.

4-119. Structures compromised by explosives or weapons require evaluation for structural integrity. For planning purposes, the more rudimentary subterranean systems are more susceptible to explosive structural damage (category 1 versus category 3). Damaged structures may require bracing and other constructed structural support prior to entry. Ordering class IV bracing material early in the planning process facilitates maintaining momentum. If structural integrity concerns are beyond the capability of the engineer, reachback expertise is available through the U.S. Army Corps of Engineers Reachback Operation Center website.

4-120. After completing the breach, the reduction element returns to the point of breach. The team uses an air quality monitor to confirm the air on the far side of the breach is suitable for Soldiers to enter. This check also includes testing for CBRN contamination. If the breach is large enough, the clearing force can push a robot through and use it to conduct a visual reconnaissance of the far side. The assault force then moves to, and secures, the far side of the point of breach. They check the immediate vicinity for trip-wires and booby traps. The assault force can expect to encounter another door as most underground facilities have both a weather door and security door. If they make contact with the enemy, they react according to their battle drills and eliminate the threat without becoming fully engaged in a baited ambush or attack. The assault force's task at this point is to secure the far side of the point of breach so the breaching element can open (reduce) the door to facilitate the follow-on forces into the underground facility.

4-121. Deliberate decisions requiring the assault force commanders involvement include the following:

- The breach fails to create an entry point. Based on information provided by subordinate leaders and enablers, the company commander makes a recommendation to the assault force commander to attempt a different method or select a different point of breach. Once the assault force commander makes the decision, the subordinate leadership takes the appropriate actions.
- The breach was successful, but the breach dangerously weakened the structural integrity of the portal. This significantly reduces the capabilities friendly forces can project into the underground facility, the speed at which the clearing force can enter and exit the underground facility, and significantly reduce the casualty evacuation capabilities and capacity. The breach force leader makes the recommendation to the assault force commander to select a different point of breach, accept the potential risks associated with a weakened structure, or to request materials to shore up the portal.

Gain Entry and Establish Internal Foothold

4-122. Once the weather door is open, the breach force starts preparing to breach the security door. The assault force withdraws from the opening and moves to a position that provides blast protection and prepares for their next task. The security element remains with the reduction element to ensure they have the required support to complete the preparations. The reduction element analyzes the security door and selects the appropriate breaching technique to create the desired effect. If the unit selects either a ballistic or an explosive method, the breach force (security and reduction elements) withdraws from the underground facility. The breach force informs the company commander they are ready to execute the second breach. Once approved, the reduction and security elements return to the point of breach. The reduction element tests the air on the far side of the breach. They then take the same actions as listed above.

4-123. The assault element proceeds to the far side of the breach and establishes a foothold. When the assault element has secured the foothold, the reduction element completes reduction of the barrier. Breaching elements take the same deliberate steps if the breach fails.

4-124. Breaching the underground facility was successful and the assault force has secured a foothold inside the first tunnel of the facility. Unless in contact with the enemy, the company commander should take a tactical pause and assess the situation. The assault force commander reports to the task force commander that

the company has successfully breached the underground facility, has gained a foothold in the facility, and established all of the necessary elements to facilitate success of clearing operations.

Note. At this point of the operation, the chapter describes the forces inside of the facility as clearing forces. The senior leader inside of the facility is the clearing force leader.

PHASE IIIC – CLEARING THE OBJECTIVE

4-125. When the assault force commander approves execution of clearing operation, the company commander provides any last minute guidance to the clearing force leader. The company establishes a release point at the entrance of the facility, sometimes referred to as a portal control point. This release point provides accountability for personnel inside the facility, controls the flow of equipment and supplies, accounts for casualties coming out of the facility, and maintains the status of clearing operations.

4-126. Once the clearing force leader enters the underground facility, that leader is responsible for all friendly forces inside the facility. As the clearing force disperses, communication between the clearing force leader and subordinate leaders becomes challenging. The clearing force leader applies pressure to the enemy by maintaining the tempo of the operation, but not so rapidly that the clearing elements make costly mistakes. The clearing force can expect to encounter the situations listed below:

- Tunnels, drifts, and rooms of varying size and function.
- Intersections of various types to include three, four, and potentially more points.
- Interior obstacles that require breaching.
- Reaching the limit of clearing force capacity and requesting additional forces.
- Uneven and complex terrain including stairs, ramps, elevator shafts, catwalks, and shafts.

4-127. During clearing operations, there are multiple methods to manage enablers such as combat engineers or CBRN reconnaissance personnel. The company commander has the option of centralized or decentralized methods of control. Each method has its benefits and risks. Commanders must weigh these risks when establishing the method. Under centralized control, Soldiers hold all enablers in the marshalling area outside the subterranean system and send them forward to accomplish a specific task. Once complete, they return to the marshalling area. This method provides more protection for enablers from unnecessary hazards; however, they require a significantly longer response time. Under decentralized control, the clearing force leader repositions enablers at the closest control point. The benefit of this is the enablers respond more quickly, but they consume more resources and are susceptible to additional hazards inside the facility.

Unmanned Ground Vehicles

4-128. When available, a clearing force may employ the use of an unmanned ground vehicle or robot to conduct operations. An unmanned ground vehicle provides the clearing force with a maneuverable platform to gain information and protect the force. The unmanned ground vehicle can assist the unit by conducting video reconnaissance, mapping, and oxygen and chemical detection if properly equipped.

4-129. An unmanned ground vehicle can provide reconnaissance and detection of obstacles, mechanical ambushes, booby traps, and enemy strong points before forces are committed to protect the clearing force. An unmanned ground vehicle equipped with video technology provides a means of early detection against adversaries. Forces with this capability can develop and shape a situation before contact.

4-130. Unmanned ground vehicles can also provide data that can assist with mapping. When outfitted with laser detection devices, they can give precise measurements of the length and width of corridors, rooms, and tunnels. These precise measurements can better assist with the clearing and exploitation of an underground facility.

4-131. A major concern with clearing forces inside a subterranean system is the potential lack of oxygen, poor air quality, and the presence of chemicals or other hazardous material. If possible, outfit an unmanned ground vehicle with oxygen sensors to detect if air quality is sufficient to permit the clearing force to access remote portions of the facility. Units may use the same technique to employ CBRN detectors.

Tunnels and Rooms

4-132. As the clearing force encounters tunnels, drifts, and rooms, they execute the appropriate battle drill for the given situation. The clearing force continues to look for indicators that provide insight to the functionality of the facility. These indicators include posted maps of the layout; operational hardwired lighting, heat and running water; posted signs and so forth. Facility information is crucial in developing higher headquarters' understanding to classify the subterranean system. As the clearing force continues movement, leaders mark tunnels, drifts, and rooms to facilitate mapping and reference points for emergency evacuations. Units should develop a marking system in the unit's SOPs. These marking techniques can include the use of chemical lights or engineer tape dispersed along the floor to ensure Soldiers are able to navigate out of the facility, use of spray paint to mark cleared rooms, direction of travel, and names of interior tunnels. Marking SOPs should include markings for very low, or potentially no, light situations as well.

Intersections

4-133. The clearing force leader establishes control points at each intersection. The control points enable the clearing force leader to track each of the clearing teams. The clearing force should only clear one direction at a time, while the control points secure the remaining passageways. The clearing force should only abandon a control point if the entire element has to evacuate the underground facility. These points facilitate accountability, provide situational awareness, aid in relaying reports, provide security, and provide points for testing air quality while the mission continues.

Interior and Subsequent Breach

4-134. When the clearing force encounters an obstacle that requires breaching, the clearing force leader requests a breaching element to move forward and assesses the point of breach to conduct a subsequent breach. While hasty in nature, units do not rush these subsequent breaches. The breaching element should avoid selecting a thermal method due to the potential side effects unless the clearing force has access to self-contained breathing apparatus or powered air-purifying respirator devices. If the breaching element desires to use an explosive method, the clearing force leaves one clearing team with the breaching element to provide localized security and to escort them out of the facility when the breach charges are set due to the overpressure effects of detonating explosives in severely restrictive locations. When using explosives inside a subterranean system, commanders and leaders must also consider potential damage to sensitive facility equipment. Damaging electrical components within the facility could affect ventilation systems or other critical components to the facility. Once the clearing force leader confirms all elements are outside the concussive effects, the breaching force initiates the breach. All elements continue to wait until air quality returns to acceptable levels. The clearing force clears back to the point of breach and tests the air on the far side for suitability. The clearing force maneuvers a clearing team through the point of breach and establishes far side security. The reduction element then reduces the remainder of the breach.

4-135. The same set of deliberate decisions are required if the breach fails or the element is unable to reduce the breach after initial success. The clearing force works through these actions in a methodical manner each time they breach. Disregarding any of these steps may result in exposure to CBRN-related materials or unnecessary casualties. Chapter 6 provides additional considerations for breaching.

Requesting More Forces

4-136. The assault force commander and clearing force leader continue to monitor the progress of clearing and the amount of forces inside the facility. They maintain communication between the two elements to allow the assault force commander to anticipate when to request additional forces. When the clearing force is unable to continue clearing without requesting additional forces, the clearing force leader sends a report to the assault force commander that includes their status and location. The clearing force maintains a defensive posture as they wait for reinforcements.

4-137. The unit stages the additional forces in the marshalling area until called forward into the subterranean system. Position the forces in a manner to allow quick access to the established entry point and have the ability to react to any counter attack, but not in a position to allow the enemy to inflict casualties using

indirect fires or CBRN attack. Do not treat these forces as a reserve since they are already dedicated to the clearing operation.

4-138. The assault force commander continues to provide forces to the clearing force leader until they reach the limits of their span of control. At that point, the assault force commander takes the following actions. First, they direct the clearing force leader to regain control over their organic forces. Second, direct the clearing force leader to conduct a passage of lines with the element that enters the facility with the company commander. Third, pass all external responsibilities to the assault force XO. Fourth, conduct commanders dialog with the task force commander to ensure the company is still operating within higher commander's intent. Fifth, direct the original clearing force leader to hand off all enablers, required specialty equipment, and nonorganic assets to the company commander when they enter the facility.

4-139. At this point, the company commander (previously assault force commander) is the clearing force leader, the senior leader in the facility. If the responsibilities of the assault force XO are too demanding, the task force commander may assign a more senior officer to serve as the assault force commander. One technique is to use the headquarters and headquarters company commander in this role.

Clearing Stairs and Ramps

4-140. The clearing force can expect to encounter stairs, ramps, and elevator shafts while conducting clearing operations. Consider these access points to other floors' key terrain in a subterranean system. These access points allow enemy forces to quickly reinforce their defenses or conduct counter attacks within the facility. Key terrain may also include catwalks and other high platforms that provide a military advantage. When possible, the clearing force secures these stairwells and ramps between floors from one end to the other to prevent the use by the enemy. While this technique is preferred, it requires a larger clearing force. At a minimum, the clearing force leader establishes a security element at each stairwell, ramp, and elevator shaft as the clearing force continues operations. When friendly forces are limited, they clear each level independently prior to entry into a stairwell. When the clearing force approaches a ramp, the clearing force leader should assess the situation to ensure the ramp is part of the same level the element is currently clearing and not a transition to another level. The clearing force should clear a ramp only after determining there is no more area to clear on the current level and they are ready to transition to the next level of the facility.

Mapping and Battle Tracking

4-141. The assault force CP maintains an updated status of the progress of the clearing operation. To assist in this requirement, the clearing force leader continually reports updated information to the CP including information on numbers, locations of personnel, and a map depicting the cleared area of the facility.

4-142. Leaders leverage maps and drawings found on site. If found, leaders transmit or deliver the maps to the CP and higher headquarters to aid battle tracking and management of follow-on forces. Leaders at all levels should validate the accuracy of pre-existing maps. If unavailable or not discovered, leaders develop the map as the clearing force moves through the subterranean system. This map will continue to grow in size as the clearing operation continues and consists of the tunnels, rooms, and intersections the clearing force has encountered. Each of these should be marked according to the unit's SOP and in a manner that Soldiers can quickly identify their approximate location. (Refer to chapter 5 and chapter 6 for more discussion on mapping and marking.)

Casualty Care, Triage, and Evacuation

4-143. In the subterranean environment, it is crucial to conduct casualty movement in the most effective and available means that protects the casualties and the evacuation team. When the clearing force takes casualties, the clearing force eliminates the threat or removes elements from immediate danger prior to administering medical care. Medical treatment, combat lifesaver, buddy aid, and self-aid are applied per the appropriate steps and SOPs. When the casualties are ready for evacuation, the clearing force moves the casualties through each of the control points back to the release point at the entrance of the underground facility or established CCP inside the underground facility. Initially, the clearing force establishes the CCP in the first cleared room. In a larger facility, the CCP moves forward as the operation progresses into the facility. During the process, the clearing force safeguards the casualties and does not compound injuries or

inflict new injuries. They report the status of casualties to the clearing force leader and the assault force commander to ensure accountability of the Soldiers.

4-144. Prior to entry into a subterranean system, an external CCP should be prepared to receive casualties, which ensures they receive medical care as quickly as possible. Soldiers rehearse the treatment of likely subterranean injuries, such as overpressure or crush injuries, in addition to the standard medical rehearsals prior to beginning the subterranean operation.

Resupply to a Force Inside of an Underground Facility

4-145. Planning for resupply during subterranean operations involves the assault force commander, XO, and first sergeant coordinating detailed planning and realistic estimates. This planning must account for enabler support requirements and those necessary to operate in the environment such as fresh air supplies. Enablers give their support requirements to the assault force commander, clearing force leader, and their respective senior noncommissioned officers during their capabilities briefing once they have been attached.

4-146. Resupply requires careful considerations of required classes of supply balanced against anticipated usage. Frequently, units designate teams to carry supplies to the necessary points for resupply. Therefore, items must be portable, easily redistributed, and necessary. Resupply locations are probably inside the first, cleared hallway or room once secured. Additionally, accurate reporting of consumption rates facilitates the movement of required items and allows for more efficiency. Units quickly resupply materiel and equipment to maintain the tempo of the operation. Prepacking equipment for use is one method of doing this. For example, loading ammunition in magazines and water in canteens versus moving crates of ammunition and water cans into the subterranean facility.

Detained Persons

4-147. Detainee handling is a resource-intensive operation requiring detailed training, guidance, and supervision. Soldiers must give all detained persons medical treatment and treat them humanely. U.S Armed Forces never torture, maltreat, or purposely place detained persons in positions of danger. There is never a military necessity to violate the law of land warfare. When the clearing force encounters surrendering personnel or noncombatants, they should immediately restrain the individuals and move them to the entrance of the facility. The clearing force hands the individuals and accompanying equipment to a designated element of the assault force, or another security force, as directed by the higher-level order. The detaining force must process the individuals using the search, silence, segregate, speed, safeguard, and tag technique. Once searched, Soldiers segregate the detainees into either the enemy prisoner of war or civilian collection points and tags them with DD Form 2745 (*Enemy Prisoner of War Capture Tag*). They link all confiscated equipment, personal items, and evidence to the detainee using the DD Form 2745. The Soldiers return all personal items and CBRN gear to the detainees after the detaining force documents the items. The Soldiers expedite any individual identified as having knowledge about the subterranean facility for interviews with S-2 personnel. This assists the unit in developing a better understanding of the facility. The XO and first sergeant coordinate for transportation assets to speed the detainees to a safe area. The Soldiers safeguard detainees and all confiscated items the entire time they are within the detaining force's control. (Refer to ATP 3-21.8 for more information about detainee operations.)

Mission Contingencies

4-148. Small unit leaders should anticipate changes to their plan as the clearing operation continues. Leaders develop friendly contingency plans based on analysis of enemy action. The following paragraphs discuss examples:

Breach

4-149. The first contingency is the breach force receives direct fire contact with the enemy at point of breach. The situation could happen at surface or subterranean level. The security element should make contact and eliminate the threat prior to the reduction element deploying to the point of breach. Once complete, the leader of the breach force should assess whether it has the capabilities to continue prior to continuing.

4-150. The second contingency is the portal opens while attempting breach. If this happens, the reduction element should quickly withdraw so that either the security element or the assault force can seize the initiative and exploit the open door prior to the enemy taking advantage of the situation.

During Clearing Operations

4-151. The third contingency is a CBRN event. Clearing forces in the immediate area need to don their MOPP gear and conduct Battle Drill 10: React to a Chemical Attack. (Refer to ATP 3-21.8 for specifics on the battle drill). The clearing force leader should report the contact to the assault force CP. The clearing force leader withdraws from the affected area and takes an appropriate COA based on the nature of the exposure. One COA would be to call enablers forward to establish the decontamination point as far forward as possible. This minimizes the size of the affected area. Another COA is to give the order to evacuate and start marshalling all elements at the release point at the entrance of the facility. This removes the remaining clearing force Soldiers from the immediate threat. This also provides the assault force with additional time to conduct a thorough decontamination of effected Soldiers and take the necessary steps to prepare for potentially reentering the facility with the known contamination. (Refer to ATP 3-11.32/ MCWP 3-37.2/NTTP 3-11.37 for more information about decontamination procedures) Once decontamination is complete, the assault force commander should have a discussion with the task force commander regarding updated guidance and necessary resources.

4-152. The fourth contingency is a fire in the subterranean facility. Fires are dangerous because they quickly consume all oxygen in the immediate area and fill the space with noxious gases. The clearing force leader should start evacuating forces from the immediate area until the clearing force reaches the point where the poor air quality no longer threatens Soldiers. The clearing force should provide a situation update for the CP and establish security until air quality has returned to suitable levels and the clearing force can resume clearing.

4-153. The fifth contingency is a tunnel collapse. When faced with a tunnel collapse, the first step the assault force commander and clearing force leader should take is an assessment of the situation, the tunnel infrastructure, and accountability of all personnel. The next step should be to evacuate all injured personnel for medical assessment, including individuals on the far side of the collapse if possible. The clearing force leader should contact the assault force commander and request assets to support clearing, widening, or opening another breach into the collapsed area to recover any trapped Soldiers. The clearing force should also conduct air quality tests to ensure the air around the collapse is suitable. If it is not, the clearing force must evacuate to prevent increasing the scope of the problem. Actions associated with this contingency are closely coordinated with the task force commander.

FOLLOW-ON FORCES

4-154. The clearing force continues until they either clear the entire facility or require additional forces to continue the clearing operation. As discussed previously, there should be planned points in the operation when the clearing force leader communicates with the assault force commander and provides a situational updates and recommendations. This dialog continues until the assault force commander or clearing force leader determines that the element has cleared the facility or is approaching their culmination point and requires additional forces.

4-155. If the assault force commander decides to commit more forces to the clearing operation, the current clearing force leader prepares to conduct a passage of lines. The leader conducts the forward passage of lines in a deliberate and methodical manner to ensure the passing unit is prepared to assume the fight when the passage is complete. Conducting a forward passage of lines within a subterranean system has a few unique considerations. The first consideration is to ensure the release point maintains personnel accountability. The second is to account for all specialty equipment (such as ballistic shields, robots, and sensors) passed from the stationary unit to the passing unit. This ensures the passing unit can continue the clearing operation upon completion of the passage of lines. The transfer of equipment should take place at a control point and not at the location of the forward most clearing element. The third consideration is to ensure the enablers are able to conduct link up with the leadership of the passing unit. Finally, provide the marking procedures SOP and an updated map of the facility.

4-156. Frequently, the marshalling area is the established contact point. The release point at the entry portal, or a designated control point within the facility, is the passage point. The position of the forward most clearing element is the battle handover line. (Refer to FM 3-90-2 for more information on passage of lines.)

PHASE IV - SITE EXPLOITATION

4-157. Site exploitation is composed of tactical site exploitation and technical exploitation. Generally, tactical site exploitation includes activities performed at or near a specific location. In most cases, specialized organizations conduct technical exploitation off-site in a laboratory environment. Site exploitation leverages multiple capabilities to varying degrees depending on needs, location, security, training, and expertise to include—

- Search techniques.
- Biometrics.
- Forensics.
- Document and media exploitation.

4-158. In the subterranean environment, site exploitation is crucial to mission success. Site exploitation assists the unit in determining the function and capability of the subterranean system. It also identifies potential locations that would be advantageous for the clearing force. This may include facility control rooms, which may give control of the entire facility to the clearing force by making use of the facility security, communications, and electronic capabilities. The clearing force identifies control panels that facilitate entry to the facility or secured areas. Site exploitation helps to identify rooms that the clearing force wants to secure without accessing. These may include areas likely to contain CBRN materials. Once the clearing force has identified this information, they must report to the assault force CP that reports the information to the task force staff for further processing. This information drives information requirements, indicators, and decision points at the assault force commander and task force commander levels. An example of this includes identifying a warning sign for a nuclear storage locker, which would generate a request for additional assets.

4-159. Information collected from effective site exploitation supports follow-on operations and targeting, and enhances force protection (Refer to ATP 3-90.15 for more information about site exploitation.).

PHASE V - CONSOLIDATION AND REORGANIZATION

4-160. The first sergeant conducts consolidation and reorganization similar to other tactical operations. When necessary, use runners and guides to move ammunition and supplies. Coordinate and assist in moving casualties from the CCP to higher levels of care.

4-161. Platoon leaders ensure their Soldiers establish security while platoon sergeants coordinate with the first sergeant for resupply and casualty evacuation. Quickly transfer captured enemy personnel to higher headquarters using the search, silence, segregate, speed, safeguard, and tag technique. Send captured information, equipment, documents, and maps to higher headquarters for further analysis as well.

CLEARING VIGNETTE

4-162. Below is a vignette that reinforces the previously discussed concepts. The following vignette presents another method of clearing to highlight options commanders may have. The vignette describes a task-organized Infantry company but applies to any maneuver formation within a BCT.

Situation: Enemy forces have been targeting U.S. and coalition forces with precision artillery strikes from a well-prepared underground facility. This underground facility is estimated to have approximately 30 personnel and has the ability to conduct sustainment operations, fire direction center operations, and indirect fire support. The facility may also contain artillery delivered chemical munitions. This facility is estimated to have enough food, water, and ammunition for the enemy force to continue to survive and operate for up to 6 months.

Mission: B Company 2-9 IN attacks Objective BEAR (underground facility) on 030800SEPXX to deny enemy forces the use of the underground facility as an artillery position.

Execution: Commander's intent, expanded purpose: Prevent the enemy usage of Objective BEAR by aggressive movement and maneuver to allow follow on forces freedom of maneuver within the area of operations.

Key Tasks:
Ensure communication with higher and adjacent headquarters at all times.
Synchronize attached enablers.
Establish positions of relative advantage within the underground facility.

End State:
Enemy: Enemy forces are no longer able to provide indirect fire support from Objective BEAR.
Terrain: Objective BEAR (underground facility) cleared of all enemy personnel.
Civilian: Collateral damage minimized.

Concept Statement
Scheme of Movement and Maneuver. First platoon is the main effort as the assault force. Second platoon is supporting effort 1 as the breach force and third platoon support effort 2 as the support force.
The decisive point is when a platoon size element has secured a foothold inside the underground facility allowing for freedom of movement inside the underground facility.
Purpose of key enablers.

Fires: Suppress enemy positions to allow freedom of movement outside the underground facility.

Engineers: Breach to allow for freedom of movement into the underground facility.

MP: Provide protection of maneuver force by securing and processing all detained persons.

EOD: Allow freedom of maneuver to friendly forces by neutralizing improvised explosive devices.

Risk Mitigation: If indicators of CBRN munitions are identified, the EOD attachment confirms them and then isolates and bypasses until exploitation forces can eliminate the threat. (See figure 4-5, page 4-34.)

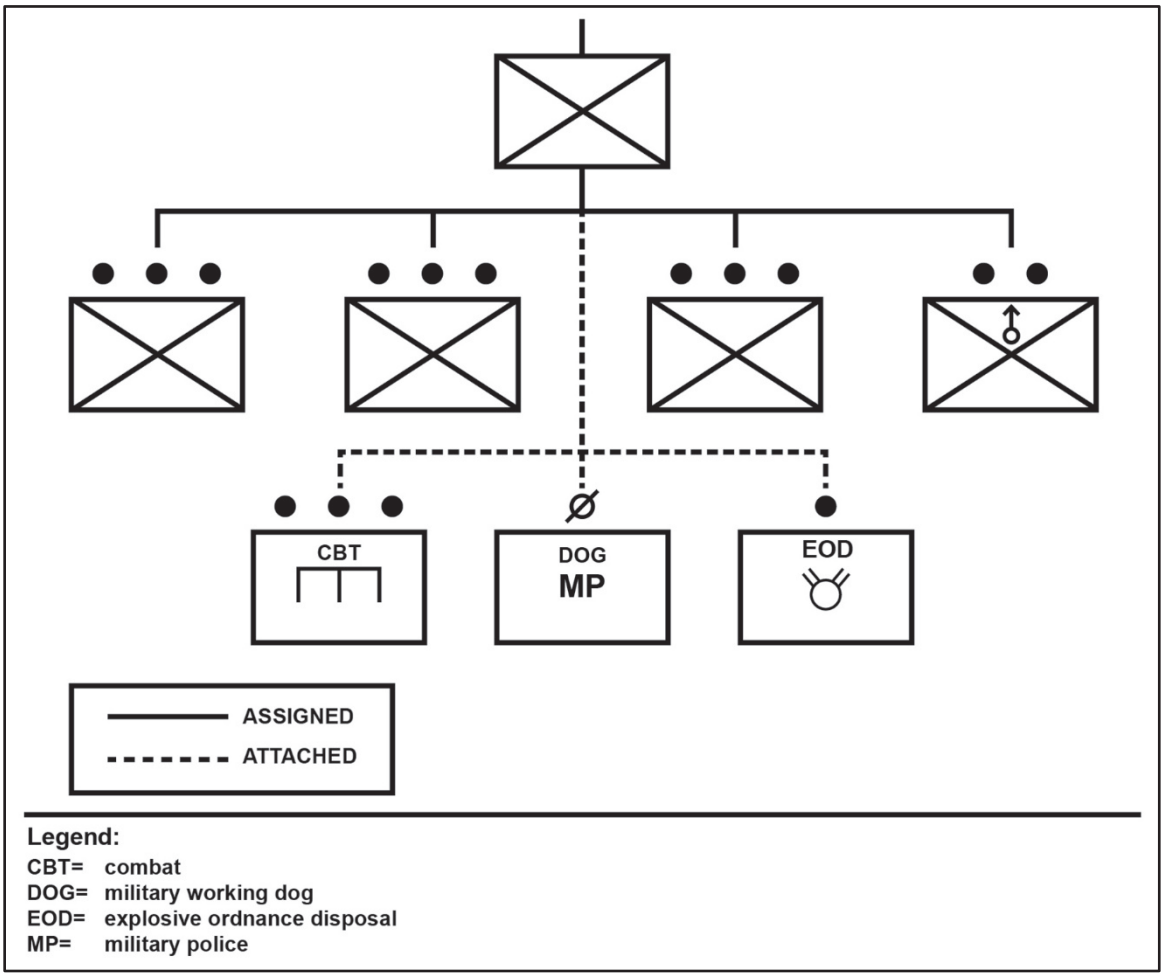


Figure 4-5. Company task organization with attachments

Concept of the Operation

The company conducts clearing operations in five phases. These phases consist of planning, movement and isolation, breach, clear, consolidate and reorganize.

Planning, Phase I

Planning begins with the receipt of the mission and ends with crossing the line of departure. The primary task during planning is to execute TLP. The company commander begins planning and receives intelligence updates. The company XO draws specialty equipment and then packages it for issue to the platoons in the marshalling area. Additionally, the company receives combat engineers, EOD teams, and military working dog team enablers as augmentation to execute the mission.

Combat engineers assist with the breaching of exterior obstacles and doors as well as interior obstacles and doors of the underground facility. Combat engineers assist with the destruction of any enemy equipment captured during the clearing operation as well.

EOD teams can provide assistance in removing improvised explosives devices or mechanical ambushes that may exist within the underground facility. EOD provides protection as well as freedom of maneuver for the maneuver forces.

Military working dogs assist with the search for any possible explosive devices or any enemy personnel within the underground facility. Military working dogs can be a vital asset for the clearing force. The commander should have an understanding of the capabilities the dogs provide prior to execution and how they can protect the formation.

Specialty equipment is vital when it comes to conducting a clearing mission. Specialty equipment provides the company with the ability to generate freedom of maneuver, provide security, and survive inside the underground facility. During a clearing operation, it is imperative that the commander determine what equipment is required to accomplish the mission.

The commander organizes the company to overwhelm at the point of penetration of an underground facility. The commander task organizes the company into a support force, breach force, and assault force. Once the initial breaches are complete, the commander adjusts the task organization in preparation for conducting clearing operations. In general, the commander and leadership must understand that platoons and smaller elements are too small to execute a clearing operation of an underground facility on their own.

Movement to and Isolation of the Objectives, Phase II

This phase starts with crossing of the line of departure and moving into positions of advantage to achieve the isolation of the underground facility. The primary tasks during the movement phase include the ground tactical movement, occupation of attack-by-fire positions, and the occupation of assault positions. These tasks enable the company to set the conditions to ensure mission success. Conducting movement requires detailed planning and execution. Movement should have a primary and alternate route, actions on contact, occupation of objective rally point, leaders' reconnaissance, casualty collection plan, weapon control status, order of movement, direct fire control measures, movement control graphics, key leader locations, integration of enablers, and a communication plan (primary, alternate, contingency, and emergency).

The company commander and designated leadership conducts a leaders' reconnaissance to confirm any priority intelligence requirement, tentative obstacles and point of breach, and confirm any direct fire control measures and indirect fire targets. The company commander designates the personnel door as the point of breach. Once complete, third platoon and the company XO continues movement into the support-by-fire positions. The company XO oversees the support by fire during the breach and ensures it executes the direct fire plan for the assault.

The breach (second platoon) force, assault (first platoon) force, and company commander maneuver along a direction of attack to the last covered and concealed position prior to the point of breach and establish an assault-by-fire position. The commander should be aware of the order of movement and select an order of movement and movement formation or technique that allows the forces to maximize security and organize quickly for the assault. (See figure 4-6, page 4-36.)

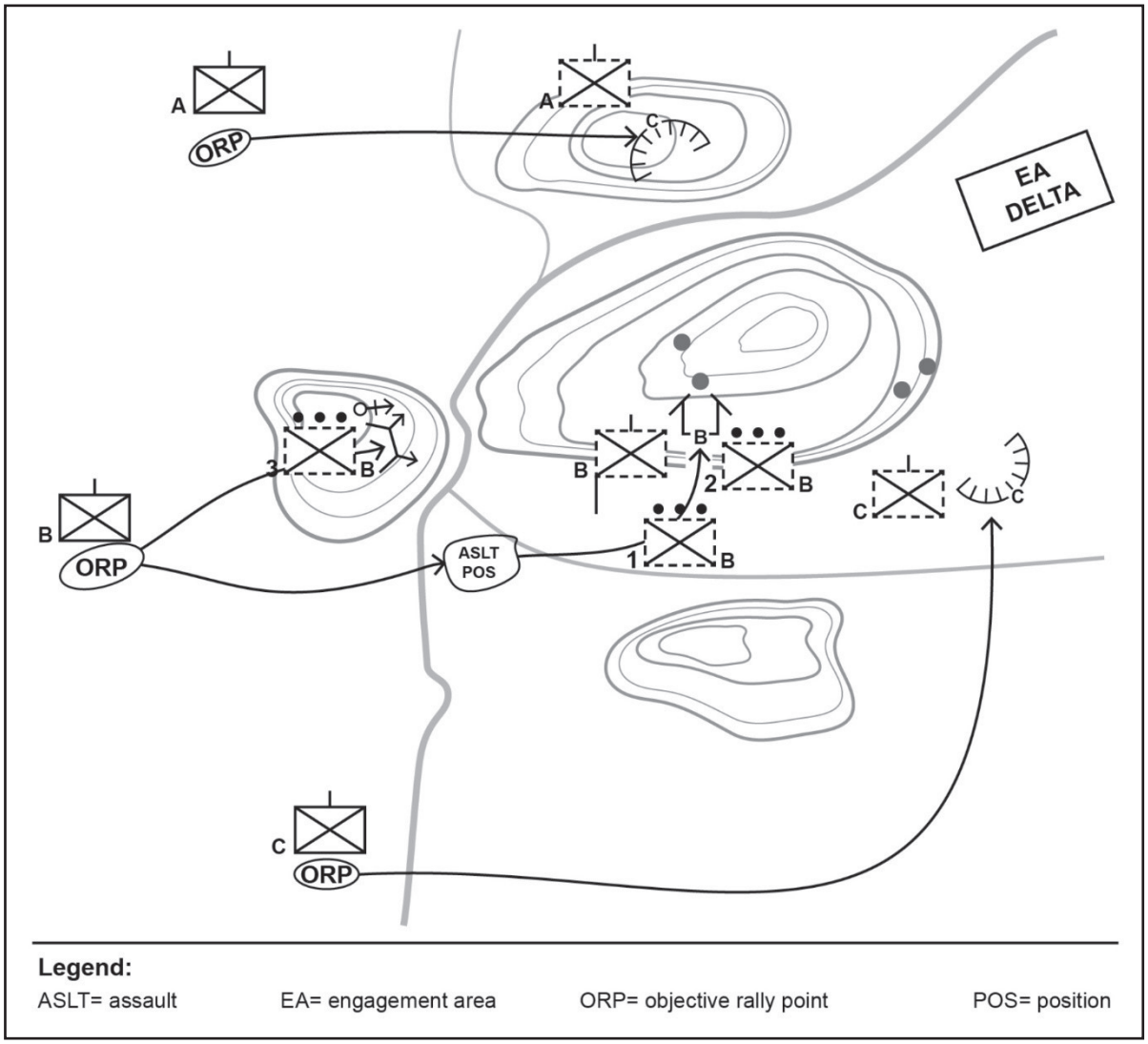


Figure 4-6. Company clear of underground facility (exterior operations)

Conducting the Breach, Phase III

This phase begins with the establishment of positions of relative advantage around the underground facility and ends with the conditions set to conduct clearing operations inside the underground facility. The primary tasks during the breach phase of the operation include identification of the points of breach, establishing a foothold inside the facility, and occupation of the site outside the facility.

Third platoon initiates the suppression and obscuration of the point of breach using direct fire weapon systems and an artillery smoke mission. When conditions are met, second platoon's security element establishes a support-by-fire position to secure the near side of the breach. Second platoon's reduction element maneuvers to the personnel entry portal and places charges on the door. The reduction element confirms the breach was successful and then tests the air inside the point of breach.

First platoon confirms the air quality is adequate and proceeds to maneuver through the point of breach and gain control of the far side of the breach. The first team inside makes direct fire contact with an enemy security team, reacts accordingly, and secures the area. They report there is a security door that requires breaching prior to entry into the facility. The team also identifies a control panel and opens the vehicle door allowing forces to more easily move into the entry area. The breach force maneuvers forward and conducts an inspection of the security door. Once the inspection is complete, charges are placed on the door and all personnel withdraw from the entry area. On detonation, the reduction element returns to the security door to discover the first charge resulted in marginal effect. The company commander reports the results to the battalion commander with the recommendation that they make a second attempt utilizing a different breaching method. The battalion commander approves and the reduction element prepares to conduct a thermal breach.

The clearing force leader directs that all personnel evacuate the facility due to potential air quality concerns. Only the breach team and a security element remain in place as the thermal breach is conducted. Once complete, the team tests the air on the far side of the breach to determine whether it is adequate to proceed. The assault force then proceeds to assault through the point of breach and clear the far side of the breach area. The commander then directs the reduction element to open the security door. First platoon sends another team inside to reinforce the established support-by-fire position and reports that the foothold is established. (See figure 4-7, page 4-38.)

The commander directs second platoon to establish the site outside the entry portal and directs the company trains to maneuver forward with all of the specialty equipment required to clear the underground facility. Second platoon establishes the marshalling area, CCP, and detainee holding area. The XO maneuvers the company CP and establishes it. The remainder of first platoon receives their specialty equipment, breaks down into their clearing teams, and starts conducting rehearsals to prepare for entering the facility. The commander designates the entry area of the facility as the release point and tasks a team from second platoon to operate it. The team is responsible for keeping accountability of the clearing force as it enters the facility, for controlling the flow of Soldiers into and out of the facility, and for supplies that flow into the facility.

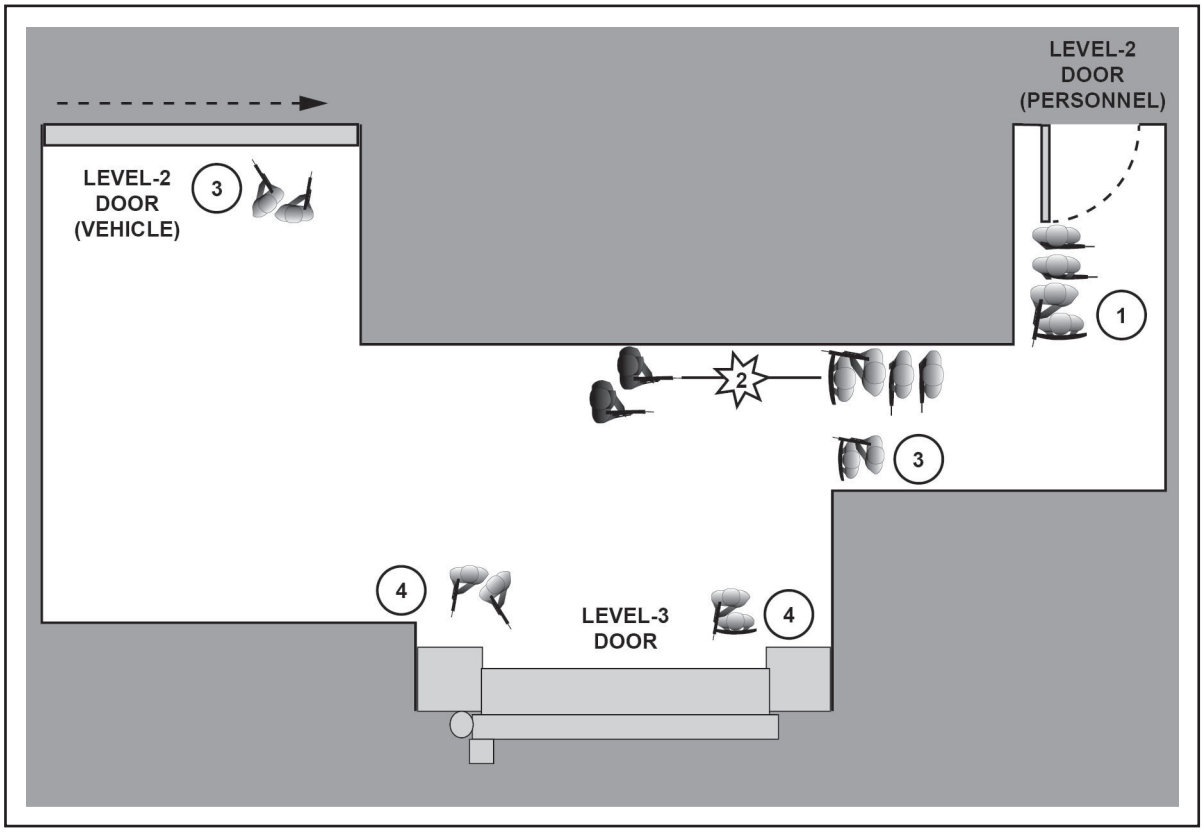


Figure 4-7. Conducting a breach and establishing a foothold

Clearing the Underground Facility, Phase IV

This phase begins when the external site is established and ends when enemy forces are cleared from the underground facility. The primary tasks during this phase is communication in and out of the underground facility, synchronization of movement forces, securing control points, and maintaining operational tempo. These tasks allow the company to achieve the final mission objectives. As the company maneuvers though the facility, Soldiers require oxygen sensors and chemical detection equipment to ensure the facility remains nontoxic.

The company commander issues guidance to the first platoon leader (clearing force leader) and directs the start of the clearing operation. The clearing force leader enters with two squads and starts the clearing process. Each team moves with a ballistic shield in front and three Soldiers stacked behind (see chapter 5 for more details on movement techniques).

The clearing force leader directs the element to initiate clearing the first hallway. At the first corner, the lead team sends a robot forward to conduct a reconnaissance of the area prior to sending any Soldiers forward. Using the robot, the clearing element determines there is a four-way intersection 20 meters down the hallway with a closed door ahead of it and an open hallway to the left and right. The clearing force leader directs the squad leader to maneuver a fire team to each of the open hallways and a two-Soldier element establishes a support-by-fire position facing the closed door. The clearing force maneuvers to gain control of the intersection. The fire team on the left hallway reports a short hallway that ends with another door. The fire team on the right hallway reports what appears to be a vehicle and requests to send the robot for further inspection. The robot reveals a four-wheel vehicle and two forklifts. The fire team maneuvers down the hallway and searches the equipment. They report that the hallway leads to a dead end past the equipment and return to the intersection. The clearing force leader requests a breach team to perform a subsequent breach on the door at the end of the short hallway to the left. After attempting to open the closed door and inspecting it, the breach team recommends conducting an explosive breach.

Once the charges are set, the entire clearing force exits the facility and waits for the detonation to occur. The clearing force and breach team reenter the facility, re-clearing the area and testing the air as they go, to inspect the point of breach. The clearing force leader reestablishes a security element on the left hallway and in front of the door and sends a clearing team and the breach team down the right hallway to inspect the point of breach. The breach was successful and the breach team confirmed the air quality was acceptable. (See figure 4-8, page 4-40.)

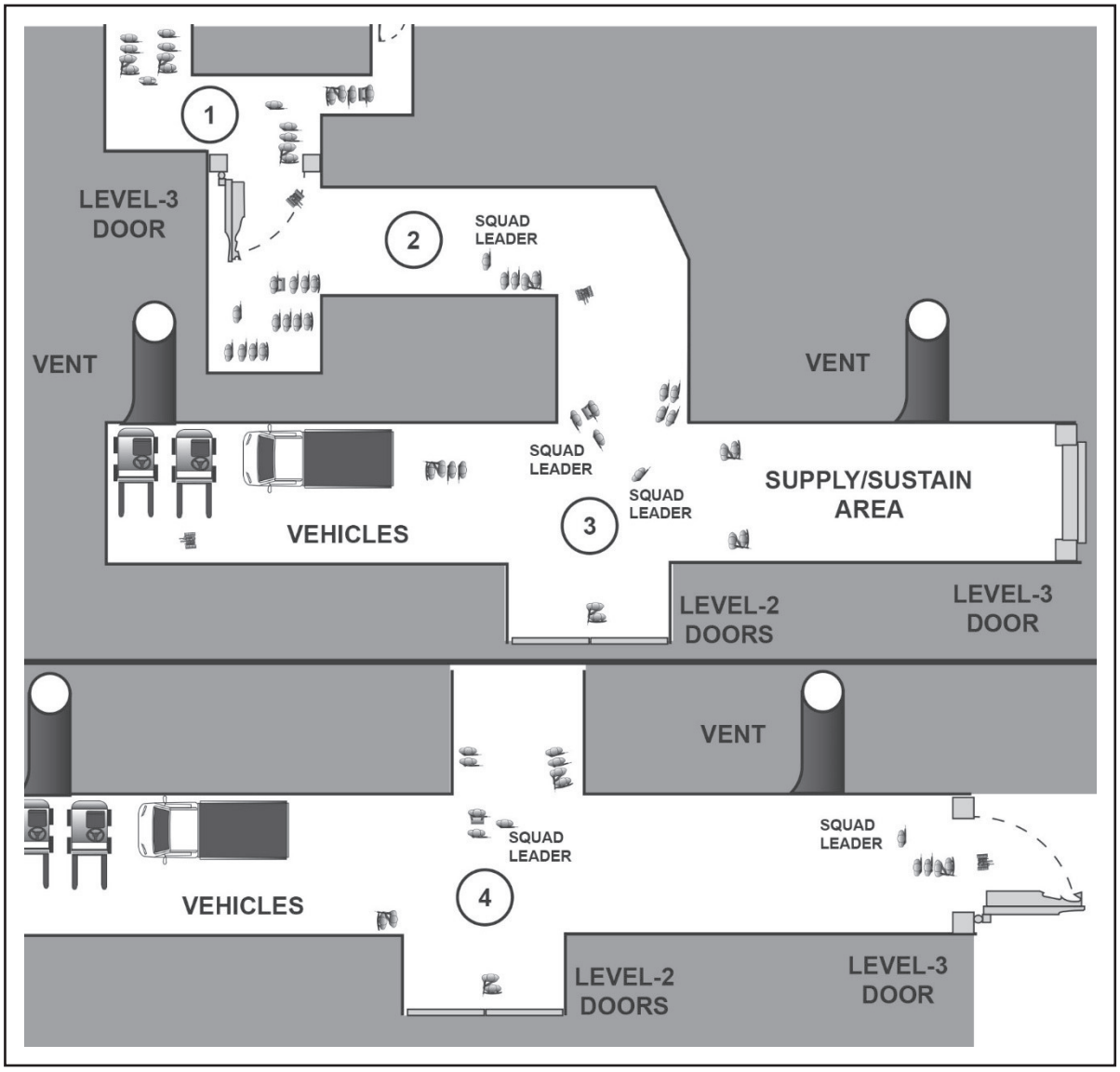


Figure 4-8. First intersection of clearing operation

The team assaults through the point of breach and secures the immediate area. The team reports that they are in what appears to be a munitions storage area. The clearing force leader directs the breach team to reduce the obstacle so they can move an EOD team to conduct further inspections and confirm initial reports. The clearing force leader adjusts the positioning of the force to include reinforcing the 2-Soldier security element to a fire team while they wait for the EOD team to link up and complete their inspection. The EOD team recommends leaving all munitions in place until the clearing operations are complete. The clearing force places a fire team at the entrance to secure the room and prepares to continue clearing operations. The clearing force leader determines that they need additional forces to continue. This provides an opportunity to provide a situation report to the commander to ensure they are still operating within the intent. While the update is taking place, the breach team inspects the next door in preparation for the next subsequent breach. The commander adds another squad to the clearing force and directs the XO to start coordinating for the movement of the seized munitions. These additional forces (two clearing teams) stage in the hallway between the intersection and the munitions holding area.

The breach team recommends conducting a mechanical breach because it is locked and the proximity to the munitions storage area. Once the breach is complete and air quality is tested, a clearing team assaults through the point of breach to secure the far side. The team takes small arms contact and preforms the appropriate battle drill. The clearing force leader directs another team through the point of breach to reinforce the first team. The breach team reduces the obstacle to facilitate further action. Once the room is secure, the clearing team reports taking two casualties, two enemy killed in action, and three wounded in action. The clearing force leader places a security element at the next door and directs teams to conduct buddy aid and detainee searches then evacuates casualties then detainees to the release point at the entry portal. The clearing force leader also sends a runner to the release point with the report. The clearing force leader establishes a control point at the first intersection and leaves a squad leader in charge. The breach team conducts the same examination described above and recommends conducting a mechanical breach due to the direction the doors open. The breach team then cuts the hinge points off the door. The clearing force assaults through the point of breach and secures the far side. The clearing force leader establishes a CCP in the room and follows the lead clearing team. The additional forces (two clearing teams) move into the CCP and await guidance. The clearing team reports another door and a hallway to the left. The team sends a robot into the hallway and determines it is a latrine with a door on the right side wall. The clearing force leader establishes a security element, bypasses the door, and directs a team to clear the latrine. The clearing force leader determines additional forces are required to continue the clearing operation. A runner is sent to the release point with a situation report, updated map, and a request for an additional squad. The commander approves the additional squad. The clearing force is now platoon sized. The clearing force directs the robot through the open door and observes what appears to be a sleeping bay with several enemy Soldiers in defensive positions. The clearing force maneuvers into the bay and the enemy surrenders. The clearing force reports the activity and the discovery of a hallway along the right wall. The clearing force leader establishes a security element at the hallway and preforms searches of the seven enemy Soldiers.

After evacuating the detainees to the release point, the clearing force continues clearing operations. The additional forces (three clearing teams) stage in the latrine and await guidance. The robot conducts a visual reconnaissance of the hallway. The hallway has a 90-degree turn to the left and a door on the right. It appears that it is the same door they recently bypassed and has a security element on the other side. The robot controller maneuvers the robot around the corner to the left and continues down the hallway. The robot controller observes a closed door on the right and a bomb trap on the left with the hallway continuing. The robot triggers a trip-wire as it entered the continued hallway.

The shock wave from the explosion knocked the door down effecting the security element behind it. The clearing force leader and teams staged in the latrine reacted to the explosion and provided buddy aid to the security element in the hallway and the clearing team and security element in the sleeping bay. The clearing force establishes a security element between the destroyed door and the trip-wire to facilitate evacuation of the casualties. The squad leader at the CCP sends a runner to the release point requesting additional aid and litter teams. The clearing force evacuates eight wounded Soldiers. The clearing force leader moves to the release point to provide an update to the company commander and requests an additional squad to replace the evacuated squad, an EOD team to conduct post-blast analysis, and an engineer team to inspect the structure of the hallway and clear the debris. The commander approves the requests for the additional clearing squad and forwards the EOD team requests on to the battalion commander. The clearing force leader stages the new clearing teams in the hallways leading to the sleeping bay and latrine.

The EOD conducts the post-blast analysis and determines there are no other booby traps in the hallway. The engineer team conducts their inspection and determines that the hallway will not collapse; therefore, the clearing operation can continue. The clearing force leader directs the next squad to clear the hallway and moves the security element in front of the door on the right. The clearing team maneuvers through the hallway and reports a door to the right and a bomb trap to the left that mirrors the previous set. The clearing force leader places a security element in front of the door and returns to the previous door. The breach team reduces the door using similar techniques described above and tests the air. The clearing force assaults through the point of breach and takes small arms contact. The clearing force team reacts with the appropriate actions and eliminates the threat. The clearing force reports two enemy killed in action. The clearing force reports the seizure of an artillery howitzer, a large door at the end of the room, and a hallway on the left wall. The clearing force leader directs the team into the hallway and establishes a security element at the door. The clearing force team clears the hallway and the subsequent room. Inside the room, they capture three detainees and seize another artillery howitzer. The clearing force team searches the detainees and evacuates them to the release point. They also locate a control panel that opens both outer doors. The clearing force leader determines that the entire facility is clear and returns to the release point to provide an update to the commander. (See figure 4-9 and figure 4-10, page 4-44.)

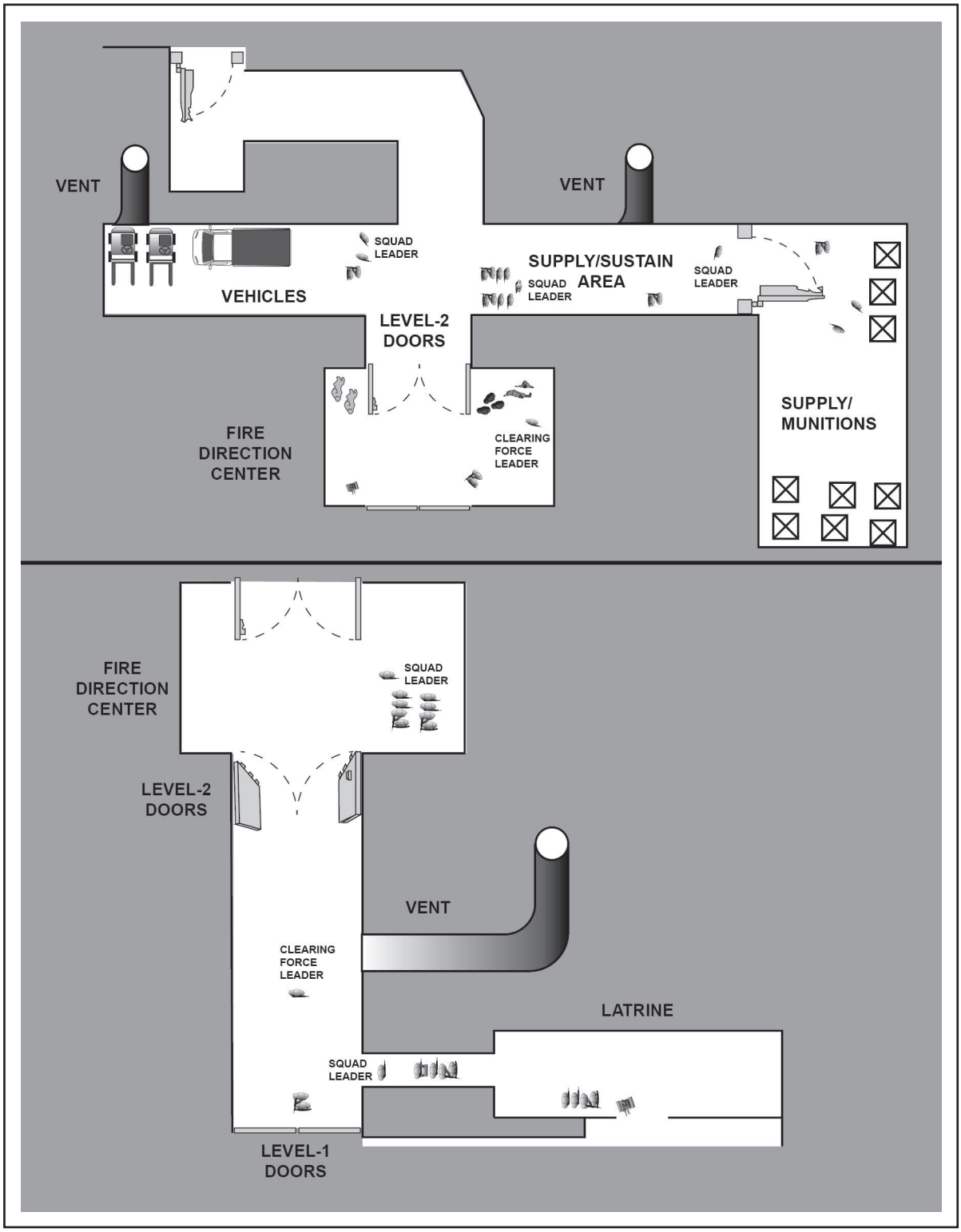


Figure 4-9. Underground facility layout

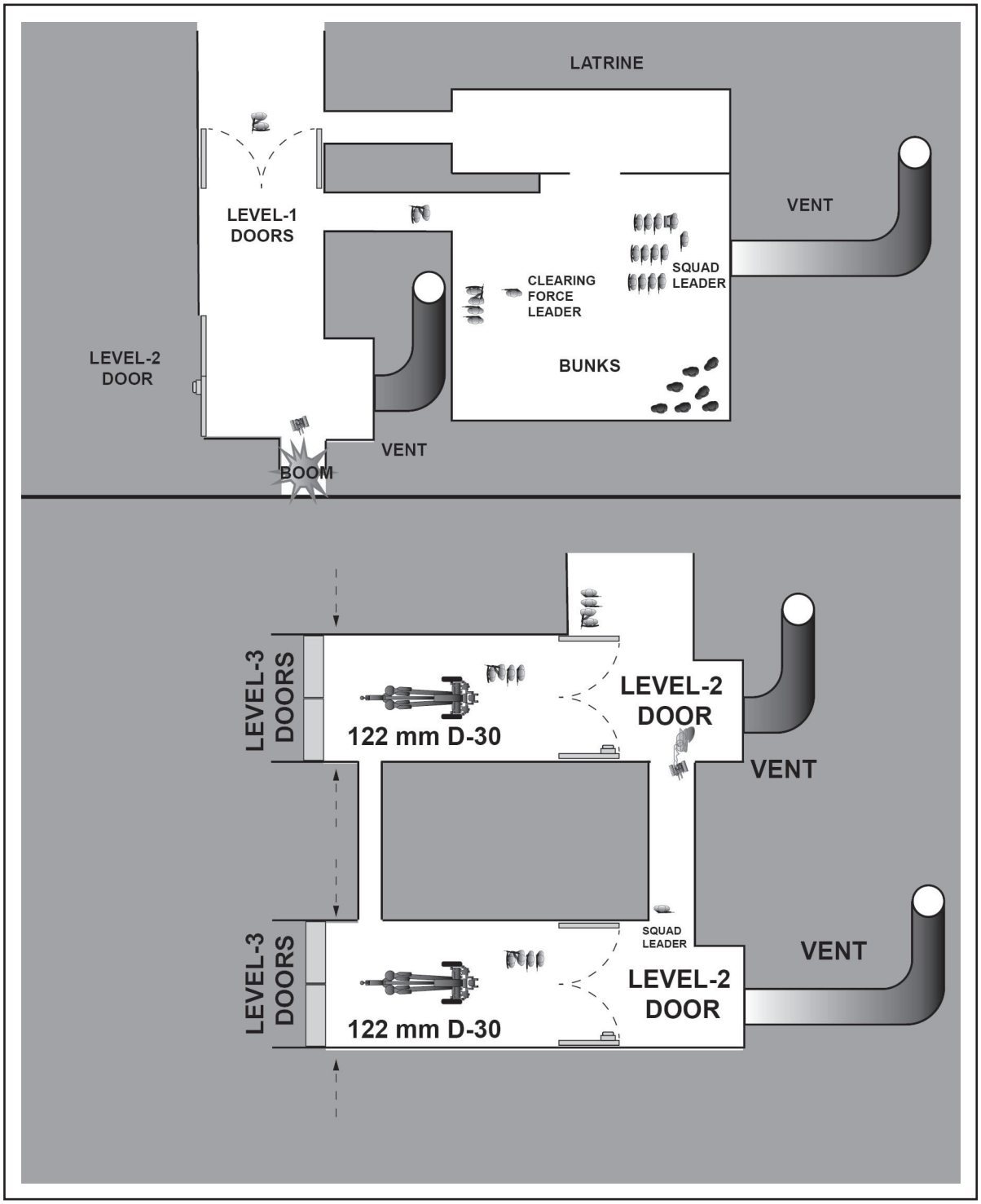


Figure 4-10. Scenario 1

Consolidation, Reorganization, and Transition, Phase V

This phase starts with the completion of the clearing operation and ends with the relief in place and exfiltration of the underground facility. The primary tasks during the reconsolidation and reorganization of the operation include improving internal and external security and preparation for possible counter attack, detainee handling, photographing and recording details of the facility, securing enemy documentation and digital devises, casualty evacuation and resupply, prepare for follow on operations, and site exploitation.

The company maintains security and identifies the location of any sensitive or possible hazardous material, chemical munitions. The company commander directs the clearing force leader to consolidate all specialty equipment in the marshalling area. The XO coordinates all detainees' transition to battalion control. Each platoon consolidates their forces and cross loads supplies. The BCT reserve company and specialty teams conduct link up to assume control of the underground facility. The clearing force leader conducts a walkthrough of the facility with the company commander and specialty team leadership. During this walkthrough, they pass all necessary information to the new element and replace Bravo company elements with those of the reserve company. The clearing force leader identifies areas where the specialty teams should conduct their site exploitation, the map the team developed of the facility, and marking techniques used by the clearing force. Once handover is complete, the company transitions to preparations for any follow-on missions.

ASSESS

4-163. *Assessment* is the determination of the progress toward accomplishing a task, creating a condition, or achieving an objective (ADP 5-0). Commanders and leaders conduct a continuous assessment of progress in relation to a given task. In subterranean operations, continuous assessment involves monitoring the situation, evaluating progress, and making necessary adjustments that are necessary in uncertain terrain and under unfamiliar conditions.

MONITORING

4-164. Commanders and leaders must monitor progress in subterranean operations. Command and control for small-unit tactics is extremely challenging under combat conditions in a subterranean environment. Subterranean environments exacerbate this problem by disorientation, communication difficulties, and an unknown enemy situation.

4-165. Leaders monitor and report their progress through situation reports, communications checks, and reporting PLs or control measures. As units develop the situation through situation reports, mapping updates, and enemy contact reports, they pass that information along to their higher headquarters per established SOPs.

EVALUATIONS

4-166. Commanders and leaders must anticipate enemy actions and other threats and use CCIR, control measures, indicators, and other information to provide insight to their subordinate unit's progress in the subterranean space. They use CCIR to inform decision making in relation to planned branches and sequels.

4-167. Units may measure progress several ways. Focusing on distances may not be effective due to the unknown size of the subterranean system. A technique may be a percentage of the operation completed so far based on number of rooms or tunnels cleared (if known). As the clearing force leaves teams behind to secure previously cleared rooms and tunnels, commanders may measure progress in number of troops left available to clear the remaining subterranean system.

4-168. During execution, commanders must evaluate the situation in relation to their tactical plan. They must account for progress, casualties, and success so far, and may have to reevaluate their plan or their tactics.

Combat Status

4-169. Commanders must determine their combat status through reports from their leaders. They must quickly analyze losses in personnel and equipment, consolidate, reorganize, and accurately report their status to higher. The first sergeant and XO must coordinate in treating casualties, requesting equipment, and sustaining operations. Commanders must be flexible in their thinking and not become rigidly committed to the initial plan.

Mission Capable

4-170. Commanders must process all the information reported above and quickly determine their ability to accomplish the mission. The characteristics of a subterranean fight which include an unknown enemy, challenging environment, and poor communications may obscure the situation to such an extent that a commander may be tempted to press ahead with a small force which may not be sufficiently capable to complete the mission, potentially at a catastrophic loss of lives and equipment.

CONSOLIDATION AND REORGANIZATION

4-171. Commanders and leaders continue their assessment during consolidation and reorganization. They factor in the effectiveness of their sustainment plans. They estimate the effectiveness of their remaining troops, which includes considering their fatigue, morale, and casualties. Finally, commanders must assess the initial plan, the tactics, the contingencies, and the overall success of the mission in relation to the higher commander's intent. They need to determine if their plan was effective, how they could have improved it, and what changes to make for future operations. Conducting this assessment should be as collaborative as possible. Leaders should seek information and input from subordinate leaders and Soldiers once they establish effective security, and pass that information to their higher headquarters.

Chapter 5
Squad and Individual Techniques

As with any operation, techniques vary based on METT-TC. Subterranean terrain is unforgiving, and hinders both communications and navigation. For this reason, movement should be well planned and decisive, with contingencies carefully considered and planned.

Additional techniques are situationally dependent; Soldiers should not view those described and shown in this chapter (booby trap, robotic platform, and military working dogs) as all encompassing. This description provides an instructive method for leaders to review when developing SOPs and planning movement through subterranean systems.

SQUAD ORDER OF MOVEMENT

5-1. No Soldier should move through a passageway alone, always move in a buddy team at a minimum. This is particularly important to enabler personnel, who likely are not familiar with the clearing force or their SOPs. Therefore, it may be easier to lose accountability of these assets in the confusion exacerbated by the subterranean space. Units must maintain accountability of their personnel entering or exiting the facility at all times. The clearing force leader or designated representative establish a release point at the entrance of the portal to maintain a by name or battle roster number log of every individual that enters and exits the underground facility. Units can manage this using an entry board with extra nametapes, dog tags, or a logbook.

APPROACH

5-2. The enemy may defend the approaches to subterranean systems with a defense in depth of fighting positions, mines, ambushes, or snipers. Soldiers must first fight and win the surface battle before preparing to enter an underground facility or other subterranean space. Soldiers should use observation, reconnaissance, and when possible, information obtained by local inhabitants to develop a clear understanding of any preparations and defenses the enemy may have established. The patrol should locate other entrances and exits prior to entering a subterranean system, covering potential enemy escape routes. The clearing force should be prepared to enter an identified alternate breaching point if required but should avoid entering the underground facility from multiple locations to avoid potential for fratricide. The assault and clearing forces must maintain a 360-degree security posture as they approach the entrance to the underground facility.

FACILITY PORTAL

5-3. Assess entrances for the possibility of booby traps. Use information collection assets, direct observation, and other standoff capabilities to determine the threat level. Once the unit breaches the portal and the clearing team has begun to conduct operations, leaders must ensure personnel do not gather directly in front of the entrance. Treat all portals and transitions from one area to another as thresholds as described in close quarters battle techniques.

5-4. Remote opening can mitigate collateral damage from booby traps. Many underground facilities have personnel doors adjacent to the main portal door that may be easier to breach. Once the breach is complete and the foothold established, the clearing force should attempt to open other adjacent doors into the facility. This includes large blast or vehicle doors to allow for the transportation of equipment and personnel. The clearing force should look for door controls, switches, and mechanical opening arms.

INITIAL ENTRY

5-5. The clearing force enters and establishes a foothold. Once the entry portal is open, air quality must be determined. The team samples the air and checks for explosive hazards to determine if it is safe to continue past the initial foothold. If available, the team uses a robot equipped with sensors and cameras to enter and conduct reconnaissance and air quality testing. When available, the team uses robots or UAS in the lead and conduct bounding over-watch moving behind the robots as they move into the underground facility. Clearing teams must ensure that they do not outrun their sensors. However, there are situations when time is limited and speed is critical. In these cases, commanders and leaders must manage the increased risks associated with less deliberate operations. Small and medium passageways may require the use of a safety line for the lead element to assist in recovery. Squads and teams may use ballistic shields to provide cover. In these cases, the clearing force stacks up behind the Soldier carrying the shield in a tight file. This varies depending upon the size and scope of the underground facility.

Note. Lead Soldiers use ballistic shields when moving down a long, very narrow corridor. While they may be used in other situations, they are not designed to be carried by all the Soldiers in the formation and may impede the rapid clearing of rooms and wider hallways in a subterranean system.

WARNING

Ballistic shields only provide temporary protection before they become unable to provide ballistic protection; like a ballistic plate in body armor, replace when damaged.

5-6. Direct the clearing team to enter and clear in a specific MOPP-level based on intelligence provided prior to entry into the underground facility. When the situation is appropriate, the initial clearing team should don their joint service lightweight integrated suit technology. Soldiers should wear and carry items like the compass, watch, flashlights, and so forth on the outside of the joint service lightweight integrated suit technology. Units and leaders should develop and implement marking SOPs to quickly identify key leaders and enablers when operating in joint service lightweight integrated suit technology.

5-7. The size and scope of the underground facility is unknown upon entry. Adjacent units could be entering the same facility through a different portal. Maintain coordination between all elements who are entering geographically close underground facilities to track the clearing teams. Friendly forces must be prepared to encounter each other from different directions while clearing. Squads and teams must understand and practice friendly recognition signals to prevent fratricide. Instructing clearing teams to not move past the initial foothold while a team at another portal moves forward (breach and hold versus breach and clear) is a technique to assist in preventing fratricide.

5-8. One Soldier should never enter a hallway or point of breach alone. If the lead Soldier is carrying a shield, then that is their primary job. A number two Soldier, at a minimum, should be directly behind and is the primary shooter. The Soldier carrying the shield slings their rifle to manipulate the shield. If the Soldier has a pistol, they may use that weapon alongside of the shield. Since it is physically exhausting, leaders rotate the responsibility of carrying the shield among the Soldiers. (See figure 5-1.)

Note. Assess size considerations when entering a crawl space. If the head and chest fit, usually the rest of the body fits. If Soldiers must remove their helmets to enter a crawl space, the space is frequently not large enough to enter.

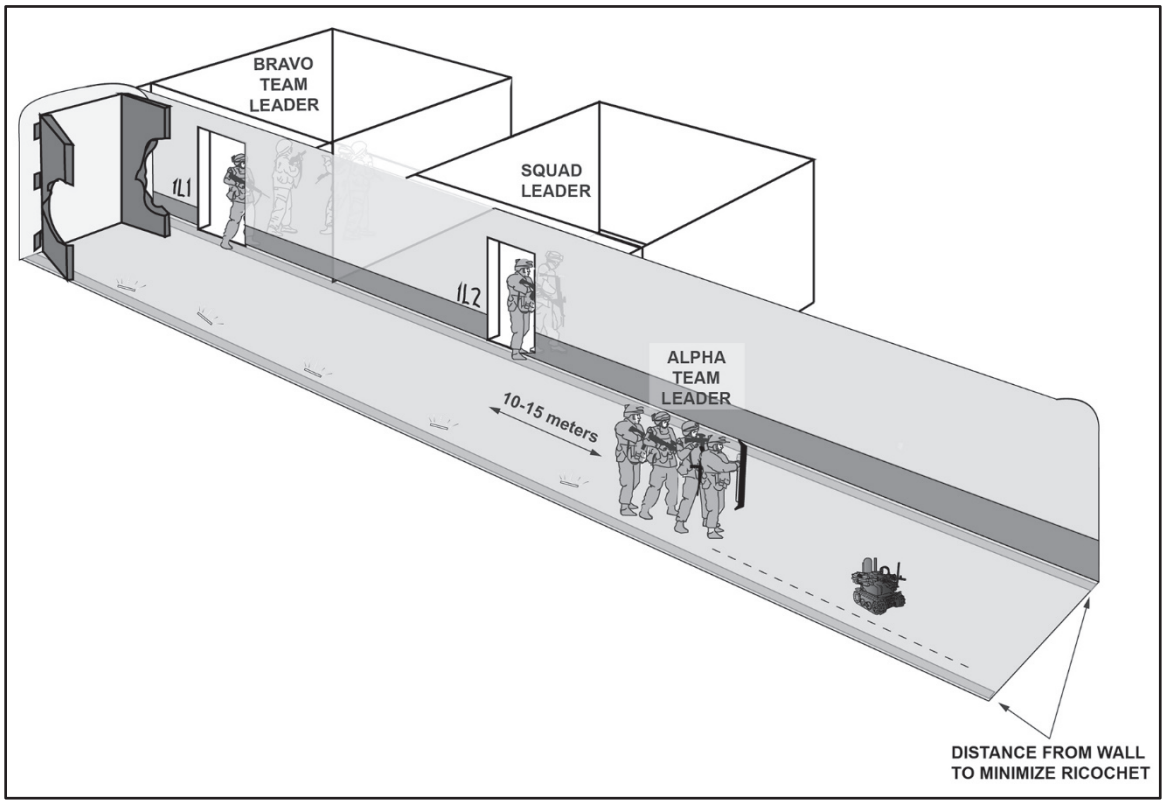


Figure 5-1. Squad order of movement at initial entry

Note. The figures in this chapter are not prescriptive or all-inclusive, merely to provide basic examples for context. Leaders must array their security, enablers, and sensors at all echelons in relation to the mission variables (METT-TC).

DESCRIBE THE ENVIRONMENT

5-9. Passageway sizes vary greatly between subterranean system categories, facilities, and even areas within the same system. The mobility restrictions described in chapter 1 are closely tied to the size of the passageways within a facility. Leaders modify individual Soldier equipment and loads as necessary to operate in these conditions.

SMALL PASSAGEWAYS –RESTRICTED

5-10. At most, small passageways only allow a single Soldier in the lead and may even require them to crawl or modify their equipment load to fit through the tight spaces. Considerations include navigating on hands and knees, perhaps without body armor or a helmet, and clearing with a pistol, flashlight (infrared and white), and night vision goggles (NVGs). Clearing these small passageways may be similar to how tunnel rats operated in Vietnam. Typically, small passageways are found in category 1 subterranean systems.

5-11. These small passageways can be fairly shallow and range from short point-to-point tunnels to large multilevel complexes. If appropriate, approach should occur by escalating force through the use of enablers with Soldiers entering a small passageway only as the last resort. Tactical call outs, military working dogs, pyro-technics, hand grenades, and other explosives provide friendly forces potential options when dealing with these facilities. The use of a small, hand-held Soldier-borne sensor can assist in increasing the unit's

situational awareness. However, a number of factors may impede their use to include complex obstacles, angle of approach, width of passageway, and the size of the subterranean system.

MEDIUM PASSAGEWAYS –SEMI-RESTRICTED

5-12. Medium passageways permit Soldiers to maneuver one or two across while wearing body armor and possibly carrying a ballistic shield. These passageways offer more space, but they are still very dangerous because one defender can hold off a much larger force. Medium passageways permit Soldiers the ability to fire and maneuver utilizing asymmetrical formations to address the threat with the smallest tactical elements as possible while wearing body armor and protective equipment to include the employment of shields and general purpose machine guns as needed. Maneuver elements should be prepared to execute multiple fire and maneuver techniques for various size structures and layouts due to confined space and size coupled with low-visibility conditions requiring a more methodical clearing procedure.

LARGE PASSAGEWAYS –UNRESTRICTED

5-13. Large passageways allow for a front wider than two Soldiers abreast with tactical spacing. Some passageways are large enough for vehicles. For these passageways, units may use standard close quarters battle style maneuvering, clearing hallways and rooms the same as they would buildings on the surface. A large passageway allows for a greater application of fire and maneuver. (See figure 5-2.)

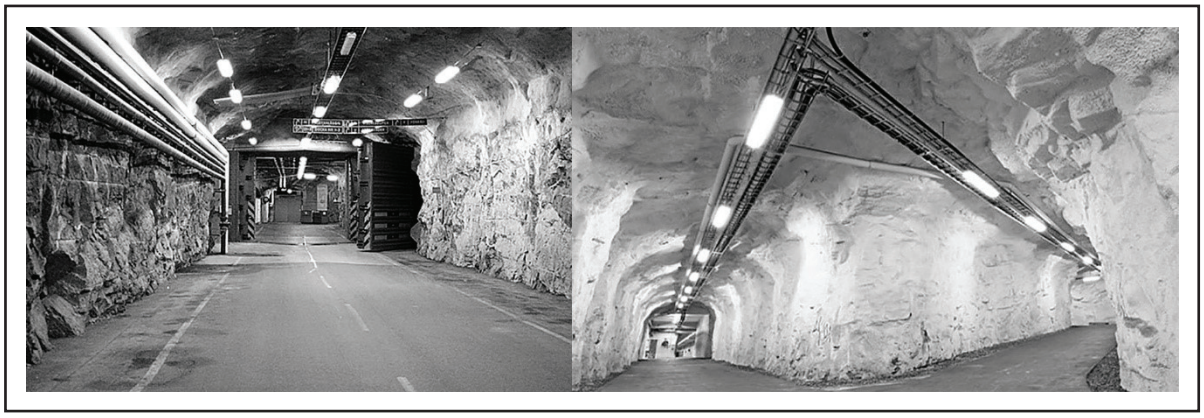


Figure 5-2. Large passageways

BOOBY TRAPS AND EXPLOSIVE HAZARDS

5-14. Use extreme caution to avoid booby traps and explosive hazards when approaching and moving through subterranean areas. Enemy forces may employ them near openings and hallway junctions. Booby traps vary significantly based on geography, availability of materials, and the technical sophistication of the enemy force. The enemy may also use early warning devices to alert them to the presence of intruders.

5-15. Booby trapped devices typically range from simple nail boards and sharpened stakes to sophisticated victim-operated explosive hazards. Based upon the capability and resources of the threat, expect them to employ military grade munitions and land mines to protect portals and access points to these facilities.

5-16. Techniques for detecting and avoiding booby traps include—

- Infrared designators, such as the AN/PEQ-2 target pointer, illuminator, and aiming light, used with NVGs can make trip wires sparkle to identify possible booby traps. The sparkle is the glint seen in the NVG lenses when the infrared illuminator crosses the wire surface.
- Soldiers can identify trip wires using rolled cloth ribbon. Hold the end of the roll and throw it down the passageway. (Must have small weight at the end.)

- Another technique to identify trip wires is to use a trip-wire feeler using a long pole, a string, and a weight. If available, robots can assist in finding them as well.
- Standing water in passageways provides excellent camouflage for antipersonnel mines and booby traps scattered on likely routes. Soldiers should avoid walking in water, if possible.
- The team should move slowly, continuously looking for booby traps and clearing corners as they approach them. When encountering other entrances and exits, the clearing team should take the same precautions as with the initial entry. Other entrances and exits could be booby-trapped.

MOVE WITHIN A SUBTERRANEAN SYSTEM

5-17. Passageways may be severely restricted. The leader should adjust the formation and spacing accordingly based off the mission variables of METT-TC. Nonverbal communication is vital. The second Soldier in the element coordinates movement. This allows the lead Soldier to focus on their sector. The team leader places automatic weapons in a weapons tight status with fires strictly controlled.

5-18. If available, the use of robotic platforms can greatly enhance the capability of the clearing force. They are the best option for conducting reconnaissance and air quality testing to protect the force. The robotic platforms used by engineers and EOD can be used for this purpose. (See figure 5-3, page 5-6.)

5-19. The clearing force designates control points at intersections and other key features as they move deeper into the underground facility. At least a two Soldier team should provide security at each control point for follow-on forces entering behind the lead element. This assists in guiding follow-on forces to conduct link up or a passage of lines with the clearing force.

5-20. The clearing force continually looks for indicators of the type of facility they have entered and other information of value to the assault force commander and clearing force leader. This includes items such as the location of ventilation systems and pipes, control rooms for command and control or environmental systems, special equipment, vehicles, site maps, and other information of value.

5-21. Specialized enabler personnel should prepare to follow behind the clearing force as close as the situation within the subterranean facility allows. EOD, medics, and military working dog teams should travel with the clearing force leader or designated representative to provide immediate support to maintain momentum. While closer is preferred, the situation determines the location and disposition of CBRN breaching elements and other enablers and may require them to be stationed outside the subterranean system. If this is the case, establishing processes and lines of communication to employ those enablers inside of the facility is critical.

5-22. The clearing force remains prepared to execute an emergency evacuation at any time during the clearing operations. The clearing force leader continually assesses their team's ability to continue clearing operations. The leader bases this assessment on factors such as personnel available, amount of the underground facility or subterranean space that has been cleared, estimated amount of remaining space to be cleared, and the status of key equipment. The clearing force leader may reach a decision point where they must request additional assets or recommend temporarily halting clearing operations. If this occurs, they gather as much intelligence as possible and may withdraw to the portal entrance and request additional enablers from higher headquarters, as required. (See figure 5-3, on page 5-6.)

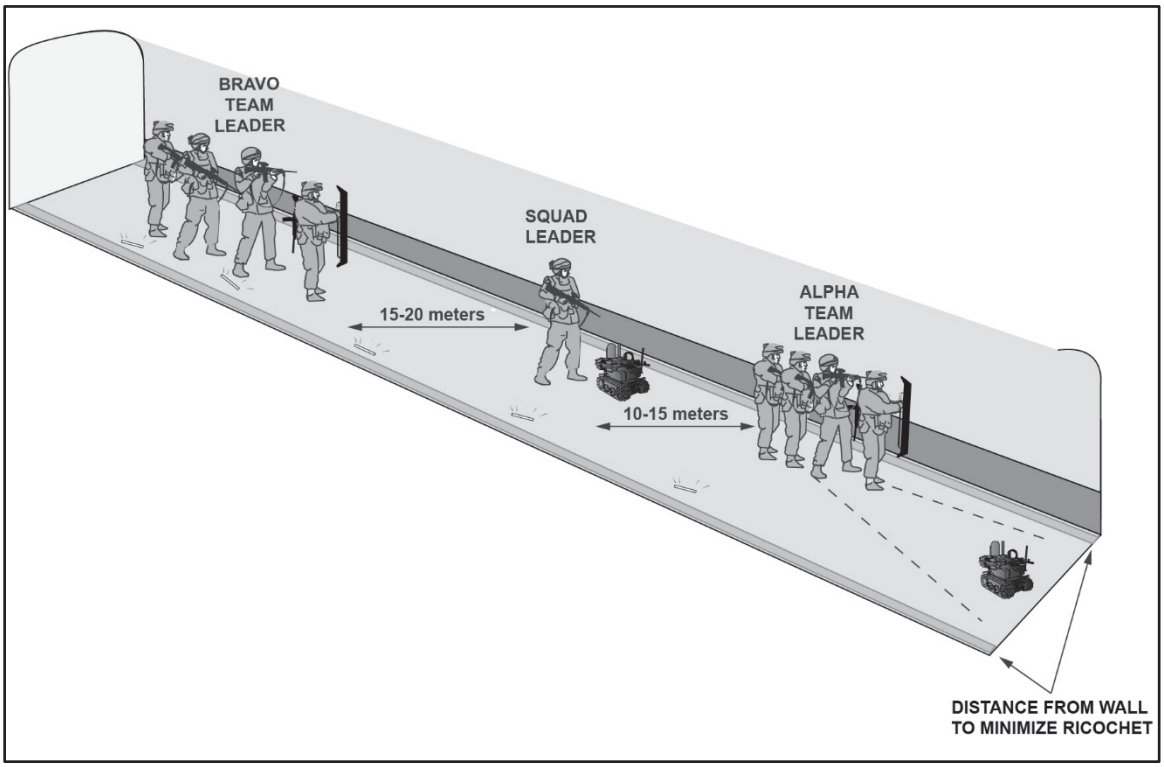


Figure 5-3. Squad order of movement (medium passageway)

5-23. The mission of clearing the underground facility and maintaining local security for the clearing force is the first priority; however, the clearing force should be prepared to conduct site exploitation while moving within the underground facility. When available, use hand-held cameras and video devices in conjunction with robotic platforms and their built-in recording capabilities. This includes rapid dissemination of information to the assault force commander outside the subterranean system.

5-24. When the team is moving inside the passageway, the distance between personnel varies according to size of the passageway, limited visibility, threat, and other factors. If Soldiers encounter fast-flowing water in the passageway, or if a sewer contains slippery obstacles, increase intervals to allow team members to react if anyone slips. The use of a safety rope or safety line can assist the team in clearing these hazardous areas.

5-25. If a squad or team encounters another drift or tunnel while another element of the clearing team is moving forward, the clearing team leader decides to either clear both passageways simultaneously or emplace security on the additional branch and continue with the primary passageway. Security emplaced on the additional passageway should include two Soldiers, an automatic weapon, and an air quality monitor at a minimum.

SECURITY HALT

5-26. Teams should halt when needed and conduct a stop, look, listen, smell halt. If possible, never stop in a long straight stretch of the passageway. Move to a turn or corner to conduct halts. This gives the clearing teams cover during enemy contact (see figure 5-4). Soldiers should avoid standing in the middle of hallways, doorways, or openings to reduce the threat from enemy fire.

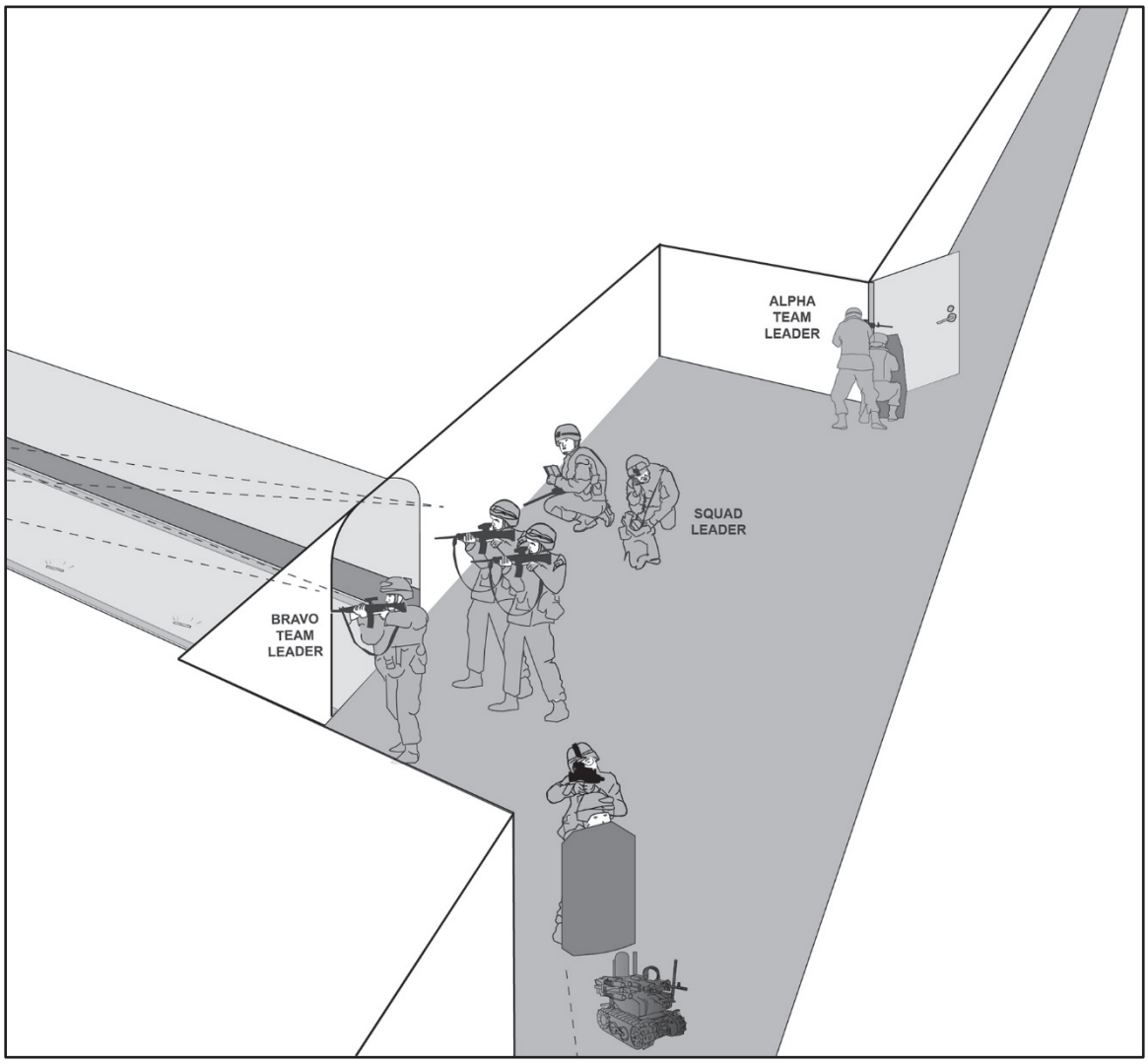


Figure 5-4. Actions at security halts

MAPPING AND MARKING OF ROUTE

5-27. A unit's marking SOPs should include considerations for subterranean operations. Leaders standardize these procedures throughout an organization to the greatest extent possible. When receiving enablers, leaders provide them with the unit marking SOPs during the integration process. As the clearing force moves through the passageway, the rear security element should mark the route per the unit SOPs. Table 5-1 depicts examples of features, items, and personnel that should be marked. The unit places markings on the same side of the passageway, near the floor whenever possible. Mark the direction of travel out of the facility. This allows the clearing force to exit the facility rapidly if an evacuation is required. The unit relays the distance traveled, azimuth, and approximate incline or decline for every leg of the movement to the command post. The command post and clearing team leader should update the map constantly. This allows the surface elements to track and mark the progress of clearing teams.

Table 5-1. Chemical light marking

Sample: Chemical Light Marking
Note. When wearing night vision goggles, chemical lights appear as the same color.
Designated Color #1 - Cleared areas and exit routes.
Designated Color #2 - Casualties.
Designated Color #3 - Danger areas and potential threats.
Designated Color #4 - Coordination points.
Designated Color #5 - Stairs and vertical shafts.
Designated Color #6 - Outside coordination points.

5-28. The map should also include a navigational chart. This chart includes all of the facility information reported to the command post. Another chart to include is a "trip ticket" of every Soldier entering or exiting the facility. These two charts along with the map allow leaders to coordinate between elements and avoid fratricide. The location of the mapping team should be far enough behind the forward clearing teams so that they do not cause a noise or light discipline compromise.

5-29. Figure 5-5 depicts the layout of an underground facility with markings added to demonstrate where the clearing element might consider placing key markings as they clear the facility. For instance, markings might include MTA for main tunnel first room; CP for coordination point; L1 for first drift on the left; L2 for second drift on the left; L2A for first room in drift 2 on the left; and so on. Figure 5-6, page 5-10, depicts this facility as a sketch map as produced by the clearing elements mapping team.

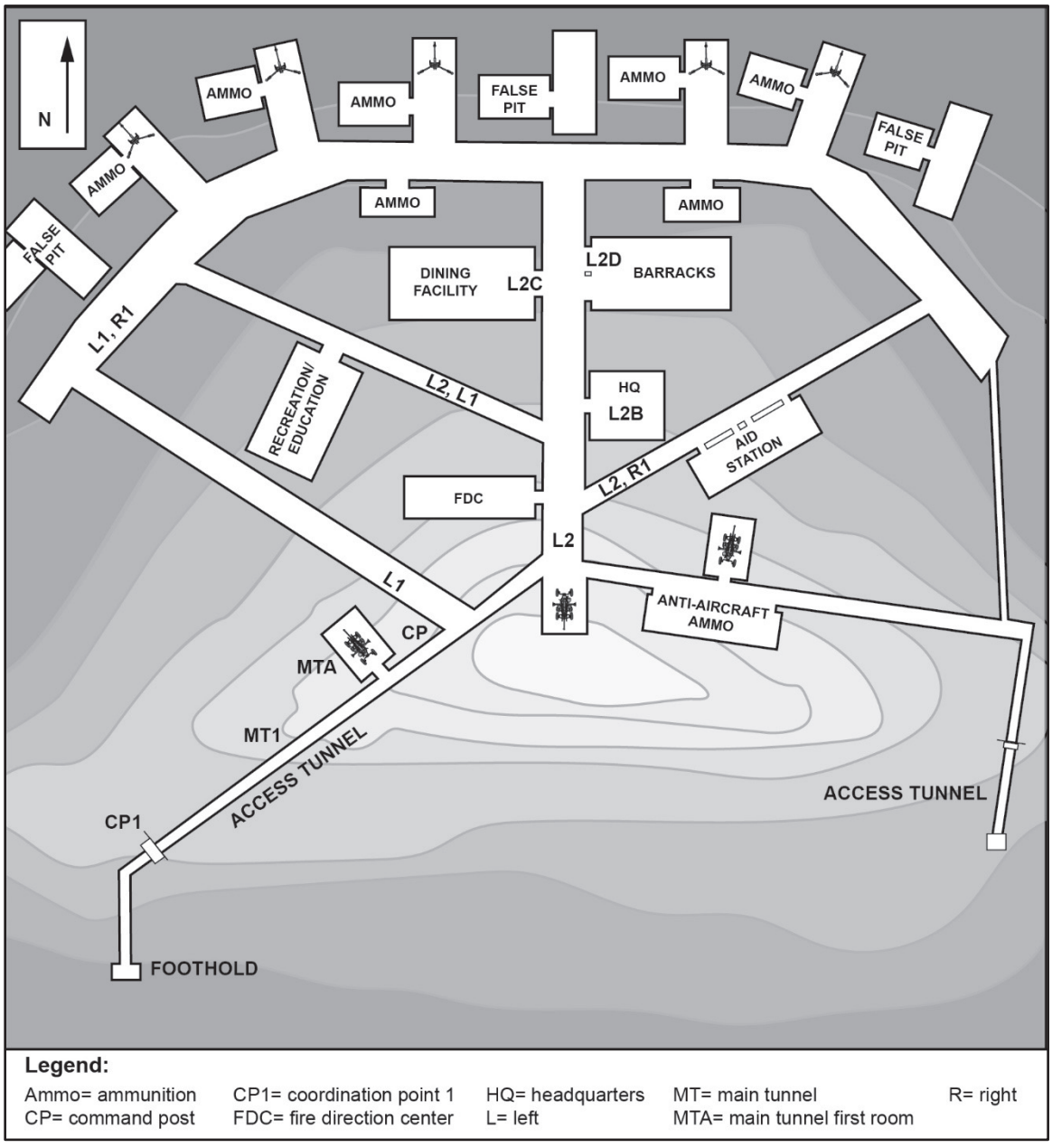


Figure 5-5. Mapping in subterranean operations

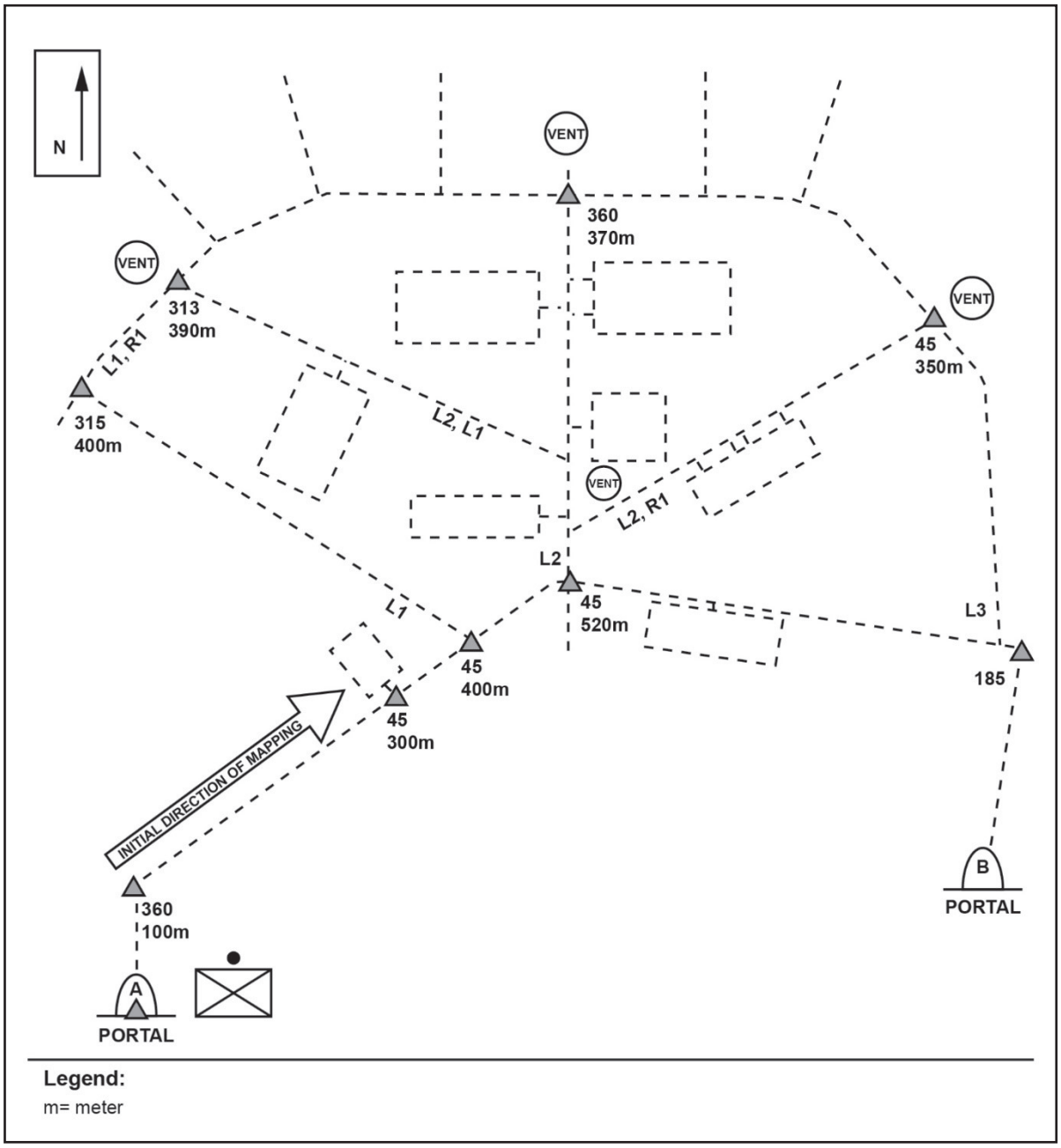


Figure 5-6. Sketch map in subterranean operations

REACT TO DIRECT FIRE CONTACT

5-30. When the enemy initiates direct fire contact, multiple actions take place simultaneously. The element in contact returns fire and seeks cover or positions their ballistic shields to provide as much cover as possible to the element. The element locates the enemy and places well-aimed fire on their position. While moving to seek cover, leaders should ensure the element maintains separation from the walls and avoids prone firing positions to reduce ricochet concerns. The leader assesses the situation and decides whether to stay in position (attack by fire), assault, or break contact. The squad leader makes this decision with multiple input factors to include the size of the enemy, distance and access to the enemy (for example, barricades and obstacles), and

any enablers (robots, dogs, and so forth), provided to the squad. If the squad makes contact, they should only consider assault if they have no choice or if the enemy force is small. Position the leader to provide effective control of their element. Figure 5-7 displays these actions. (Refer to ATP 3-21.8 for more information.) Muzzle awareness and having clear fields of fire are critical in confined space combat. In limited visibility situations, all Soldiers must know where they are in the formation and clearly understand their fields of fire. Tightly control the use of hand grenades, grenade launchers, and other explosives to reduce the possibility of blast overpressure injuries or fatalities.

Note. Ricochets typically follow a flat, hard surface (such as a wall composed of stone, concrete, or steel), so keep off the walls when moving.

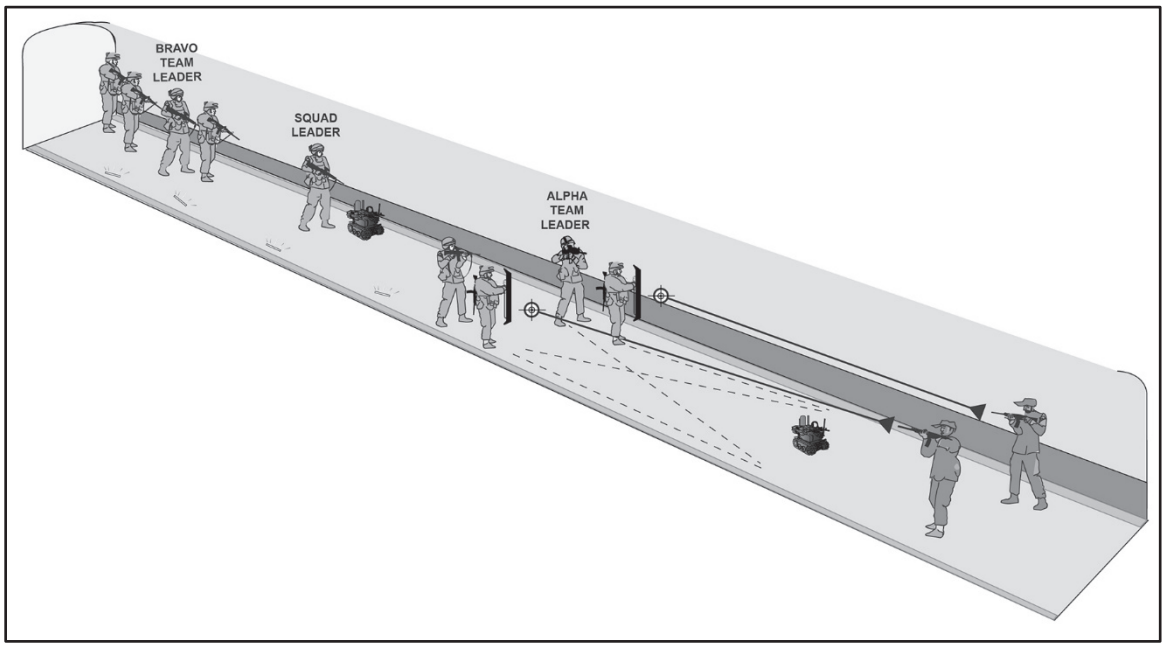


Figure 5-7. React to contact

PRINCIPALS OF CLOSE QUARTERS COMBAT

5-31. When expecting to make direct fire contact with the enemy in a subterranean space, the following principles may be helpful when planning and executing subterranean operations at the squad level:

- Surprise.
- Speed.
- Controlled violence of action.

5-32. Surprise is the key to a successful outcome in close quarters combat. The fire team or squad clearing the room, hallway, or other area must achieve surprise. The fire teams achieve this by deceiving, distracting, or startling an enemy. Even a few seconds of surprise can determine the success of a direct fire contact. Surprise is harder to attain when facing an alert, prepared, and well-trained enemy.

5-33. Speed provides a measure of security to the clearing unit. Speed does not mean a lack of caution, which could risk the Soldiers and the mission. It is the speed generated by a well-rehearsed force, confident in their battle drills, and mentally prepared to quickly engage and defeat an enemy element. Speed allows a unit to maximize their surprise over the enemy.

5-34. Violence of action refers to quickly eliminating or neutralizing the enemy while giving them the least chance of inflicting friendly casualties. The controlled violence of action is further defined to account for the

unique risks associated with the subterranean environment that includes possible CBRN caches, impacts on the air quality, and other sensitive equipment. Violence of action applies to the application of direct fire, maneuver, and the Soldier mindset. Along with surprise and speed, controlled violence of action facilitates the rapid and deliberate defeat of the enemy force.

CONDUCT SQUAD ASSAULT

5-35. Once the element has reacted to contact, the second option, listed above, is to conduct an assault. Clearing force leaders execute this battle drill when the squad has successfully located and suppressed the enemy positions and is numerically superior to the enemy. Leadership establishes a support by fire and an assault element. The support-by-fire element continues to suppress the enemy positions. The assault element fights through the enemy position using fire and movement. Soldiers only use pyrotechnics or smoke after accounting for the adverse air quality effects. (See appendix A for further discussion.) The squad then consolidates and reorganizes. Figures 5-8 and 5-9 show a squad assault. (See ATP 3-21.8 for more information.)

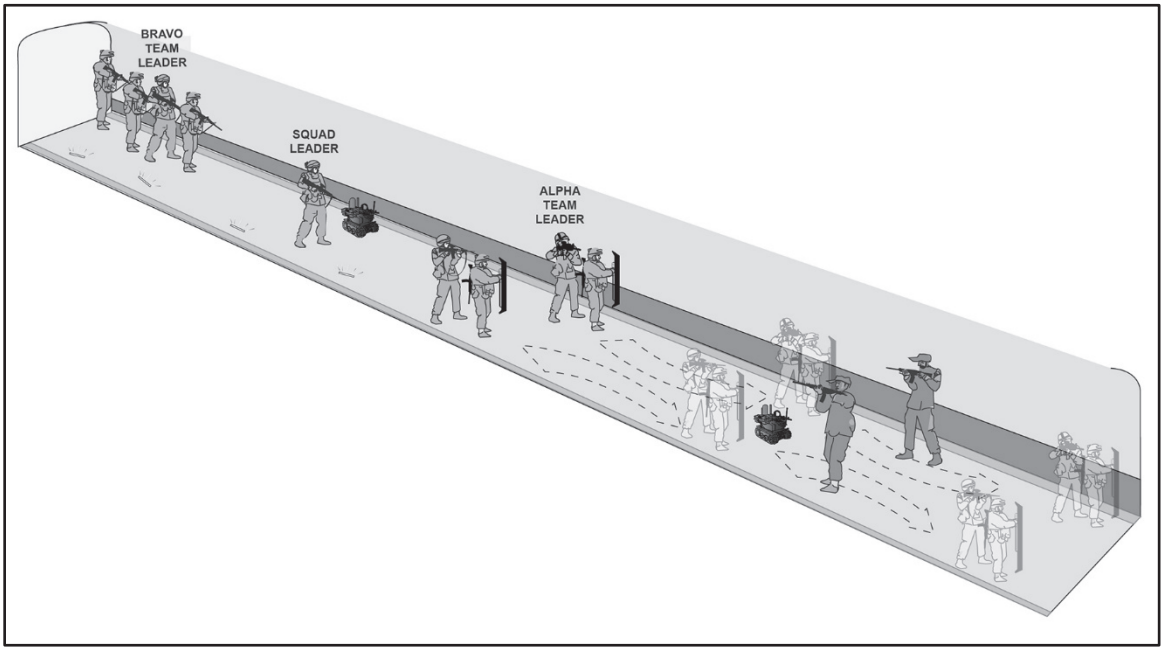


Figure 5-8. Squad assault (part I)

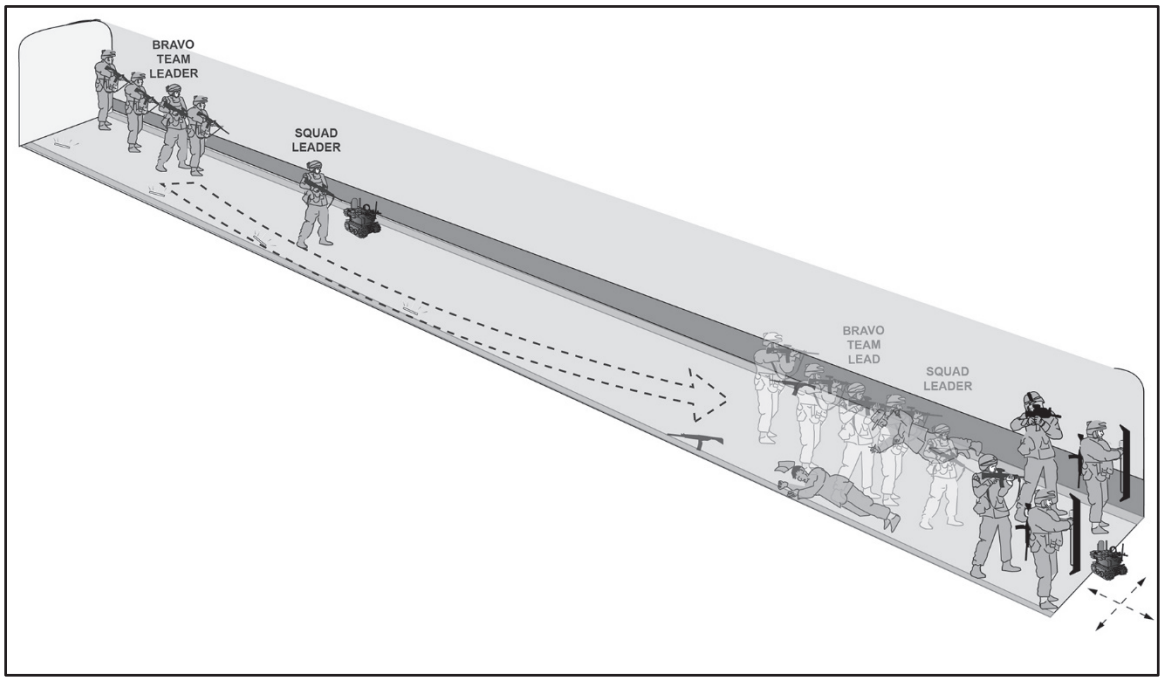


Figure 5-9. Squad assault (part II)

SQUAD BREAK CONTACT

5-36. Once the element has reacted to contact, the third option, listed above, is to break contact. Execute this battle drill when the leaders have determined the element has made contact with a larger force or cannot conduct an assault. The leader establishes base-of-fire and bounding elements. The base-of-fire element suppresses the enemy while the bounding elements move to occupy an overwatch position. The base of fire element continues to suppress the enemy until the bounding element occupies the overwatch position. Once occupied, the elements switch roles and continue until breaking contact or reaching an assigned position to conduct the next mission. The element with the ballistic shields should only bound back as far as the other element without passing it. This keeps the shields in between the element and the enemy, allowing the element to move cover while under some protection from the ballistic shield. The squad considers the use of pyrotechnics or smoke as long as the leadership takes steps to reduce its effects on the element. The squad then consolidates and reorganizes. Figures 5-10, page 5-14, and 5-11, page 5-14, show a squad breaking contact. (See ATP 3-21.8 for more information.)

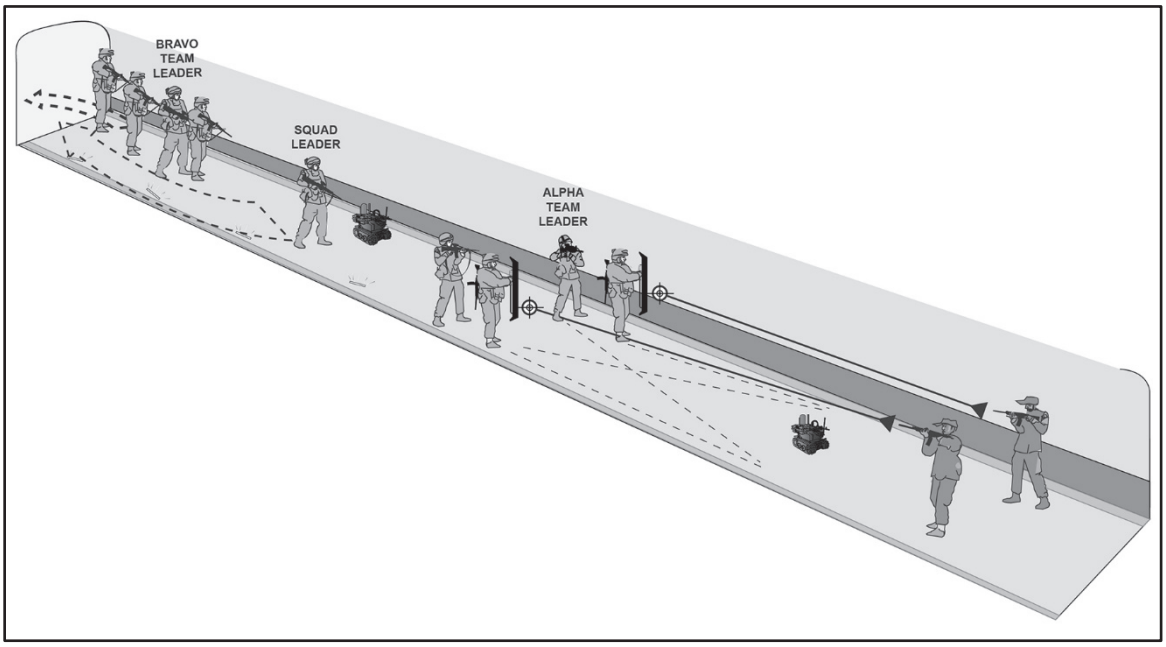


Figure 5-10. Squad break contact (part I)

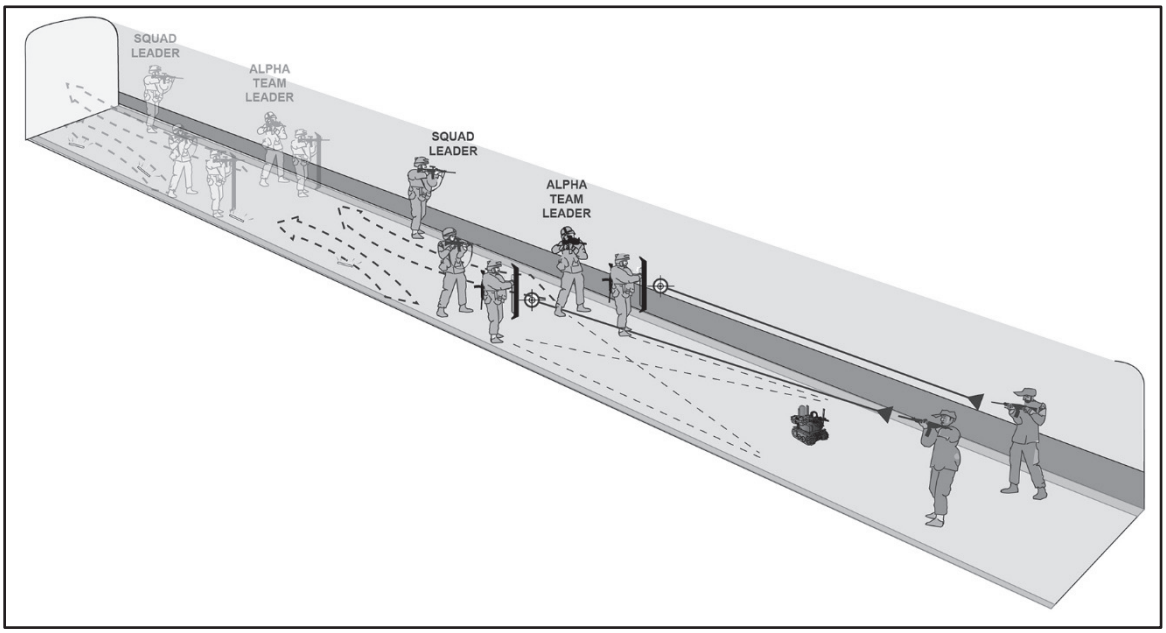


Figure 5-11. Squad break contact (part II)

REACT TO CONTACT (CBRN OR ATMOSPHERIC THREAT)

5-37. Oxygen sensors and CBRN detectors must be with the lead element at all times. Using these sensors on a robot, while still maintaining sensors on the lead, clearing team members is a good technique. However, each additional team in other parts of the subterranean system should maintain and use these sensors as well, since the atmospheric quality can vary drastically from one point to another. Monitor these sensors at all

times to identify dangerous changes in the environment. All personnel should be familiar with these devices, know how to react if an alarm goes off, and know the physical signs and symptoms of bad air quality. If a chemical or radiation alarm goes off, personnel should take immediate action per the unit's SOP. If an air quality alarm goes off (reduced oxygen), the lead element should mark that location and retrograde to the last security halt location and verify the readings on their sensors. After reacting to the alarm and reporting higher, the clearing element should take the appropriate, preplanned actions. These actions may include evacuating the passageway, increasing their MOPP level for a chemical threat, verifying alarm with an additional sensor system, or clearing their sensors and continuing (see figure 5-12). The clearing element should be prepared to conduct air monitoring for potential hazards at every internal door prior to conducting a breach. If CBRN threats are possible or likely, the clearing element should attempt to test the airflow around the door. If clearing a large underground facility, the clearing element should place oxygen sensors and a chemical detector with personnel located at control points to ensure continuous monitoring throughout the facility. See company and platoon CBRN requirements for additional information on the actions required when operating in a CBRN environment.

Note. The clearing element should not attempt to reduce or breach an airlock door within the underground facility unless they have been directed to do so and special equipment and technical specialists are present.

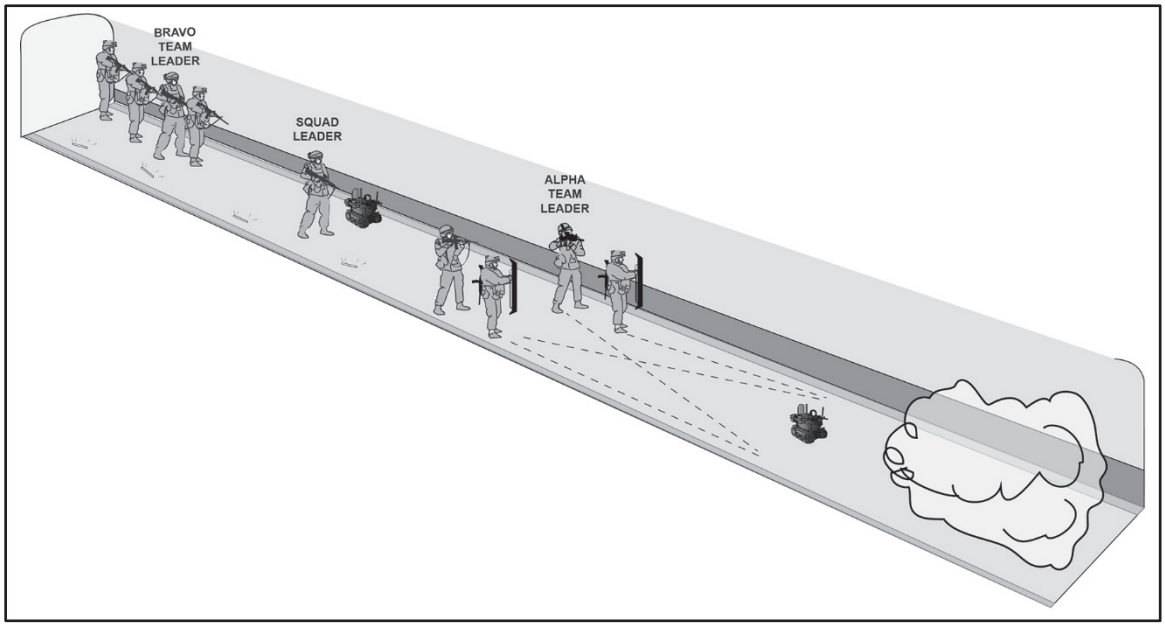


Figure 5-12. React to contact (CBRN or atmospheric threat)

5-38. The clearing team searches for signs or placards indicating of the function of the underground facility. Ordinarily, facility workers post these indicators on or around portals, or on routes near the underground facility. Figure 5-13 depicts some internationally recognized indicator markings. Units should attempt to familiarize their Soldiers with known CBRN placards and markings that are specific to their area of operations.

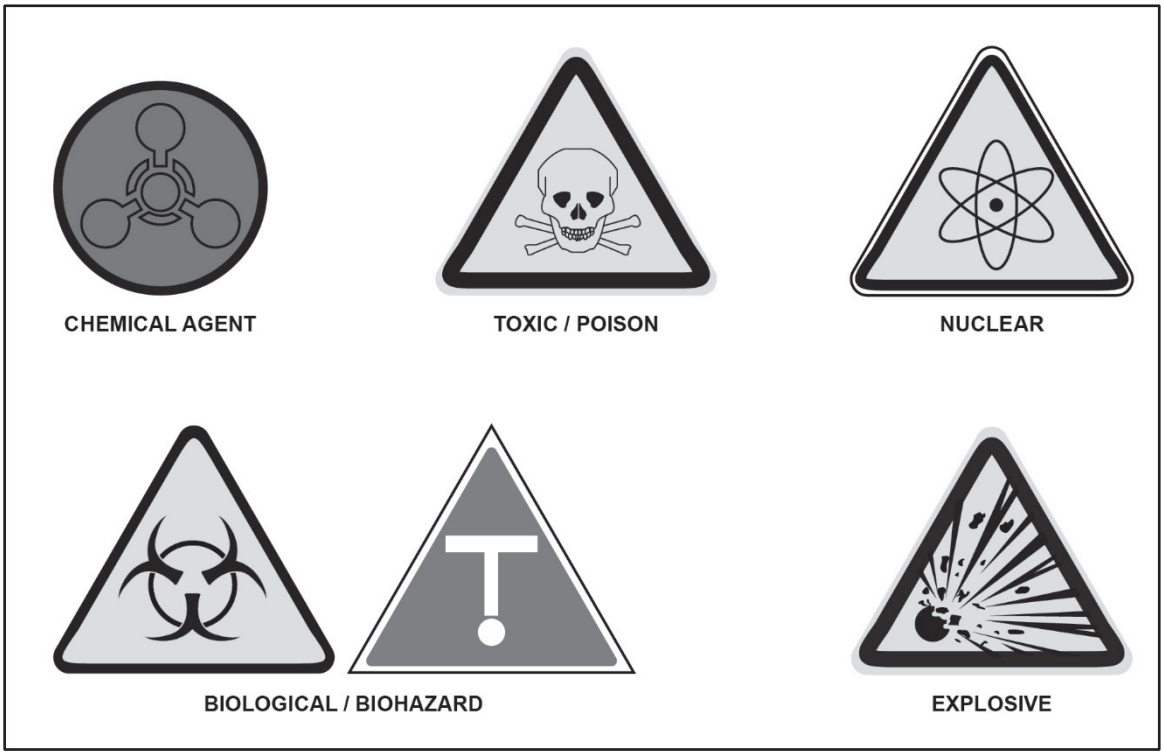


Figure 5-13. Internationally recognized signs

SUSTAINMENT CONSIDERATIONS

5-39. Resupply requirements and the potential for casualties increases as the subterranean operation continues. The clearing force uses available communications, such as radio, runner, or hard wire to request resupply or to coordinate for evacuation of casualties.

EVACUATE A CASUALTY

5-40. Casualty evacuation from within an underground facility can present substantial challenges to the clearing team. The clearing team should prepare to provide immediate treatment at the point of attack for multiple casualties and to extract casualties back outside to the CCP. Plan for and rehearse patient packaging and the use of manual lifts, carries, and litters prior to the execution of clearing operations. Plan for additional personnel and specialized subterranean rescue equipment to assist in casualty evacuation. Each member of the clearing team should carry extra medical supplies.

RESUPPLY AFTER ENTRY

5-41. The clearing teams should consider preparing resupply bundles prior to entry with resupply items that are critical to sustainment. Examples of supplies that can be prepared prior to execution include spare batteries for all equipment, ammunition, water, food, medical supplies, and breaching equipment. Many passageways are too small to support vehicle movement. Therefore, preconfigured supply bundles should be small enough to fit through tight spaces and light enough to be hand carried by a two-person team.

Chapter 6
Enabling Organizations, Obstacles, and Capabilities

This chapter describes additional capabilities, many of which are located at EAB, to consider prior to conducting subterranean operations. In addition, this chapter describes how to breach and mitigate obstacles encountered in subterranean systems.

ENABLING ORGANIZATIONS

6-1. BCTs operating in a subterranean environment require either support from enabling elements within their organization or requested through EAB. Combat engineers, MP, CBRN response teams, EOD units, and others provide critical capabilities to maneuver units.

CHEMICAL, BIOLOGICAL, RADIOLOGICAL, NUCLEAR

6-2. CBRN enablers exist at many levels, from battalion and brigade CBRN staff officers to CBRN units from platoon to brigade task organized as needed for the mission. CBRN staff officers provide expertise on CBRN threats and hazards and have the ability to reach out to EAB CBRN cells or other technical experts for advanced analysis and additional capabilities when needed. Hazard response companies have both mounted and dismounted CBRN reconnaissance, surveillance, and decontamination capabilities to support brigades during combined arms countering of WMD and subterranean operations. Area support companies may provide CBRN dismounted reconnaissance, surveillance, and decontamination support within theater and corps consolidation areas. Organizations above brigade, such as a CBRN response team or a nuclear disablement team are assets that may be available to assist the BCT with CBRN threats in a subterranean environment. Coordination for these assets occurs through division or other EAB.

6-3. While some basic CBRN detection capability exists at the individual Soldier level, this capability is limited to identification of a limited set of agents. CBRN reconnaissance personnel can detect and analyze a broad range of hazards, which include traditional chemical warfare agents, toxic industrial materials, toxic industrial chemicals, and nontraditional agents.

6-4. The CBRN reconnaissance platoon organic to the BCT is capable of assessment, identification, and monitoring of any WMDs and their precursors. Teams are equipped with CBRN monitors. The brigade engineer battalion has air quality monitoring capability with a commercial off-the-shelf gas monitor found in the urban operations platoon kit. IBCT dismounted CBRN reconnaissance platoons also retain commercial off-the-shelf gas monitors and an additional capability with the organic dismounted reconnaissance sets, kits, and outfits equipment set. For known or suspected WMD sites refer to ATP 3-90.40 which provides doctrine for WMD site exploitation.

Contamination

6-5. When exposed to contaminants, commanders must take all feasible precautions to mitigate the spread of contamination to other members of the unit, adjacent organizations, civilian population, and the environment. Reducing contamination and limiting the spread of cross-contamination during operations protects operational readiness of other units, the local civilian community and supports unified action partner interests. The following activities are examples of protecting the environment and the personnel operating in it from contamination:

- Marking contaminated areas, diverting friendly forces and civilians around or away from areas of possible contamination.
- Prohibiting the local civilian population from entering or exiting contaminated areas.

- Assessing the risk of cross-contamination internal to the site against time, security, and decontamination resources.
- Decontaminating personnel and equipment as near as possible to the contaminated site before they move.
- Decontaminating personnel and equipment before movement to a new location.
- Using engineer assets to prepare the site for destruction activities to mitigate and limit the spread of contamination.
- Conducting risk assessments on the environmental impacts of destroying, removing, transferring, and disposing of WMD and toxic industrial materials located on or off site.

Contamination Control Area

6-6. The contamination control area allows the BCT to process and decontaminate personnel exposed to liquid, solid, aerosol, or vapor CBRN agents. Units can modify procedures and equipment designed for CBRN agents for use with toxic industrial material and chemicals as well.

6-7. Preparing for a contamination control area is a function of contingency planning. The two focal points of the contingency planning process are identifying the need for contamination control areas and developing appropriate strategies for their implementation. Commanders decide whether to use fixed or mobile contamination control areas, or a combination of both. Planners and contamination control personnel develop procedures and designate areas for mask refurbishment, weapon decontamination and storage, and trash disposal. ATP 3-11.32/MCWP 3-37.2/NTTP 3-11.37, chapter 4, provides information that helps planners determine who is required to process through the contamination control area after CBRN incidents.

6-8. The contamination control station provides a radiological decontamination capability to personnel during a nuclear accident or an attack with a radiological source. The contamination control station must be available on-site beginning with the initial entry through completion of the BCT mission. A contamination control station must be established and operational when an expected or likely CBRN contamination risk exists. According to Department of Defense Manual 3150.08, all services use the designated contamination control station in response to a nuclear weapons incident. Services integrate with other entities for maximum unity of effort.

Decontamination

6-9. CBRN EAB enablers train to conduct all levels of decontamination. However, they are a limited resource asset. Therefore, successful protection against CBRN hazards involves training of contamination mitigation measures and decontamination tasks at individual and collective levels. Contamination mitigation starts with limiting or reducing exposure to CBRN hazard areas. Soldiers must be able to employ individual protection, use the warning and reporting system, mark contaminated areas to limit those exposed, and conduct decontamination.

6-10. The commander's risk assessment should address the four decontamination principles listed below and be considered during the planning an execution:

- Speed. Personnel should conduct decontamination as soon as possible.
- Need. Decontaminate only what is operationally necessary.
- Priority. Decontaminate the most mission essential items first.
- Limited area. Decontaminate as far forward as possible to limit spread to clean areas.

6-11. The four basic levels of decontamination are described below:

- Immediate. Immediate decontamination is a lifesaving measure that should be conducted as soon as possible by the individual, buddy, or crew. It includes skin decontamination, personal wipe down, operator wipe down, and spot decontamination. Train immediate decontamination as a battle drill following a CBRN attack. Conduct this drill at the point of contamination.
- Operational. Operational decontamination limits the spread of contamination, allows the force to continue operations within the contaminated area, and enables the freedom of maneuver. The tasks include MOPP gear exchange and vehicle wash down. Conduct operational decontamination in a

clean area close to the objective. Execute with organic capabilities, which includes a designated and trained team.

- Thorough. Thorough decontamination provides a reduction of risk that allows long-term MOPP reduction. The tasks include detailed equipment decontamination and detailed troop decontamination. Outside support from the CBRN unit is required. After a unit has completed operations on site, thorough decontamination—resource- and time-intensive—should take place.
- Clearance. Clearance decontamination is concerned with the decontamination of equipment and personnel upon temporary or permanent removal from an operation to a standard sufficient to allow unrestricted transportation, maintenance, employment, and disposal. Clearance decontamination is likely to be expensive in time and resources, because there is a need to comply with national and international standards for cross-border movement.

Note. Refer to ATP 3-11.32/MCWP 3-37.2/NTTP 3-11.37 for detailed information about planning, preparing, and executing decontamination operations.

Emergency Personnel Decontamination Station

6-12. Establish an emergency personnel decontamination station to support operations when expecting likely or potential exposure to CBRN contamination. These stations decontaminate personnel, equipment, and other enablers such as military working dogs. They also decontaminate casualties prior to removing their personal protective equipment to allow for further medical treatment. An emergency personnel decontamination station consists of a marked hotline, decontamination supplies, a contamination control line, and a rescue team. The emergency personnel decontamination station is not a substitution for Soldier decontamination procedures.

6-13. A team leader supervises the emergency personnel decontamination station with the assistance of two or more team members. Prior to entering a subterranean system with suspected WMD or toxic industrial chemicals, establish the emergency personnel decontamination station. The site should be outside the fragmentation range of any known or expected explosive hazards and CBRN threats preferably by at least 450 meters. The emergency personnel decontamination station team leader consults with EOD or CBRN enablers when adjusting these distances. The emergency personnel decontamination station must be set up in a contamination free area that is clear of brush, trees, and vegetation. When outdoors, the emergency personnel decontamination station must be upwind of the subterranean facility or incident location. Use a flat or gently sloping site so that contamination flows away from the known clean area.

6-14. As long as the site remains unused, move the emergency personnel decontamination station forward as the operation persists. Positioning the emergency personnel decontamination station forward minimizes contamination throughout the area of operations. Moving the emergency personnel decontamination station forward should be a deliberate and planned event, tied to checkpoints or other control measures. Procedures for establishing the emergency personnel decontamination station do not change. Monitor the new area before setting up the emergency personnel decontamination station.

6-15. A critical feature of the emergency personnel decontamination station is the hotline. It is an imaginary, clearly marked line separating the suspected contamination area from the contamination reduction area (warm zone) where decontamination begins. At the end of the emergency personnel decontamination station, use another clearly marked line to establish a clean area called the contamination control line. Carefully monitor this line to ensure casualties, personnel, and equipment are no longer in a potentially contaminated area prior to removing personal protective equipment. Use this line to establish the redress and treatment areas. Personnel do not cross the contamination control line until decontamination procedures and monitoring for residual contamination is complete. The contamination control line prevents personnel from crossing back into the contamination reduction area (warm zone) without the proper personal protective equipment.

6-16. The emergency personnel decontamination station team makes sure all personnel processing through the site comply with the following actions:

- Move into the wind as undressing progresses.
- Decontaminate and remove the most heavily contaminated items of clothing first.

- Remove all articles of clothing worn at the incident site.
- Remove the mask and hood last before crossing into the redress area.

6-17. The emergency personnel decontamination station team decontaminates as much of the personnel protection items and mission-essential equipment as possible. Technical decontamination is the planned systematic process of reducing contamination to a level that is as low as reasonably achievable and is the intended outcome of the emergency personnel decontamination station. When the military operations are complete, the area is marked as a contaminated area and prepared for further decontaminating.

EXPLOSIVE ORDNANCE DISPOSAL

6-18. EOD personnel provide capability to access, diagnose, render safe, recover, and dispose of explosive hazards or any hazardous material associated with an explosive ordnance disposal incident.

6-19. The EOD capability available to the BCT is a conventional EOD company, which consists of a headquarters platoon and three EOD platoons. Each platoon has three, two-Soldier EOD teams for nine teams per company. The headquarters may provide command and control for the subordinate platoons while providing the BCT staff with subject matter expertise on EOD, countering improvised explosive devices, and countering of WMD activities. Usually, each EOD platoon enables a maneuver battalion within the BCT.

Render Safe

6-20. The portion of the EOD procedures involving the application of special methods and tools to provide for the interruption of functions or separation of essential components of unexploded explosive ordnance to prevent an unacceptable detonation.

6-21. EOD forces provide capability to render safe all munitions containing explosives, nuclear fission or fusion materials, and biological and chemical agents.

6-22. CBRN forces alone do not have the capability to render safe unless integrated with EOD capabilities. Example is the chemical, biological, radiological, nuclear, and high-yield explosive response team or ad hoc integration. The interoperability of a hazards response company and EOD company, or BCT reconnaissance platoon and EOD platoon.

Detect, Identify, Evaluate, and Render Safe Explosive Ordnance, Improvised Explosive Devices and Other Explosive Hazards

6-23. EOD forces have the ability to identify chemical agents, biological agent precursors, radiological isotopes, and nuclear weapon systems. The teams are able to collect samples for further analysis, perform leak seal and packaging of chemical and biological munitions, perform render-safe procedures, and conduct emergency personnel decontamination activities for EOD personnel.

6-24. Integrate EOD forces, along with other critical enablers, into maneuver unit plans, rehearsals, and movements to provide their capability to maintain freedom of action and preserve combat power.

MILITARY POLICE

6-25. Each BCT has an organic provost marshal cell that is responsible for the planning, integration, and employment of MP assets task organized to the BCT. Military police serve as a significant force enabler and provide unique technical capabilities through the execution of MP disciplines that include security and mobility support, policing, and detention (see FM 3-39). The supported commander prioritizes the efforts of the MP assets and optimizes their unique technical capabilities to support the overall effort. Military police conduct police intelligence which supports the operations process and protection supporting tasks by providing police information and intelligence to enhance situational understanding, protect the force, and enable rule of law (see ATP 3-39.20). The detention, security, and mobility support disciplines enable the BCT activities in a subterranean environment and along lines of communication in the area of operations.

Detainee Operations

6-26. Military police personnel provide capabilities that are required for handling detainees. Detainee operations is a broad joint term that encompasses the capture, initial detention, screening, transportation, treatment and protection, housing, transfer, and release of the wide range of persons who could be categorized as detainees. The term detainee includes any person captured, detained, or otherwise under the control of Department of Defense personnel (JP 3-63).

6-27. Military police support BCTs by employing detention technical skills at the brigade detainee collection point. At the collection point, place detainees in a location where U.S. armed forces can fulfill legal and policy requirements for detainee treatment and administration. The senior officer of a supporting MP unit (company commander or platoon leader) serves as the officer in charge of the detainee collection point. When there are no supporting MP units controlling the detainee collection point, the BCT provost marshal advises the BCT and subordinate commanders. Treat detainees humanely according to governing laws, regulations, and policy. The provost marshal provides oversight of detainee operations.

Security and Mobility Support

6-28. Security and mobility support is a MP discipline conducted to protect the force, noncombatants, and preserve the commander's freedom of action. MP units expedite the secure movement of theater resources to ensure that commanders receive the forces, supplies, and equipment needed to support the operational plan and changing tactical situations. Throughout all aspects of the security and mobility support discipline, MP units conduct proactive measures to detect, deter, and defeat threat forces operating within the area of operations. Primary tasks of security and mobility support that enables BCT's in subterranean environments include support to mobility, area security, and military working dogs. (See ATP 3-39.30 for additional information on security and mobility support.)

Military Working Dogs

6-29. The advantages of using military working dogs include their ability to detect explosives and personnel as well as their ability to distract enemy personnel during the clearing process. Using military working dogs to interdict humans can have a powerful psychological effect over the enemy. However, the lack of airflow (reduced detection capability), ambient light, and confined spaces may overwhelm some military working dogs' senses. Leaders and staffs weigh military working dog capabilities against their potential vulnerabilities such as poor air quality, disorientation from an enclosed and unfamiliar environment, and susceptibility to booby traps when planning operations. Commanders and staff should also be familiar with, and plan for, necessary work and rest cycles for the animals and their handlers to preserve their effectiveness. Some of the potential uses for military working dogs include the following:

- Route clearance.
- Portal detection sweeps.
- Camera clearance inside the facility.
- Distracting enemy forces in defensive positions during the clearing process.
- Internal detection sweeps during clearance and site exploitation.

6-30. Screen, and then train, military working dogs to identify which ones can operate in a subterranean environment. Specialized subterranean training for military working dogs should include environmental generalization, overcoming distractions (gunfire, breaching, and explosions), tactical movement, and team integration (discriminating between friendly and enemy forces). Appendix A discusses medical first responder considerations when employing working dogs. Integration of military working dogs into tactical training events as often as possible helps to mitigate these multiple distractors. (See ATP 3-39.34 for additional information on military working dogs.)

Critical Asset Security

6-31. *Critical asset security* is the protection and security of personnel and physical assets or information that is analyzed and deemed essential to the operation and success of the mission and to resources required for protection (ADP 3-37). Military police performing critical asset security can detect and defeat level I and

level II enemy threats, while delaying level III threats. Military police enhance local security and mobility measures to protect critical facilities and property by establishing checkpoints, entry control points, observation posts, and providing response forces. MP units also provide in-transit security to protect friendly routes, convoys, and personnel throughout the depth of the battlefield. The skills generated from critical asset security enables MP to assist commanders in subterranean areas by providing an economy of force to secure critical assets, while maneuver forces on engaging enemy forces in close combat. (See ATP 3-39.30 for additional information on MP support.)

ENGINEERS

6-32. Engineer missions in the subterranean environment are similar to those in other land environments. Engineers employ mechanical, ballistic, thermal, and specialized explosive techniques and tools to enable the maneuver force to move and maneuver into and in subterranean areas. When anticipating obstacles, planning considerations must account for attrition of BCT engineers during movement and maneuver to the subterranean location. By requesting EAB engineer units in advance, units can incorporate them into their rehearsals. EAB platoons and squads from the sapper, mobility augmentation, and clearance companies have specific urban operations and blasting demolitions kits used for mechanical, thermal, and explosive breaching.

6-33. Engineer reconnaissance teams, which may include military working dogs, accompany maneuver force reconnaissance elements to collect details about the point of penetration. Engineers use the instrument set, reconnaissance and surveying digital tool set (common name: ENFIRE) to determine point of penetration dimensional data. Thorough technical reconnaissance fulfills information requirements the breach element needs to identify primary and alternate obstacle breach methods and locations.

6-34. Engineer reconnaissance teams can provide direction and distances in total darkness employing tools in the reconnaissance and surveying instrument set. The teams can provide BCT leaders with the information required to map the facility and provide critical information to update command and control systems. The follow-on force, technical, and exploitation formations use this information. Engineer survey and design detachments can create and directly import technical drawings into command and control systems that depict a common operational picture.

6-35. Once secured, survey and design teams provide specialized reconnaissance of the subterranean system. Geospatial engineers receive this information and then update the common operational picture for the maneuver forces.

INTELLIGENCE

6-36. Intelligence operations are the tasks undertaken by military intelligence units and Soldiers to obtain information to satisfy validated requirements (FM 2-0). Information requirements needed to conduct operations in subterranean environments are similar to those needed to conduct operations on surface terrain. However, the restrictive nature of subterranean environments to collection may call for the extensive use of multiple intelligence disciplines to answer information gaps. For example, the structure of a subterranean system may be unknown due to limited, direct, physical access to the system. Commanders and staffs must understand the organic and nonorganic information collection systems and intelligence disciplines to determine which of these assets may be useful to answer their subterranean information gaps.

6-37. The use of redundant and mixed collection assets can provide an accurate assessment of threat composition, disposition, and courses of action. Additionally, redundant and mixed collection assets can cue one another for further collection opportunities. An example is using remote sensors to cue overhead collection assets to determine underground facility activity.

Intelligence Discipline Support to Subterranean Operations

6-38. During operations, units organize the intelligence collection activities using the intelligence disciplines. They employ single-source capabilities alongside other means of information collection (reconnaissance, surveillance, and security operations). The intelligence disciplines are defined methods of intelligence collection, processing, exploitation, and reporting that use specific categories of technical or human resources. Utilizing the intelligence disciplines to support subterranean operations is critical to understanding all aspects that may influence mission success. The intelligence disciplines are—

- Counterintelligence.
- Geospatial intelligence.
- Human intelligence.
- Measurement and signature intelligence.
- Open-source intelligence.
- Signals intelligence.
- Technical intelligence.

Counterintelligence

6-39. Counterintelligence counters or neutralizes intelligence collection efforts through collection, counterintelligence investigations, operations analysis, production, and technical services and support. Counterintelligence includes all actions taken to detect, identify, track, exploit, and neutralize the multidiscipline intelligence activities of foreign intelligence and security services, international terrorist organizations, and adversaries, and is the key intelligence community contributor to protect U.S. interests and equities. BCTs receive counterintelligence support through augmentation from higher echelons. (For additional information on counterintelligence, see ATP 2-22.2-1.)

Geospatial Intelligence

6-40. *Geospatial intelligence* consist of the exploitation and analysis of imagery and geospatial information to describe, assess, and visually depict physical features and geographically referenced activities on the Earth. Geospatial intelligence consists of imagery, imagery intelligence, and geospatial information (JP 2-03). Geospatial intelligence is critical to gaining an understanding of terrain and its effects on friendly and threat operations.

6-41. The BCT geospatial intelligence cell is comprised of geospatial imagery analysts and geospatial engineers who provide commanders with a more complete picture of the physical environment and infrastructure in the operational environment. The advantages of the geospatial intelligence cell include centralized geospatial intelligence production, synchronization of effort, and maximization of geospatial imagery analyst and geospatial engineer skills (ATP 2-19.4).

6-42. Geospatial intelligence assists in developing analytic conclusions on the threat's use of terrain and the impacts it may have on friendly and threat operations. Geospatial intelligence also assists in the identification of subterranean system indicators. Determining indicators of the threat's use of subterranean environments—such as the location of portals and identifying manmade changes to physical terrain—are essential to gaining an understanding of the threat's utilization of subterranean environments in the area of operations. Multiple platforms and systems collect information to assist in the creating of geospatial intelligence. (For additional information on geospatial intelligence, see ATP 2-22.7).

Human Intelligence

6-43. *Human intelligence* is the collection by a trained human intelligence collector of foreign information from people and multimedia to identify elements, intentions, composition, strength, dispositions, tactics, equipment, and capabilities (ADP 2-0). Human intelligence uses human sources and a variety of collection methods, both passive and active, to collect information to satisfy the commander's requirements and cue other information collection assets.

6-44. Human intelligence can assist in collecting critical information pertaining to subterranean systems. When other disciplines do not have the capability to answer information gaps, human intelligence may be able to gather the required information. For example, displaced persons or defectors may have critical information pertaining to the threat's use of subterranean environments or the threat composition and disposition in these environments. (For additional information on human intelligence, see ADP 2-0.)

Measurement and Signature Intelligence

6-45. *Measurement and signature intelligence* is information produced by quantitative and qualitative analysis of physical attributes of targets and events to characterize, locate, and identify targets and events,

and derived from specialized, technically derived measurements of physical phenomenon intrinsic to an object or event. (JP 2-0).

6-46. Like geospatial intelligence, measurement and signature intelligence can assist in developing analytic conclusions on the threats use of terrain and the impacts it may have on friendly and threat operations. Measurement and signature intelligence can provide information used to determine enemy operations, construction efforts (tunnels and portals), hazardous areas (minefields and obstacles), and early indications of enemy foot and vehicle movements, and possible staging areas. Measurement and signature intelligence is also useful in determining if underground facilities are active, inactive, and developing a baseline of activity in the immediate area. (For more information on measurement and signature intelligence, see ATP 3-22.8).

Open-source Intelligence

6-47. *Open-source intelligence* is relevant information derived from the systematic collection, processing, and analysis of publicly available information in response to known or anticipated intelligence requirements (JP 2-0). Two important related terms are—

- Open source, which is any person or group that provides information without the expectation of privacy. Open source information does not protect the information and its relationships from public disclosure.
- Publicly available information, which is data, facts, instructions, and other published or broadcast material for general public consumption. It is available on request to members of the public, lawfully seen or heard by any casual observer, or made available at a meeting open to the public.

6-48. Information on many of the world's subterranean systems may be available through publically available information. This includes but is not limited to—

- Blueprints.
- Architectural drawings and renderings.
- Information papers and briefs.
- Photographs.
- Imagery.
- Maps of natural and urban terrain.
- Land and geological surveys.
- Cave and cavern surveys.

6-49. Publically available information on military subterranean systems may be limited. In these instances, it may be necessary to utilize other intelligence disciplines in conjunction with open-source intelligence to answer information gaps. For example, if through open-source reporting it is determined that a threat underground facility is located at location X, the use of another intelligence discipline such as signals intelligence may be able to confirm the information.

Note. All open-source activities performed by intelligence personnel must comply with the legal restrictions in Executive Order 12333, DOD 5240.1-R, and AR 381-10. (For additional information on open-source intelligence, see ATP 2-22.9).

Signals Intelligence

6-50. *Signals intelligence* is intelligence derived from communications, electronic, and foreign instrumentation signals (JP 2-0). Signals intelligence provides unique intelligence information, complements intelligence derived from other sources, and is often used for cueing other sensors to potential targets of interest. For example, signals intelligence, which identifies an activity of interest, may cue other information collection assets to confirm that activity. Conversely, changes detected by other information collection assets can cue signals intelligence collection against new targets.

6-51. When conducting subterranean operations, signals intelligence can also assist in identifying the location, composition, and disposition of threat forces as well as command and control nodes associated with

threat units, organizations and other entities. As mentioned previously, signals intelligence complements intelligence derived from other sources and can cue other sensors to confirm threat activity. Due to the restrictive terrain of subterranean environments, signals intelligence capabilities may be limited due to electromagnetic spectrum interference. In these instances, it is important to use other intelligence disciplines in conjunction with signals intelligence. (For additional information on signals intelligence, see ATP 2-22.6-2.)

Technical Intelligence

6-52. *Technical intelligence* is intelligence derived from the collection, processing, analysis, and exploitation of data and information pertaining to foreign equipment and materiel for the purposes of preventing technological surprise, assessing foreign, scientific, and technical capabilities, and developing countermeasures designed to neutralize any adversary's technological advantages (JP 2-0). BCTs can request technical intelligence support from EAB.

6-53. Like other intelligence disciplines, technical intelligence can cue other assets and resources when conducting subterranean operations. It can track individuals, refine targeting information, and to tie enemy activity to known threat networks (For more information on technical intelligence, see ATP 2-22.4). The use of technical intelligence can assist in determining how threats use technology and tactics in support of subterranean environment infrastructure. This includes but is not limited to—

- Providing indications and warning of threat characteristics.
- Information on weapon systems.
- Threat use of communication systems.
- Threat use of ventilation and other life support systems.
- Threat use of communication systems.
- Threat use of pumping systems.
- Threat use of power and lighting systems.
- Threat use and type of entries to include blast doors.
- Threat use of technology for mobility in subterranean environments.

CYBERSPACE AND ELECTRONIC WARFARE OPERATIONS

6-54. Cyberspace and electronic warfare are pervasive and enabling operations every commander must understand and integrate within all operational processes. Cyberspace is a global domain within the information environment consisting of the interdependent networks of information technology infrastructures and resident data, including the internet, cyberspace and telecommunications networks, computer systems, and embedded processors and controllers (JP 3-12). The term electronic warfare refers to military action involving the use of electromagnetic energy and directed energy to control the electromagnetic spectrum or to attack the enemy (JP 3-13.1). Commanders must recognize the proliferation of cyberspace and electronic warfare capabilities (both friendly and threat) and the impact of these capabilities on operations (FM 3-0). FM 3-12 provides overarching doctrinal guidance and direction to Army commanders for planning, integration, and synchronization of cyberspace and electronic warfare using cyberspace electromagnetic activities in unified land operations.

Authorities and Capabilities of Cyberspace and Electronic Warfare Operations

6-55. Within the Army force structure, every organization has the integral task and ability to conduct cyberspace security but only select organizations have the authority to conduct cyberspace operations. *Cyberspace operations* are the employment of cyberspace capabilities where the primary purpose is to achieve objectives in or through cyberspace (JP 3-0). Cyberspace operations include both offensive cyberspace operations and defensive cyberspace operations. Army units that conduct defensive cyberspace operations operate within Army authorities and are requested and tasked through Army channels. Though there are specific Army units that conduct offensive cyberspace operations, they do so only under joint operational authorities. Units conducting subterranean operations request offensive cyberspace operations effects through joint operations authorities.

6-56. Organic electronic warfare assets and capabilities typically reside within corps, divisions, and brigades. Army forces conduct cyberspace operations and electronic warfare as part of or in direct coordination with the joint force. Army forces may conduct offensive cyberspace operations, defensive cyberspace operations, and electronic warfare with Army force organic or joint requested effects to support the joint commander's intent. (See JP 3-12 and JP 3-13.1 for more information.)

6-57. To an ever-increasing degree, activities in the information environment are inseparable from ground operations (FM 3-0). When planning for cyberspace or electronic warfare operations in the subterranean operational environment, commanders must bear in mind the effects, capabilities, constraints, limitations, and types of cyberspace and electromagnetic environments they may encounter. They do this during mission analysis through IPB and information collection to build situational understanding of the cyberspace environment.

Identifying Networks

6-58. During mission analysis, the planning staff identifies possible networks within or effecting the subterranean area of operations. Commanders must plan for the capture of subterranean networks and ensure they operate within granted authorities when considering COAs. The staff must consider the following potential networks in the operating environment.

Interconnected Networks

6-59. An interconnected network is a network that conducts electronic transfer of information to other systems within the network through either direct-wired connections or wireless connections utilizing the electromagnetic spectrum. An example of an interconnected network is an adversary command and control network used throughout the threat forces' battlespace similar to the department of defense information network, the global Department of Defense critical warfighting network.

Stand-alone Networks

6-60. A stand-alone network is an internal network not connected to any outside sources for electronic transfer of information. This may be a single computer or multiple, internally networked systems with no outside connectivity. An example may be a supervisory control and data acquisition network to control power or water within the subterranean operational environment.

Unknown Network

6-61. Units may encounter networks on the objective without having any indication from IPB that those networks exist. Staffs must plan for and develop COAs and SOPs for action upon discovery depending on whether the unknown network is interconnected or stand-alone.

Planning Cyberspace and Electronic Warefare Operations

6-62. There are several indicators of threat forces' cyberspace and electronic warfare operations to observe when conducting IPB for subterranean operations. Cyberspace and electronic warfare operations require a power source and, in the case of an interconnected network, a conduit to external portions of the network. Indicators to observe include internal or external power generation in conjunction with various antenna or fiber optic cabling extending from the subterranean facility. In the case of a stand-alone network, there may be no external system indicators.

6-63. Execution of cyberspace operations potentially has a long lead-time due to the requirement of approval by legal and policy authorities or restrictions placed upon the forces that conduct the effects or actions. Cyberspace operations require significant external coordination for any operation not contained within the commander's area of operations. As the requesting organization, commanders focus on the desired effects or actions and not the means to achieve the effect.

6-64. Consider including offensive cyberspace and defensive cyberspace operations during planning. Offensive cyberspace operations are cyberspace operations intended to project power by the application of force in or through cyberspace (JP 3-12). Army units plan, integrate, and synchronize offensive cyberspace operations to create and achieve effects to support the commander's objectives as part of the operations

process outside of the department of defense information network. Commanders conducting subterranean operations should consider requesting offensive cyberspace operations effects. Offensive cyberspace operations provide destruction, disruption, degradation, or deception to cyberspace-networked systems. Systems to affect may include any networked security measures in place such as cameras, motion-detecting devices, and alarms. See FM 3-12 for more information on effects outside of the department of defense information network.

6-65. Defensive cyberspace operations are passive and active cyberspace operations intended to preserve the ability to utilize friendly cyberspace capabilities and protect data, networks, net-centric capabilities, and other designated systems (JP 3-12). Defensive cyberspace operations are internal defensive measures or responsive actions to a specific threat to the Department of Defense information network. As such, commanders would only request defensive cyberspace operations if they discovered unauthorized activity, alerts, and other threats against the Department of Defense information network.

6-66. If the commander desires offensive cyberspace operations or defensive cyberspace operations, collection plans are coordinated and synchronized though intelligence personnel. Submit requests for cyberspace effects by utilizing the cyber effects request format. (For more information and an example of the cyber effects request format, see FM 3-12.).

6-67. Electronic warfare considerations for subterranean operations focus on site security. Threat forces may employ remote detonated explosive hazards to disrupt movement around and inside subterranean facilities. Commanders integrate electronic warfare devices into clearing and exploitation forces to prevent remote detonation of explosive hazards. Additionally, commanders should augment security forces with electronic warfare assets to detect additional threat forces that may attempt counterattacks to retake subterranean facilities. To monitor for counterattacks, place electronic warfare assets at observation posts with clear line of sight of avenues of approach to maximize detection range against threat emitters. Do not collocate radio systems such as retransmission sites with electronic warfare assets due to systems interference that decreases both the capability of electronic warfare assets to detect threat emitters as well as friendly radio transmissions.

Actions on the Objective When Encountering Network Assets

6-68. Subterranean forces encountering a stand-alone or previously undetected network or network assets during the conduct of operations must execute planned COAs immediately upon discovery. The following bullets describe three potential scenarios friendly forces may encounter:

- Threat forces completely abandon all subterranean network assets leaving the network fully accessible to friendly forces.
- Threat forces physically destroyed all network assets. Cyberspace forensic examination may still extract data from the network even if all hardware is physically destroyed.
- Threat forces only destroy data within the network or network asset. As with physical destruction, cyberspace forensic examination may still extract data from the network.

6-69. In all cases, physical security of the threat network is paramount. Additionally, subterranean forces must not make any digital connection to the threat force's network prior to digital forensic examination by qualified cyberspace forensic assets. Commanders may request cyberspace assets to conduct network exploitation as the requested cyberspace assets deem fit.

MITIGATING OBSTACLES IN A SUBTERRANEAN ENVIRONMENT

6-70. Breaching in a subterranean environment is a complicated task. Units should train to conduct mechanical, ballistic, thermal, and explosive methods. Explosive breaching is the least preferred method in a subterranean facility due to overpressure, shockwave propagation, air contamination, loss of visibility, and potential to collapse the passageway.

MECHANICAL

6-71. Mechanical breaching is structurally destroying the portal to cause its lock or hinges to fail by using sledgehammers, bolt cutters, crowbars, picket pounders, or even an armored vehicle to create a breach. The building material of the door is critical in determining the effectiveness of mechanical breaching. With some

doors, the methods of mechanical breaching are very slow. Therefore, units should anticipate enemy counteraction to the breach. Breaching fragile doors using a sledgehammer is effective and rapid. If possible, breach sturdy doors by hooking a cable to a vehicle. Both of these techniques minimize collateral damage and maintain the element of surprise. Plan mechanical breaching as a backup to a ballistic or explosive breaching on outer portals.

6-72. The engineer urban operations platoon and squad kits include tools such as radial saws and hydraulic screw cutting equipment that can tear through or reduce metal and reinforced barricades. Facility type, construction, and hazards may eliminate the ability to conduct an explosive breach; therefore, leaders may direct the entry team to conduct entry using urban operations tool kits. Cut off saws provide a rapid means to cut through metal such as exposed hinges, protective lock sleeves and locks. The hydraulic, screw cutting tool provides the ability to cut, tear, or shear metal without spark. The entry team can target exposed hinges, protective lock sleeves, and locks. Other mechanical entry techniques include the use hand tools such as hooligan tool, bolt cutters, door rams, and sledgehammers to destroy light metal, wooden or chain locked gates. These items require little training, special handling, or protective equipment, and brigade formations have specific kits and tools in limited quantities. Increased demands in the subterranean environment may require a higher density of these tools to meet mission requirements.

6-73. Construction or maintenance equipment may also provide capabilities to support obstacle reduction. When feasible, use bulldozer blades to shear lock systems and protective lock sleeves. Winches may be able move nonexplosive obstacles from an entry site. Considerations include terrain, operator skill, size of the equipment, winch system strength, and time available. Depending on size of the tunnel, this equipment may provide cover for friendly forces. Units must incorporate nonstandard entry techniques in training for subterranean facilities.

BALLISTIC

6-74. Ballistic breaching uses a projectile weapon to create a breach, to include shotguns, shoulder-launched munitions and close combat missiles. Direct a ballistic breach against a wall, a door, or a window. Normally, Soldiers execute door breaches from close distances. It is preferable to use precision fires to destroy either the latch and lock or hinges of the door. This minimizes collateral damage, quickly opens most doors, and allows for rapid entry of the room. Shooting the latch and lock of a door is easiest as it requires fewer shots and is easy to target. Whereas, hinges may be hidden from the outside and require more shots.

THERMAL

6-75. Thermal entry techniques use cutting torches to create the breach by producing extremely high heat to melt or burn the barricade. This form of breaching is most effective on locks and hinges, but is also very slow and deliberate.

6-76. Thermal breaching provides commander’s with an additional breaching method. There is a number of cutting torch options, some of which may be resident in the unit maintenance sections. As with other breaching methods, cutting torches require careful consideration prior to use. Operators must be trained, have the equipment, possess sufficient quantity of expendable materials and gas, have the required protective equipment (such as a self-contained breathing apparatus), and an environmental awareness of ignition threats. Thermal breaching, in most cases, quickly depletes oxygen levels and creates noxious gases that may be harmful in enclosed and underground spaces. This method may not be practical when facing a hardened facility and speed is important.

THERMAL BREACHING IN CONFINED SPACES

The use of thermal cutting tools in confined spaces produces noxious fumes not filtered by the protective mask. Exercise extreme caution when cutting in confined spaces. Exclude using gas-powered torches in confined spaces from plans unless compressed air or oxygen (self-contained breathing apparatus) is available. Draw contaminated air away from a concentrated area using fans or other methods.

Explosive

6-77. Explosive entry techniques use explosives to reduce obstacles. Explosive entry is fast and effective, but inherently high risk to everyone inside the confined space. Explosives are an effective means of entry to exterior barricades. Engineers with training in explosive entry techniques execute these tasks using the blasting demolitions kit and other techniques taught in the urban mobility breaching course. Explosive breaching inside of a subterranean space creates over pressurization that can have debilitating or lethal effects on personnel. Deliberately plan minimum safe distances before using explosives.

EXPLOSIVES IN CONFINED SPACES

Explosive breaching in confined spaces creates overpressure and shock waves that travel along walls and around corners. This effect is deadly and may require evacuation of all personnel from the underground facility prior to initiating the explosive breach.

Bypass

6-78. Some obstacles (blast protection doors) are simply too resource intensive to allow entry techniques described above. In these cases, it may be practical and appropriate to create alternate entry points with heavy equipment or hand tools. Place and maintain security when bypassing an obstacle that the enemy may use as an avenue of approach, such as a level 3 barricade.

Persistent Surveillance

6-79. When bypassing subterranean areas, employ persistent surveillance to notify maneuver forces of potential enemy forces or other movement. Persistent surveillance systems enable friendly forces to maintain freedom of mobility while simultaneously maintaining situational awareness of the bypassed subterranean areas. Soldiers, sensors, or other methods may provide this surveillance.

6-80. The Spider networked munition system may provide early warning with its trip line sensors and can employ lethal and nonlethal munitions. The Spider networked munition system can employ man-in-the-loop antipersonnel capability. In addition, the Spider can control and initiate demolitions and provide tactical obstacle effects in restricted terrain by remotely initiating explosive obstacles. (See ATP 3-90.8 for more information on the Spider networked munition system.)

ADDITIONAL SUBTERRANEAN CAPABILITIES

6-81. During mission analysis prior to subterranean operations, units identify capability gaps. To the extent possible, units mitigate these capability gaps through specialized equipment requests and coordination with EAB to receive additional capabilities that can used to facilitate operations and minimize risk to the force.

While not all-inclusive, staffs consider the following capabilities prior to conducting operations in an area where contact with subterranean systems is possible:

- Surviving the environment.
- Mapping and marking.
- Communicating.
- Robotics.
- Defeating the enemy.

SURVIVING THE ENVIRONMENT

6-82. As discussed in the chapter 1, the environmental and atmospheric conditions of a subterranean space can be lethal to U.S. Soldiers and enemies. Providing the specialized equipment for Soldiers can be challenging, especially in a large-scale combat operation with numerous competing priorities. Therefore, successful units plan and prepare for surviving and operating in this environment.

Chemical, Biological, Radiological, and Nuclear Detection Capability

6-83. Organic CBRN detection capability may not be sufficient when conducting operations in subterranean systems, particularly if contact with these materials is suspected or likely. When contact with these materials is possible, each team in the facility should have one of these monitors to identify these incredibly dangerous risks. Not only does this include actual devices to monitor and detect these dangerous agents, this also includes a sufficient number of replacement joint service lightweight integrated suit technology, filters, swabs, and other materials that quickly expand when encountering and testing for these dangerous toxins.

Air Quality Monitors

6-84. In addition to monitoring for CBRN threats, units must be prepared to monitor for other atmospheric threats in the environment, to include low oxygen levels, high amounts of carbon dioxide, and a large number of other atmospheric threats that are pervasive in enclosed, subterranean spaces which can be very life threatening. There are a number of relatively inexpensive but effective products designed to monitor the air quality and ensure that it is safe to breathe. Ideally, each Soldier going into this environment should have one of these devices.

Self-Contained Breathing Apparatus

6-85. Use self-contained breathing apparatuses when poor air quality, failing air exchange systems, or operational effects create an unsafe environment for operations. Protective masks without a self-contained breathing apparatus provide no protection against the absence of oxygen. Having breathing apparatus equipment available is the primary protection element against the absence of oxygen, in the presence of hazardous gases, or in the event of a cave-in.

6-86. In the event a sensor detects low oxygen levels or the presence of toxic fumes, use a self-contained breathing apparatus to continue operations in the environment. The term self-contained means that the breathing equipment is not dependent on a remote supply (for example, through a long hose). The mining industry, fire departments, military, and law enforcement units that are required to enter and work in subterranean spaces use self-contained breathing apparatuses worldwide. Self-contained breathing apparatus systems require special training, technical and logistical support that may only exist in specialty units such as CBRN, EOD, and SOF. Self-contained breathing apparatuses fall into two different categories: open and closed circuit.

Closed-circuit

6-87. A closed-circuit breathing apparatus is a rebreather that uses soda lime to absorb the carbon dioxide that a user has exhaled to permit the rebreathing (recycling) of the unused oxygen content of each breath. A small cylinder adds fresh oxygen to replenish the amount metabolized by the user.

Open-circuit

6-88. Open circuit systems differ from closed-circuit systems in that they use filtered, compressed air rather than pure oxygen. Firefighters use these systems, which are similar to systems that scuba divers use. However, these systems are not as effective at filtering the air as the closed-circuit systems; and therefore, limit the length of time that users can remain in this environment.

Note. Personnel should receive training, medical supervision, and the proper equipment prior to using a self-contained breathing apparatus.

MAPPING AND MARKING

6-89. Navigation can quickly become a challenge in a subterranean environment. Conditions such as total darkness, confined spaces with multiple rooms, obscurants, and increased noise requires the clearing force to develop and utilize marking systems to inform support teams of cleared areas and direction of travel. Teams create rudimentary maps to update the common operational picture. Typically, these maps are hand drawn and passed to higher headquarters to include into a common operational picture. The clearing force must prepare to create hand-drawn maps using pace count or pedometers. Unit SOPs and rehearsals dictate marking requirements and materials such as chalk, chemical lights, or paint. The clearing force must develop a system to identify other critical areas such as cleared rooms, areas suspected to contain booby traps, areas of suspected CBRN or other toxic contamination, rooms that contain items of intelligence value, and CCPs. Units must rehearse marking in obscured and total darkness conditions with casualty evacuation or emergency evacuation as a part of rehearsals.

6-90. The use of current radios and global positioning system are ineffective in a subterranean environment. Unit standing operating procedures dictate how clearing teams map subterranean areas using pace count, electronic means, laser measuring devices, or pedometers. Using a pace count in concert with marking walls is an easy way to provide direction and distance to extraction points and casualty evacuation points. Some electronic systems incorporate a commercial grade global positioning system enabled pedometer that requires a radio signal to provide location and mapping function. Others provide military network connected information to a consolidated digital common operational picture.

COMMUNICATING

6-91. Communications between the clearing force and above ground elements during clearing is difficult. The Army's family of radios does not function effectively in subterranean environments. Commercial radio systems that operate on a mesh net system provide a solution but may be complicated to operate and maintain. A drawback with commercial radios is these systems cannot reside on tactical military networks. Leaders must be prepared to utilize runners if no other options are available. The positioning of support elements within the subterranean (line of sight) can provide a means of communication between teams.

6-92. Due to the increased noise levels present in a subterranean environment, the clearing force requires more than standard combat hearing protection. BCT leaders need to consider using inner ear protection with an over the ear system. The Army currently has over the ear hearing protection with a noise canceling capability with the ability to connect to Army radios included in the urban ops squad and platoon sets. These systems can both protect Soldiers' hearing and provide a means for internal team communications to increase efficiency.

6-93. Mesh net radio systems rely on multiple radios to transfer transmitted signals from one entity to another using a "hopping" or "repeater" method. Current systems have demonstrated the ability to "hop" eleven times before signal and data degrades. The effective transmission of the signal requires that each radio be within range of another radio. This technique requires a large increase in radios depending on the depth, length, and structural materials of the subterranean facility. The increased noise levels from weapons fire and the use of grenades make communications within the clearing force difficult. Rehearsals and SOPs can eliminate some of the issues that may arise, however the need to use radios for internal team communications remains. Using current radio systems with an over-the-ear communications system can provide the necessary means for internal squad communications. In a large facility, the BCT may have to cross-level radios to provide enough for the clearing forces, extraction and CASEVAC teams, and other enablers.

6-94. Runners can provide a continuous update to the surface on conditions in the subterranean environment. Other tasks include leading support elements to CCPs, shuttling equipment to the assault team, and providing escort around unclear areas.

ROBOTICS

6-95. Subterranean spaces are an extremely hazardous environment due to the presence of both natural and fabricated dangers and obstacles. When available, leaders must consider utilizing robotics for exploration of underground passageways before personnel make entry. Both unmanned ground and aerial systems can provide the assault team with an intelligence, surveillance, and reconnaissance capability not normally organic to the assault formation. When possible, friendly forces should maintain overwatch of these systems to prevent the enemy from capturing or disabling the unmanned systems.

6-96. BCTs have some organic robotics capability. Additionally, many of the enablers they receive to support operations in this environment have some robotics capability. The use of robotic platforms can confirm the presence of an enemy force, neutralize booby traps, and explosive hazards, or identify the facility use and the related risk analysis for entering. BCT planners must consider requesting additional robotics capable of remote monitoring for chemical weapons material, toxic industrial materials, toxic industrial chemicals, radiological isotope, providing low light observation, and with the ability to operate in a communication restrictive environment. Prior to use of a robotics platform, the clearing force leader must consider communications issues that may arise when operating in a subterranean environment. This may include the loss of signal to the platform, which may require the robot's operator to use a fiber optic cable or maneuver behind the robot at a safe distance.

6-97. Most robots are not able to relay their location or heading. Communications is an issue once the robots go around corners, which affects video signal and radio communications. Obstacles such as water, stairs, and walls may present challenges as well. While a tethered robot does not suffer a degradation of signal, the tether cannot recover the robot. Adding a tether to a robot can assist with recovery if the robot is stuck. Not every robot is equipped with an infrared or white light source. Finally, battery life can be a limitation as well.

DEFEATING THE ENEMY

6-98. While a unit's organic weapon systems provide a basic capability to destroy and defeat an enemy force, they may present limitations when operating in a subterranean environment. When possible, commanders and staffs should consider and request the following equipment. This equipment may assist their subordinate units in clearing an enemy force from a subterranean system.

Vision and Optics

6-99. Passive night vision systems do not function well, if at all, in total darkness. Subterranean environments vary from lighted to complete darkness. The two typical types of night vision sensors, image intensifiers, and thermal imagers perform differently under various conditions. For instance, image intensifiers do not work in complete darkness without the use of an infrared or other light source. Soldiers can use thermal imagers in complete darkness.

6-100. The enhanced NVG combines an image intensifier and thermal imager. Leaders should consider cross leveling the enhanced night vision goggles from the outer security element to the clearing team to provide the capability to operate in near total darkness. Thermal imaging devices used in conjunction with the enhanced night vision goggles provides the assault team with a means of detecting individuals in total darkness.

6-101. The construction of a subterranean environment can make the task of closing with the enemy difficult. Dimly lit corridors, restrictive avenues of approach, and noise are all factors that benefit the enemy. Enhanced night vision goggles that require no ambient light, robotics, and portable ballistic shields can increase an entry or clearing team's survivability and success. These tools provide the clearing force with the necessary advantage to defeat the enemy in total darkness.

6-102. Weapon and helmet mounted lights that include an infrared mode can significantly enhance mobility in dark spaces. Commercially available spectral filters can provide the same results on small tactical lights. Infrared spotlights can assist with illuminating large areas prior to entry while providing the team with an

overview of danger areas. However, the enemy may be equipped with similar capabilities to detect the infrared source.

Weapon Suppression Systems

6-103. Weapon suppression systems (silencers) provide a reduced muzzle flash and acoustic signature. Leaders should consider the benefits of outfitting all clearing team weapons (except for shotguns and grenade launchers) with a suppressor. Options include adding weapon suppressors to secondary weapons systems for use during initial entry, or adding these systems to the Soldiers' primary weapons system. The addition of a weapons suppression system modifies weapon ballistic performance, requiring a specific realignment of optics or sights.

Infrared Pointers

6-104. Target pointer illuminator lights and aiming lasers provide the clearing force with the ability to rapidly acquire, handoff, and engage targets. The use of these systems can aid in the identification of tripwires by observing the reflection or disruption of light as it passes over the tripwire. All members of the entry team must have this system mounted and zeroed prior to beginning the operation. Additionally, the clearing force Considers using the system in infrared mode to minimize visible light sources. Soldiers using lasers may increase the possibility of triggering light activated explosive hazards.

Handguns

6-105. Due to the restrictive nature of fighting in a subterranean environment, leaders consider providing a handgun to each member of the clearing force. A handgun with the appropriate ammunition is an effective alternative for clearing small rooms rapidly reducing the risk of ricochets or secondary effects to fragile equipment.

Munitions

6-106. Ammunition effects can change in a subterranean environment, construction materials used can have unintended results. Firing of ammunition in a confined space immediately increases carbon monoxide content and can achieve incapacitating effect. Bullets can ricochet multiple times causing damage to equipment and create a more dangerous environment. The clearing force or enemy can damage containers releasing toxic chemicals or materials that can negatively affect the entire BCT formation. BCT leaders must consider special ammunition requirements and restrictions. Leaders can restrict the use of items such as fragmentation hand grenades and replace them with special grenades such as stun grenades. However, the use of these grenades still causes over pressure injuries; therefore, planners must weigh the tactical risk and cost-benefit. Providing squads with armor piercing rounds provides additional penetration of metal, wood and dirt barricades.

Ballistic Shields

6-107. Portable ballistic shields can provide some cover for the clearing force. Currently the IBCT engineer squads have ballistic blankets as a part of the urban operations squad set. These ballistic blankets are composed of two 24 inch by 34-inch sections. Overlaid sections form a 72-inch by 24-inch shield. This attaches to a 6-foot aluminum ladder section with wheel assembly used as a portable blast shield or as a litter. The clearing team must plan for limited visibility, which can lead to triggering a victim-operated explosive hazard or other booby-trap.

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Chapter 7
Sustainment

Sustainment operations provide support and services to ensure freedom of action, extend operational reach, and prolong endurance. BCT sustainment organizations synchronize and execute sustainment operations in support of the BCT under all conditions to allow the BCT to seize, retain, and exploit the initiative. The same is true of subterranean operations although there are additional considerations to sustain forces underground. This chapter describes sustainment operations in support of the BCT and specifically discusses the unique considerations to sustain subterranean operations.

LOGISTICS PLANNING CONSIDERATIONS

7-1. The terrain of subterranean operations can hinder efficient and effective sustainment operations. Though the infrastructure of a subterranean environment may limit the distribution of supplies, medical care, evacuation, and other sustainment functions, the principles of sustainment remain the same with unique considerations for operating in a subterranean environment. Some unique considerations sustainment planners must consider for subterranean logistics operations include—

- Access to the subterranean site may be limited to a few key routes, which may become blocked and not easily bypassed.
- Lines of communications are more difficult to maintain, they may be compressed or extended underground.
- Access points and corridors in underground facilities are frequently limited and narrow, which may cause significant challenges during resupply, casualty evacuation, and other operations.
- Unique, specialty items and commercial off the shelf equipment are harder to maintain and resupply.
- Increased small arms munitions and explosives consumption rates.
- Unique types of ammunition consumption not typically seen in the supply system.
- Normally, resources dedicated to standard resupply operations may be required to transport subterranean specific or unique supplies; thereby limiting transportation capacity for other classes of supply.
- Recovery operations may be limited to self-recovery and like item recovery.
- Units may need to use equipment for dual purposes such as using welding equipment for nonstandard breaching.
- Additional security requirements for the trains as maneuver forces potentially bypass enemy forces in previously undiscovered underground facilities.

7-2. During subterranean operations, the situation may require units to hand carry supplies or use small all-terrain vehicles to resupply their force. The BSB and forward support companies (FSCs) must consider smaller man-portable configured loads in confined spaces if there are constraints due to terrain and other operational environment concerns. Maneuver units may have to hand carry configured loads from a logistics release point to the forward line of troops inside an underground facility. Configured loads must be portable, easily redistributed, and essential to the operation. There may not be a capability for units to utilize materiel-handling equipment, such as forklifts, in certain underground facilities. Units may need to use items such as litters to resupply dismounted forces inside underground facilities.

UNIQUE SUBTERRANEAN SUPPLIES

7-3. Units may also require unusual and nonstandard supplies for subterranean operations. Maintenance and spare parts for unique, commercial off the shelf, and nonstandard equipment may be difficult to obtain. Sustainment planners may need to rely on and plan for an increased use of contractors or logistics assistance representatives during subterranean operations. Sustainment planners at the BCT echelon should coordinate closely with counterparts at the division and corps to ensure they can sustain the specialty units and materiel required for subterranean operations. Unique supply considerations sustainment planners may face during subterranean operations include an increased use of the following items:

- Special weapons, nonlethal munitions, and lethal munitions requirements such as stun, thermobaric, and other grenades.
- Unique equipment used for subterranean operations such as self-contained breathing apparatuses, robots, sensors, urban operations tool kits, rope, ladders, paint marking kits, and oxygen and atmospheric sensors.
- Standard items such as batteries, water cans, fuel cans, light sticks, engineer tape, ballistic shields, riot gear, flexible cuffs, litters, bracing, blocking, and barricade materiel.
- CBRN suits, decontamination equipment, chemical alarms, air monitors, filters, and large amounts of water for decontamination operations.
- Nonstandard items such as TA-312 field telephones, switchboards, and DR8 wire for communication and marking.
- Small unit means of dismounted resupply using nonstandard items such as wheelbarrows, dollies, handcarts, all-terrain vehicles, litters, and other unique ways.

FORECASTING

7-4. Sustainment units should understand the diverse sustainment requirements of conducting underground operations. Traditional reliance on historical consumption data may be problematic since this data is not likely to be available. Sustainment planners must anticipate associated sustainment requirements before and during a subterranean operation. Sustainment leaders and planners at all levels forecast requirements based on current balances and upcoming mission requirements. The maintenance management personnel also plan and forecast maintenance and related materiel requirements such as spare part replacement, recovery, and battle damage assessment and repair based on future subterranean operation plans.

7-5. Logistic status reports are the primary way for units to forecast, record consumption, and plan for the resupply of standard, nonstandard, and commercial off the shelf items during subterranean operations just as they do for normal operations. Accurate reporting through the logistics status report is even more critical during subterranean operations where planners may not have historical data available and consumption rates for certain classes of supplies are higher than other standard above ground-level operations. The logistics status report is the primary product used throughout the brigade and at higher levels of command to provide a logistics snapshot of current stock status, on-hand quantities, and future requirements. They are a snapshot taken in time. They account for each unit's specific requirements based on task organization, equipment density, and assigned mission. Logistic status reports include the unit's on hand stockage levels, and what they expect to have over the next 24, 48, and 72 hours.

7-6. The brigade S-4 receives the logistics status report from all subordinate units and enablers. The BCT S-4, with the brigade XO's concurrence, determines which units receive designated supplies and shares that information with the BSB support operations section. The BSB support operations officer synchronizes distribution, updates the supply point on hand status, forecasts resupply requirements for the brigade, and plans resupply. The section updates the logistic status report with the BSB supply points' adjusted balances and additional or new forecasted requirements. The BSB support operations officer forwards the entire report to the BCT S-4 and provides a courtesy copy to the supporting sustainment brigade support operations officer. The same methods and flow of logistics reporting follows the same methods during subterranean operations as other standard above ground-level operations. (See ATP 4-90 for more information on logistics status reports.)

SUBTERRANEAN SUSTAINMENT CONCEPT OF SUPPORT

7-7. Planning for subterranean operations is challenging for sustainment planners since there is limited to no current historic consumption data on this type of operations. Table 7-1 provides planners an example of potential consumption factors, initial loads, and resupply planning timeline that sustainment planners may find in subterranean operations. The table shows an example of a hypothetical Infantry platoon of 50 Soldiers including enablers for continuous operations in an underground facility for 12 hours. Every situation during subterranean operations is different. The table simply shows a potential way for sustainment planners to consider consumption and unit resupply needs for this complex mission. Every operation varies depending on mission variables. A subterranean sustainment concept of support is in addition to the BCT's standard concept of support for its above ground mission. Also, note that these estimates for commodities, such as water, increases in a CBRN environment.

Table 7-1. Subterranean sustainment concept of support planning factors, example

Planning assumptions: • 50 Soldiers in an Infantry platoon conducting subterranean operations • 12 continuous hours of operations in underground facilities • 30 percent casualty rate during subterranean operations		
Class of Supply	***Initial Load***	***Consumption during 12 hours***
• Class I: • MREs • Water	• Three MREs per Soldier (150 total per platoon) • Two quarts per Soldier	• 100 MREs or eight cases per platoon • Six gallons per Soldier in 12 hours
• Class II: • AA batteries • Radio batteries • Flexible cuffs • Chemical lights • Communication wire and equipment (DR8, TA 312, TA1)	• Eight AA batteries per Soldier (night vision and rifle laser designators) • 12 radio batteries • Two flexible cuffs per Soldier • One box of 12 chemical lights per Soldier • Four spools of communication wire per platoon	• 400 AA batteries per platoon • 18 radio batteries • 50 flexible cuffs • 10 boxes of assorted colored chemical lights • Two spools of communication wire
• Class III (B): • F24 • Diesel	• 25 gallons F24 for one HMMWV • 56 gallons F24 for one MTV • 155 gallons F24 for one HEMTT wrecker • 18 gallons F24 for two 10k generators • 10 gallons diesel fuel for two all-terrain vehicles	• 125 gallons of F24 during 12 hours of continuous subterranean operations • 40 gallons of diesel fuel

Table 7-1. Subterranean sustainment concept of support planning factors (continued)

Class of Supply	*Initial Load*	*Consumption during 12 hours*
• Class V: •9mm •5.56 ball •5.56 tracer •5.56 link •7.62 link •HE grenade •Stun grenade	•900 rounds 9 mm •10,500 rounds 5.56 ball •2,100 rounds 556 tracer •2,000 rounds 5.56 link •2,000 rounds 7.62 link •20 HE grenades •20 stun grenades	• • 900 rounds 9 mm • 21,000 rounds 5.56 ball • 4,200 rounds 556 tracer • 4,000 rounds 5.56 link • 4,000 rounds 7.62 link • 10 HE grenades • 20 stun grenades
• Class VIII: •Push packages •Litter	•Each Push Package in addition to Soldier IFAKs should include: •4 gallon trash bag •6 combat gauze •6 battle dressings •6 tourniquets •6 intravenous (IV) solutions •6 IV starter sets •6 IV needles •6 nasopharyngeal cannula •Four litters	• • 30 percent of class VIII push packages
Legend: DR – distribution reel, HEMTT – heavy expanded mobility tactical truck, HMMWV – high mobility multi-wheeled vehicle, HE – high explosive, IFAK – improved first aid kit, IV – intravenous, MRE – meals, ready to eat, MTV – medium tactical vehicle, TA – telephone apparatus		

ARMY HEALTH SYSTEM SUPPORT PLANNING CONSIDERATIONS

7-8. Developing a battalion medical support plan requires medical planners to focus on the following medical functions (area and organic support), they are—

- Medical treatment (to include combat and operational stress control).
- Medical evacuation and en route medical care.
- Medical logistics (to include blood management).

7-9. For planners to determine medical support requirements for each of the medical functions listed in paragraph 7-8 medical planners must produce accurate casualty estimates. The challenge to producing accurate casualty estimates for subterranean operations is the absence of modeling and simulations data and historical medical information.

7-10. One solution available to medical planners is to use casualty estimates and the results of modeling and simulations from combat operations conducted in dense urban environments. Although not an exact match, there are enough similarities between the two environments to establish a baseline for casualty estimates in subterranean operations.

7-11. The U. S. Army medical department center and school developed the automated military acute concussion evaluation tool and the statistical analysis cell disease and nonbattle injuries methodology that can assist medical planners with medical and casualty estimation. The requesting individual must contact the computational sciences division for access to the military acute concussion evaluation tool or the statistical analysis cell for disease and nonbattle injuries calculations. The statistical analysis cell provides disease and nonbattle injuries rates on an as needed basis. Medical planners who use the military acute concussion evaluation tool to assist in estimating casualties should provide both positive and negative feedback to the

computational sciences division via email to usarmy.jbsa.medcom-ameddcs.list.cdid-ops-admin@mail.mil with ATTN: CSD in the subject line. Send requests for disease and nonbattle injury calculations directly to the statistical analysis cell via email to us.army.jbsa.medcom-ameddcs.list.sac@mail.mil. Planners consider medical intelligence when developing a thorough medical support plan. In an emergency, up-to-date medical intelligence assessments can be obtained by contacting the Defense Intelligence Agency, Attention: Director, National Center for Medical Intelligence, Fort Detrick, Maryland 21702-5000 or at the National Center for Medical Intelligence website.

7-12. Alternative medical casualty estimating and medical planning tools include the joint medical planning tool and the medical planner's toolkit. The joint medical planning tool is a DoD-accredited tool for health risk assessment and COA analysis. It accepts estimated patient streams and patient condition occurrence frequency data generated by the medical planner's toolkit. These software tools are available to qualified users after attending the joint medical planning tool course at the Defense Medical Training Institute. Contact the contingency operations program by phone at (210) 221-2652/9570; defense switched network 471, or by email via usarmy.jbsa.medcom-ameddcs.list.dmrti-jommc@mail.mil.

7-13. Planners can obtain information request access to the medical and casualty estimator tool at the medical and casualty estimator tool at the United States Army Medical Department Center and School, Capabilities Development Integration Directorate, Computational Sciences Division. Their email address is ameddcs.mbx.strategic-studies@mail.mil. Obtain trauma information from the Department of Defense Trauma Registry via email at usarmy.jbsa.medcom-aisr.list.jts-help-desk@mail.mil or at their website.

ORGANIC AND AREA SUPPORT MEDICAL TREATMENT ASSETS

7-14. Once medical planners have prepared their medical estimates, they can begin to focus on coordinating with supporting medical support assets. Medical planners should prepare for medical treatment and combat and operational stress control assets, medical evacuation, en route care assets, medical logistics, and blood management assets.

7-15. Organic and area support medical treatment and combat and operational stress control assets include the battalion medical platoon's treatment squad and combat medic section, brigade support medical company's medical treatment platoon, and area support medical company's area support medical treatment platoon.

7-16. Organic and area support medical evacuation assets evacuation and en route care assets include the battalion medical platoon's medical evacuation squad, brigade support medical company's evacuation platoon, area support medical company's ambulance platoon, and medical company (ground ambulance).

7-17. Organic and area support medical logistics and blood management assets include the battalion medical platoon's headquarters section (class VIIIA only, no blood support capability [medical platoon sergeant]), brigade medical supply office, area medical logistics company at multifunctional medical battalion, and medical detachment (blood support) at multifunctional medical battalion.

7-18. Table 7-2, page 7-6, identifies applicable Army Health System functions. The table also provides reasonable assumptions, and provides planning, coordination, and preparatory considerations that may be useful to medical planners when developing the battalion medical support plan.

Table 7-2. Medical planning considerations

MEDICAL FUNCTION	*ASSUMPTIONS*	*PLAN, COORDINATE, AND PREPARE FOR*
Medical treatment to include COSC. Reference: ATP 4-02.3 Army Health System Support to Maneuver Forces	• High casualty rates from blast overpressure injuries, small arms fire, secondary fragments, and explosive devices in confined spaces. • Increased rates of combat and operational stress reactions. • Potential for high CBRN casualty rates. • Delays in acquiring and treating casualties. • Possibility of envenomation from venomous snakes and arthropods.	• Establish CCPs. • Establish BAS. • BSMC treatment platoon support. • ASMC treatment platoon support. • FST/FRST surgical support. • Medical evacuation support. • COSC support. • Blood support. • CBRN patient decontamination support. • The need for antivenom for venomous snakes and arthropods. ***Note***. Plan to collocate organic and area support medical treatment assets as close to the fight as the tactical situation permits.
Medical evacuation and en route medical care. Reference: ATP 4-02.2 *Medical Evacuation.*	Delays in acquiring, treating, extricating casualties from the underground facility and subterranean environment delay medical evacuation and provision of en route medical care.	• Organic and area support ground and air ambulance support. • Establishing AXPs. • Engineer support. ***Note***. Collocate organic and area support medical evacuation assets as close to the fight as the tactical situation permits.
Medical logistics and blood support. Reference: ATP 4-02.1 Army Medical Logistics.	High casualty rates consume existing class VIII and blood supplies at higher rates, exhausting on hand supplies.	• Increased quantities of class VIII. • Battle dressings. • Tourniquets. • IV fluids. • IV starter sets. • IV needles. • Pain medications. • Blood products. • Pre-package class VIII consumables to push forward with litter teams as necessary. ***Note***. Collocate organic and area support medical logistics elements as close to the fight as the tactical situation permits.
Legend: ASMC – area support medical company, ATP – Army techniques publication, AXP – ambulance exchange points, BAS – battalion aid station, BSMC – brigade support medical company, CCP – casualty collection point, COSC – combat and operational stress control, CBRN – chemical biological radiological, and nuclear, FST – forward surgical team, FRST – forward resuscitative surgical team		

CASUALTY EVACUATION

7-19. The medical support plan must include CASEVAC consideration. Depending on the physical dimensions of the underground facility and the subterranean environment, it may not be possible to establish a battalion aid station or any other medical treatment facility on the inside of the structure.

7-20. In the event that a medical treatment facility cannot be established inside the subterranean system, it is necessary to move casualties to CCPs established off axis to the main effort. Placing CCPs in this manner protects combat medical personnel and casualties from direct fires and the effects of blast overpressure while treating casualties (see figure 7-1).

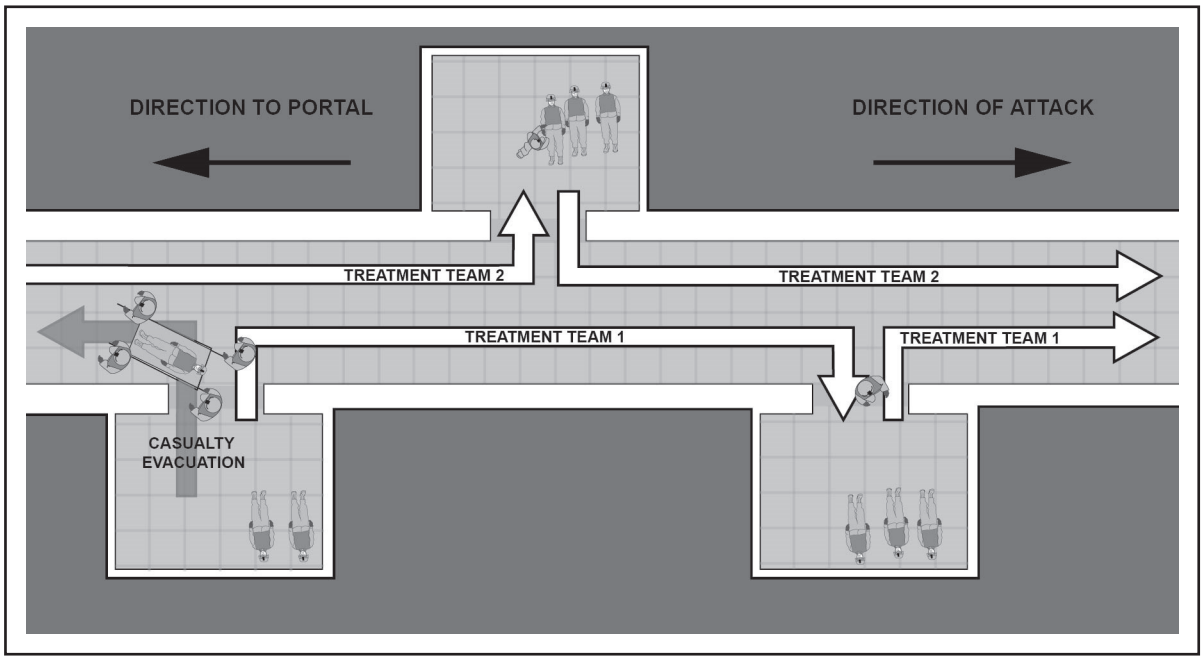

Figure 7-1. Casualty collection point bounding

CASUALTY EVACUATION TASKS

7-21. Casualty evacuation tasks include—

- One man carries.
- Two man carries.
- Two and four man litter carries.
- Using all available nonmedical vehicles and aircraft to transport casualties.
- Using nonstandard equipment, litters, and all-terrain vehicles to transport casualties from underground facilities.

7-22. Table 7-3, page 7-8, identifies casualty evacuation tasks and extraction considerations along with assumptions and potential courses of action. Commanders and staffs may use these when planning casualty evacuation operations during subterranean operations.

MASS CASUALTY SCENARIOS

7-23. Unit casualty rates can quickly exceed those established by medical planners when the enemy uses the confined spaces and complexity of subterranean environments coupled with the capabilities of modern weapons systems to inflict mass casualties. Sudden increases in casualties can rapidly overwhelm organic medical assets and produce a mass casualty scenario.

7-24. To mitigate the impact of a mass casualty scenario, units must develop a comprehensive mass casualty response plan. This plan along with the unit's SOPs and policy outline specific duties, responsibilities, training requirements, and expectations to execute and rehearse prior to conducting operations. Staffs prepare a comprehensive mass casualty plan that facilitates the efficient use of available medical assets to quickly triage, treat, and evacuate casualties to the appropriate role of medical care.

Table 7-3 Casualty evacuation planning considerations

CASUALTY EVACUATION TASKS	*ASSUMPTIONS*	*PLAN, COORDINATE, AND PREPARE FOR*
Manual carries (one and two man). Litter carries (two and four man). Casualty transport via nonmedical vehicles.	Delays in locating, acquiring, treating, and moving casualties from the point of injury to established CCPs. Delays in moving casualties from established CCPs to the extraction point. Extracting casualties from the subterranean environment may be a lengthy process.	• Develop CASEVAC plans and SOPs. • Coordinate and exercise the plan with supporting (organic and area support) medical assets. • Train and equip more combat lifesavers. • Conduct refresher training for self-aid and buddy-aid. • Establish, equip, train, and rehearse dedicated litter teams. • Use all available nonmedical ground vehicles and aircraft to transport casualties. • Engineer support to train unit personnel on rigging and extraction techniques (vertical lifting) for casualties. • Engineer support to clear entry and exit points to speed evacuation of casualties.
Legend: CASEVAC – casualty evacuation, CCP – casualty collection point, SOP – standard operating procedure		

RESUPPLY OPERATIONS

7-25. The role of a BSB is to provide logistics and Army Health System support to a BCT. The BSB provides sustainment planning, synchronization, and execution of logistics and Army Health System support in support of a BCT. The BSB conducts distribution operations, transportation and supply support, field maintenance, and Role 2 medical care for a BCT in decisive action operations.

7-26. The BSB's distribution company is the primary supply and transportation hub of the BCT. It manages the distribution of supplies to the brigade and provides distribution capability for class I, II, III, IV, V, and IX. The company may provide limited transportation of brigade personnel as well at the sacrifice of supply distribution capability. The BSB distribution company also executes daily receipt, storage, and issue of supply class I, II, III, IV, V and IX as well as transporting cargo for the BCT.

7-27. Forward support companies (FSCs) provide direct support to maneuver, engineer, cavalry, and fires battalions in the BCT. The FSC provides the supported commander with dedicated logistics assets organized specifically to meet the battalion's requirements. An FSC provides field feeding, bulk fuel, general supply, ammunition, and field-level maintenance to its supported battalion. FSCs are organic to the BSB and may be attached to or OPCON to its supported battalion for a limited duration for a specific mission or phase of an operation. The BSB distribution company and FSCs are the center of distribution and resupply operations for the BCT.

7-28. Sustainment units and maneuver forces should focus on resupplying and issuing supplies and specialty equipment to support subterranean operations. The BSB and FSC must be ready to reposition sustainment assets, configure loads, and bundle supplies as required for to support the BCT's efforts. Subterranean

operations may require the BSB and FSCs to reposition and bundle of supplies near entrances to underground facilities. The logistics units must also consider techniques to resupply forces underground where resupply may only be available through man portable configured loads. Sustainment planners must also consider repurposing equipment, such as litters and other available equipment, for resupply operations.

METHODS OF RESUPPLY

7-29. BSB supply and distribution planners must understand that unpredictable events such as weather, terrain, enemy contact, complexity of operating underground, potential for CBRN environments, and other mission and operational variables that occur during combat often disrupt planned resupply schedules. This unpredictability requires constant assessment of the situation and rapid adjustments of the distribution plan. Resupply operations require continuous and close coordination between the supporting and supported units. These attributes of resupply operations are consistent whether on the surface or in a subterranean environment. The supporting and supported units must identify resupply timelines and locations as well as synchronizing their efforts with both the above ground and subterranean operation's plan. There are two methods of resupply: planned and emergency resupply. Both methods of resupply apply to subterranean operations. (See ATP 4-90 for more detailed information on methods of resupply.)

Planned Resupply

7-30. Planned resupply is the preferred method of resupply even during subterranean operations. The sustainment concept of support, synchronization matrix, logistics status reports, and running estimates establish the requirement, timing, and frequency for routine planned resupply.

7-31. The BSB support operations section is the principal staff section responsible for synchronizing BSB distribution or logistics package (LOGPAC) operations that accomplish resupply for all units assigned or attached to the BCT. The BSB support operations officer is responsible for applying the BSB capabilities against the BCT's requirements including during subterranean and other operations. The BCT S-4 identifies requirements through logistic status reports, running estimates, and mission analysis.

7-32. Planned resupply operations cover all classes of supply to include water, and any other specialty items the BCT uses during subterranean operations. Resupply operations can include sustaining units with repair parts and class II expendable items for commercial off the shelf systems when applicable as well. Whenever possible, the BSB should conduct routine, planned resupply operations on a regular basis, ideally during hours of limited visibility.

Emergency Resupply

7-33. Emergency resupply is the least preferred method of supply but may be more prevalent during subterranean operations due to the planning and forecasting difficulty with so many unknowns. Requests for emergency resupply may indicate a breakdown in coordination and collaboration between sustainment and maneuver forces or the requests may reflect incorrect planning assumptions. In either case, accurate reporting through logistic status reports is critical to reduce the number of required emergency resupply operations.

7-34. When a unit has an urgent need for resupply that cannot wait for a planned resupply through a routine LOGPAC, the distribution platoon from a battalion or squadron FSC or a distribution company from the BSB conducts an emergency resupply using one or more techniques of resupply. An emergency resupply in a subterranean environment typically involves the resupply of water, ammunition, batteries, medical supplies, and other subterranean specific survivability equipment such as air tanks for breathing devices.

7-35. Poor logistics reporting from units places a burden on the sustainment system by needlessly placing personnel and equipment at risk through additional resupply operations and degrades the efficient distribution of supplies across the BCT. Emergency resupply that extends beyond BSB capabilities requires immediate intervention of the next higher sustainment command such as a sustainment brigade and combat sustainment support battalion capable of executing the mission.

TECHNIQUES OF RESUPPLY

7-36. Sustainment and maneuver units may use multiple techniques for resupply during both planned and emergency resupply subterranean operations. Units can utilize different techniques to conduct supply point and unit distribution operations. In many cases, units conduct both supply point and unit distribution operations during the same resupply technique. (See ATP 4-90 for more information on techniques of resupply.)

Logistics Release Point

7-37. Units most commonly execute resupply and distribution by means of a logistics release point. The logistics release point may be any place on the ground where distribution unit vehicles take supplies and met by the supported unit that then take the supplies forward to their unit for subsequent distribution. Units can continue to utilize a logistics release point during subterranean operations.

7-38. A logistics release point maximizes the efficient use of distribution assets and reduce the amount of time and distance the supported unit requires traveling to receive supplies. The logistics release point is often located between the combat trains and the maneuver battalion's company trains. In subterranean operations, units may locate a logistics release point near the entrance to an underground facility, outside a facility, or inside an underground facility. Units determine the location of a logistics release point based on mission variables and security requirements with the understanding that the logistics release point may be inside an underground facility in certain instances. A logistics release point is normally established and secured for only a limited duration of time. Resupply at a logistics release point is a planned, coordinated, and synchronized operation.

7-39. While a maneuver force can collocate a logistics release point with the combat trains, the FSC and its supported battalion should establish the logistics release point between the combat trains and company trains for maximum efficiency. Establishing a logistics release point outside of the company trains increases the need for security, but it also allows maneuver commanders to maintain momentum and shorten the lines of communications for resupply. The FSC commander and battalion S-4 plan the location, timing, and establishment of logistics release points for the maneuver battalion. In the case of subterranean operations, units may locate their initial logistics release point at the entrance to an underground facility, inside the first passageway or hallway, or inside the first room of the facility. See further discussion on brigade and battalion trains as well as the echelon of sustainment later in the chapter.

Logistics Package

7-40. The BSB may continue to conduct logistics packages during subterranean operations. A LOGPAC is the grouping of multiple classes of supply and supply vehicles under the control of a single convoy commander (FM 3-90-1). The LOGPAC technique is a simple and efficient way to accomplish routine, planned resupply. The LOGPAC resupply convoy utilizes the combat and field trains to echelon sustainment across the battlefield. Before a LOGPAC, the BSB's distribution company configures loads to resupply the BCT's maneuver battalions. Typically, a platoon leader from the BSB's distribution company leads a LOGPAC from the BSA. However, the distribution company from the BSB or the FSC supporting a maneuver battalion can conduct a LOGPAC from the BSA depending on mission variables. Scheduled LOGPACs typically contain a standardized allocation of supplies based on the sustainment concept of support, synchronization matrix, and consumption rates of the supported force. The BSB or FSC can dispatch special or emergency LOGPACs as needed by the supported units.

7-41. Once received by the FSC, the platoon leader from the FSC's distribution platoon leads the battalion LOGPAC accompanied by maneuver company supply sergeants. The FSC often breaks the resupply into company-configured loads in the company trains. The maneuver company XO or first sergeant meets the LOGPAC at the logistics release point and escorts the convoy to the maneuver company's positions. A combat sustainment support battalion supporting the BCT or the brigade's BSB can also conduct throughput to the maneuver forces by LOGPAC if the mission dictates.

Pre-positioned Supplies

7-42. The pre-positioning of supplies is a preplanned resupply technique that reduces the reliance on traditional convoy operations and other resupply operations. Units may be able to pre-position supplies for

subterranean operations. Pre-positioned supplies build a stockage level of high demand, consumable supplies such as water, ammunition, and other specialty items for subterranean operations.

7-43. Sustainment planners and maneuver forces can bundle supplies into packages to support specific elements. Units should look to bundle breaching materiel, batteries, enemy prisoner of war materials (such as flexible handcuffs) for the assault and clearing force.

7-44. Sustainment units and maneuver forces must carefully plan the pre-positioning of supplies on the battlefield. All leaders must know the exact locations of pre-positioned supply sites, which units must verify during reconnaissance and rehearsals. Maneuver forces can take measures to ensure survivability of the supplies such as digging in pre-positioned supplies and selecting covered and concealed positions. In the case of subterranean operations, units might consider pre-positioning supplies at a portal if the maneuver forces or FSC has not used that location for its combat trains or logistics release point.

7-45. Units can also assemble stockpiles of pre-positioned supplies in their combat trains or logistics release point. Although, there may not be a lot of physical space to stockpile supplies near the entrance to underground facilities. Underground facilities may be limited to a single, narrow portal that may not be conducive to the pre-positioning of supplies due to limited space and the simultaneous requirement for casualty evacuation, command and control, and follow-on forces.

Aerial Delivery

7-46. Aerial delivery provides an effective means of conducting unit distribution operations during subterranean operations. Logistics units can use aerial delivery for both routine and emergency resupply to units during subterranean operations where terrain limits access by ground transportation assets. Aerial delivery includes airdrop, airland, and sling-load operations. The BCT can use this asset to support remote or forward locations.

7-47. Airdrop is the unloading of personnel or materiel from aircraft in flight. Low cost low altitude and free drop are examples of airdrop methods that logistic units can use for unit distribution through aerial delivery. The free dropping of duffle bags, aviator kit bags, or other containers of supplies from flying rotary wing aircraft could result in injuries or damage to ground personnel, aircraft crew members, aircraft, and intended logistical supplies and must be used with care. A sling load is an external load carried beneath a utility or cargo rotary-wing aircraft held in place by a sling, bag, or net. As in airdrop, weather conditions, mission requirements, threat environment, and equipment units deliver determine the equipment and type of aircraft used for the delivery. (See ATP 4-48 for more information on aerial delivery methods.)

Logistics Consolidation During Subterranean Operations

7-48. The BSB and logistics units should consolidate gains, reset, and conduct resupply operations during and after the BCT's subterranean operations. While maneuver forces are in underground facilities, the BSB should look to consolidate, reset, and reorganize supplies in support of resupply operations during subterranean operations. During this time, the BSB can move forward critical supplies and capabilities such as welders that the BCT might need inside an underground facility. At the start of subterranean operations, the BSB and FSCs should consider the prepositioning of critical supplies as needed at a logistics release point or portal opening to an underground facility. Consolidating during subterranean operations also allows the BSB and medical providers the opportunity to prepare for potential casualties.

Operational Contract Support

7-49. Commanders and staffs must be cognizant of potential sources of commercial support within their area of operations. Effective utilization of available commercial sources can enhance the resupply speed and efficiency of common items during the execution of operations.

7-50. Operational contract support is the integration of commercial sector support into military operations. Operational contract support consists of three complementary functions: Contract support integration, contracting support, and contractor management. Operational contract support has three types of contract support: Theater support, external support, and systems support. See ATP 4-10 for a full discussion on operational contract support.

7-51. Economy is a principle of sustainment that provides sustainment resources in an efficient manner that enables the commander to employ all assets to the greatest effect possible. Units may achieve economy by contracting for support or using host-nation resources that reduce or eliminate the use of limited military resources. See ADP 4-0 and ATP 4-10 for more information regarding the integration of operational contract support into subterranean sustainment operations.

ECHELON OF SUSTAINMENT

7-52. The array in echelons of the support organizations of a BCT can vary widely based upon mission variables. In many cases, the echelon of sustainment during subterranean operations closely resembles a traditional battlefield. Units continue to echelon forces using the field, combat, and company trains. Only the placement of these locations on the battlefield and their proximity to each other may be different in subterranean operations.

7-53. Echelon support is an array of capabilities within an area of operation. It is a deliberate and collaborative logistical operational decision based upon thorough mission analysis and the MDMP. The leadership and staffs at the brigade, battalion, and company levels determine how to array the forces and echelon sustainment capabilities. Sustainment planners echelon logistics assets to weight the effort supporting mission requirements. The echelon of sustainment extends operational reach and allows commanders to maintain momentum.

7-54. The echelons, utilizing the trains, place sustainment capability, supplies, and replenishment in advantageous locations across the battlefield. The echeloning of support shortens the legs of the supported unit including subterranean operations in tunnels, caves, and underground facilities. (See ATP 4-90 for more information on the echelon of sustainment.) Figure 7-2 illustrates an example of echeloned sustainment using field, combat, and company trains.

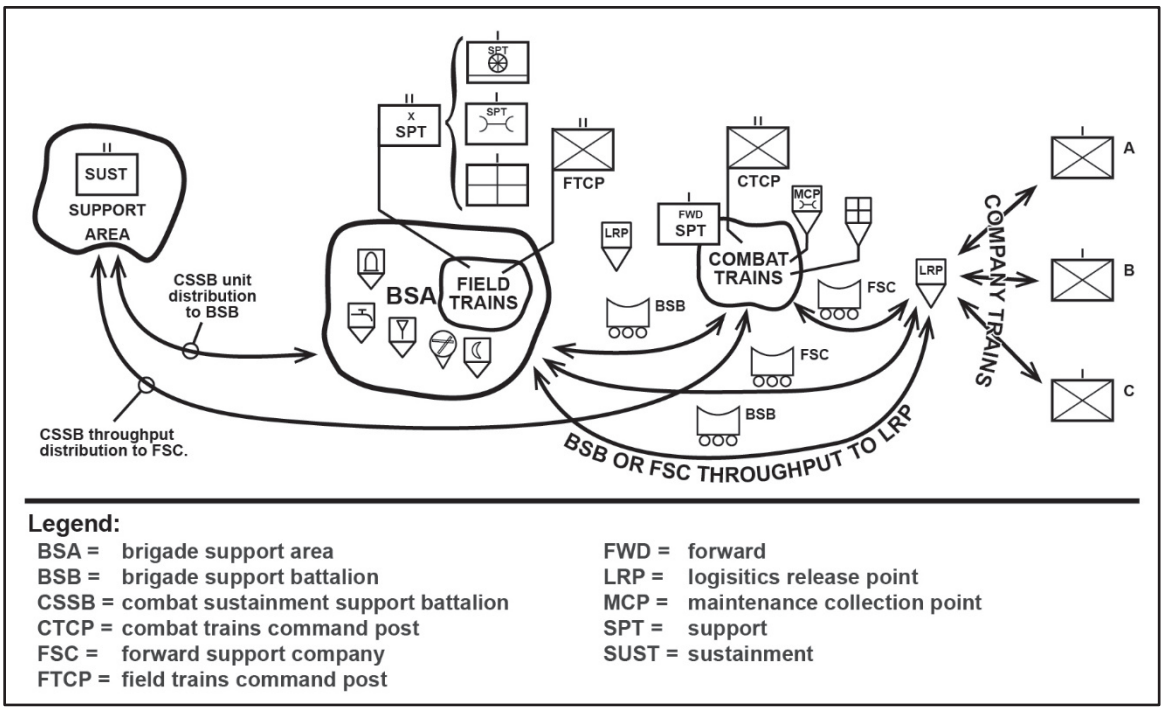

Figure 7-2. Echeloned sustainment using field, combat, and company trains, example

TRAINS

7-55. The BSB and FSCs support the BCT and its battalions at multiple echelons within an area of operation. The BCT normally operates in echeloned trains when subordinate units employ elements into multiple

locations across the battlefield including a subterranean battlespace. Trains are a grouping of personnel, vehicles, and equipment that provide sustainment to the battalion and subordinate companies of the BCT arrayed across the area of operations.

7-56. Battalions and squadrons employ echeloned trains at their level and typically organize sustainment forces into company trains, combat trains, and field trains to array subordinate sustainment elements such as unit personnel, vehicles, supplies, and equipment including their designated FSC. The battalion or squadron commander and staff, the BSB commander and staff, and the FSC commander collaborate to determine the best method of employment appropriate for the BCT's sustainment concept of support and brigade commander's guidance. The commanders and staffs also determine the best allocation of personnel between each train and command posts within the trains. Echeloning of support can include elements of the battalion or squadron aid station, battalion or brigade S-1 (personnel staff officer) section, S-4 section, and the FSC.

Field Trains

7-57. Field trains are positioned based on mission variable considerations and are often located in the BSA during subterranean operations. When established, the field trains command post serves as the battalion or squadron commander's primary direct coordination element with the supporting BSB in the BSA. Normally, the field trains command post consists of the headquarters and headquarters company (battery or troop) XO or first sergeant, an S-4 representative, S-1 representative, and supply sergeant or representative for the maneuver battalion.

7-58. The FSC typically places personnel in the field trains to coordinate logistics requirements with the BSB and configure resupply of rations, water, fuel, and ammunition. These FSC elements also enable the flow of class IV, VIII, and IX. FSC elements in the field trains may normally consist of the FSC XO and/or first sergeant, ammunition handlers, field feeding Soldiers, fuel handlers, motor transport operators, and supply sergeant or other representatives from the FSC. The field trains command post typically serves the following functions:

- Synchronizes and integrates the BCT sustainment concept of support.
- Coordinates logistics requirements with the BSB support operations section.
- Configures LOGPACs tailored to support requirements.
- Coordinates with the BCT for personnel services and replacement operations.
- Forecasts and coordinates future sustainment requirements.
- Coordinates retrograde of equipment.
- Coordinates retrograde of personnel to include casualty evacuation, personnel movement, and human remains.
- Logistics supply and transportation to enable distribution of supplies.

7-59. The maneuver battalion does not necessarily have to locate its field trains command post in the BSA. While it is common to have the field trains command post collocated in the BSA, mission variables can dictate the necessity to move the field trains command post forward closer to the maneuver battalion's combat trains and combat trains command post.

Combat Trains

7-60. Combat trains usually consist of elements of the battalion or squadron's headquarters and headquarters company commander, S-1 section, S-4 section, battalion aid station, maintenance collection point, supply sergeant or representative, and elements of the FSC. The FSC typically positions its commander, first sergeant, field feeding section, portions of the distribution platoon, maintenance control officer, and portions of the maintenance platoon in the combat trains. Units consider the mission variables when locating combat trains for the battalion or squadron during subterranean operations. The BCT and BSB commanders place assets and leaders in locations in the trains to best support their mission, sustainment concept of support, and concept of the operation.

7-61. When established, the combat trains command post plans and coordinates sustainment operations in support of tactical operations. The combat trains command post coordinates and executes sustainment operations between the field trains command post and company trains. The combat trains command post

serves as the focal point for all administrative and logistical functions for the battalion or squadron. The combat trains command post may serve as an alternate command post for the battalion or squadron main command post when necessary. The battalion or squadron S-4 usually serves as the combat trains command post officer in charge, and the maintenance control officer usually serves as the maintenance collection point officer in charge. The combat trains command post serves the following functions:

- Tracks the current battle.
- Controls sustainment support to the current operation.
- Provides sustainment representation to the main command post for planning and integration.
- Monitors supply routes and control the sustainment flow of materiel and personnel.
- Coordinates evacuation of casualties, equipment, and detainees.

7-62. The commander should consider dispersion when arraying forces and capabilities in the combat trains. The FSC can establish its company headquarters away from the combat trains command post, dependent on mission variables, and continue to maintain digital and voice communication. Leaders must also consider the additional security and communication requirements that dispersion requires in the combat trains.

7-63. Additionally, there is often a need for increased security for the trains during subterranean operations. As maneuver forces potentially bypass enemy forces in previously undiscovered underground facilities, enemy forces may exit those facilities in the middle of the combat and field trains. The BSB, FSCs, other sustainment units must maintain security in every direction in the trains as enemy formations can appear in the BCT's support area or division consolidation areas.

Company, Battery, and Troop Trains

7-64. Echeloning of support begins at the company, battery, or troop level. During subterranean operations, the situation may dictate that units locate their company trains underground. Companies within the BCT have no organic logistics organizations. They must echelon support, if required, with internal personnel and equipment used to facilitate or expedite logistics support within these units. The commander determines the composition of company trains, which may consist of the first sergeant, supply sergeant, and unit medic.

7-65. The maneuver and FSC company commanders may also include field maintenance teams from the FSC in the company trains. The FSC elements and maneuver companies must understand the movement and timing of logistics actions in the company trains. Maneuver first sergeants and their supply sergeants are a critical element in the synchronization of logistics assets, maintenance, and resupply operations at the company trains during subterranean operations just like on a traditional battlefield above ground.

7-66. Depending on the distribution method used, the first sergeant may send unit personnel and vehicles to a logistics release point designated by the FSC and battalion S-4. Alternatively, the first sergeant may coordinate for the FSC to deliver supplies to a location, which is unit distribution. Within the company (battery or troop), the first sergeant replenishes company elements using various resupply techniques depending on the situation. Unit elements may move from their positions to the designated site to feed, resupply, or turn in damaged equipment. This is an example of supply point distribution. Moving to a designated site is a technique that maneuver forces typically use in assembly areas and when contact is not likely. This method takes the least amount of time for sustainment operations at the maneuver unit level. Maneuver forces may also rotate companies or platoons through the supply point distribution site for resupply. Alternatively, the FSC could coordinate for the BSB distribution company to throughput the supplies directly to the maneuver unit. Throughput distribution is a method of distribution which bypasses one or more intermediate supply echelons in the supply system to avoid multiple handling (ATP 4-11).

FORWARD LOGISTIC ELEMENT

7-67. During subterranean operations, the BSB may need to establish an FLE. An FLE is comprised of task-organized multifunctional logistics assets designed to support offensive operations. The intent for employing an FLE is to minimize tactical pauses to the offensive plan and enable momentum for the commander by reducing the lines of communication. An FLE in subterranean operations can assist the BSB in placing additional critical supplies forward on the battlefield near an underground facility where the BCT is operating.

7-68. The BSB establishes a FLE based on tactical operations requirements for subterranean operations. The BSB is the lowest echelon unit that can establish an FLE. The supported unit's tasks, requirements, and capabilities also determine the FLE capabilities. While mission variables dictate a FLE's composition, a BSB typically establishes an FLE with fuel, ammunition, water, and class I supplies, recovery assets, and medical personnel. The FSCs continue to provide direct support to their assigned battalions using logistics release points as required. Security is also a concern for the FLE. The FLE requires more significant security considerations to defend against a level I threat, because the FLE is usually a fixed node for an extended period. An FLE requires more security planning and defense than a logistics release point, which units establish for a limited duration of time at a location.

Echelon Above Brigade Support

7-69. The brigade logistics support team is an U.S. Army Materiel Command deployable organization made up of both military and Department of the Army civilian members that normally operates in direct support of a designated brigade or brigade level unit and provides limited general support to other units normally on an area basis as directed. The brigade logistics support team expedites the delivery of repair parts and prioritizes field service representative support. They provide technical support reach-back capability from the BCT to the appropriate support in the United States Army Materiel Command.

7-70. The brigade logistics support team chief, a major (O-4), acts as U.S. Army Materiel Command's advisor to the BCT commander and is responsible to coordinate all U.S. Army Materiel Command and related acquisition, logistics, and technology support with the brigade. The brigade logistics support team serves as an integral facilitator and coordinator with field service representatives and U.S. Army Material Command for the maintenance and replacement of parts for commercial off-the-shelf and unique equipment the BCT uses for subterranean operations.

7-71. A sustainment brigade uses a combat sustainment support battalion to provide replenishment support to the BSB. The combat sustainment support battalion's subordinate elements consist of functional companies that provide supplies, field services, ammunition, fuel, transportation, and maintenance. The task organization of these companies is dependent on mission variables. During subterranean operations, the combat sustainment support battalion can provide water purification, petroleum storage, transportation assets, and throughput in support of the BSB and the BCT. The combat sustainment support battalion maintains the flow of replenishment and retrograde of unserviceable components, end items, and supplies.

MAINTENANCE AND RECOVERY OPERATIONS

7-72. The BSB field maintenance company and FSCs provide maintenance support to the BCT. The role of a BSB field maintenance company is to provide field-level maintenance support to the BSB and BCT. The field maintenance company provides repair capability for automotive, ground support, communications and electronics and armament. The field maintenance company also provides limited field-level maintenance support to the FSCs for low-density commodities and recovery. The field maintenance company can send limited support forward to support the FSC's field maintenance teams or maintenance collection points to ensure they have required support positioned well forward.

7-73. The maintenance platoon of the FSC performs field-level maintenance, maintenance management functions, dispatching, recovery, and scheduled service operations for their supported battalion and FSC vehicles and equipment. The supported battalion's chain of command determines the FSC maintenance priorities, with recommendations from the FSC commander and the maintenance control officer. The maintenance platoon's first priority is to reinforce the field maintenance team's mission.

7-74. The FSCs contain a large percentage of the BSB's overall maintenance capability. FSCs specific battalions in the BCT. The organization of these support companies provides them with the mechanics and tools necessary to repair and maintain the specific equipment in its supported battalion. The organization design makes the FSC a critical and valuable maintenance capability within the BCT, and planning for its use must be deliberate and thoughtful. In most instances, an FSC provides dedicated support to a single maneuver battalion and operates independently in this manner. In some cases, mission requirements may require consolidation of the FSC maintenance capability to provide the most effective support to the BCTs operations including subterranean operations.

MAINTENANCE

7-75. The primary purpose of maintenance is to ensure equipment readiness. Ideally, all equipment is fully mission capable, able for units to employ the equipment immediately, and perform the intended functions. The second purpose of maintenance is to generate combat power by repairing damaged equipment as quickly and as close to the point of failure as possible. Repairs should return the damaged equipment to a fully mission capable status or to a state that allows mission accomplishment. The same is true for subterranean operations.

7-76. Once units enter combat operations, maintenance is critical to maintain combat power and momentum. Replacement systems may not be immediately available. This is especially true during the early stages of an operation, including subterranean operations. Units must keep existing systems fully mission capable for the duration of the operation or until the system is clearly damaged beyond field-level maintenance repair capability.

7-77. The Army maintenance structure is smaller but highly adaptable and flexible if properly understood and utilized. BCTs have the capability to repair all of their brigade systems with the maintenance assets within the BSB. As such, there is no need to evacuate BCT equipment that requires field-level maintenance to another organization or echelon of support. Furthermore, there is no repair capability outside of the BCT for the main battle tank, Infantry fighting vehicles, or Stryker systems. The only time a unit evacuates a system outside of the BSB is if it requires sustainment-level maintenance.

7-78. Integrate maintenance planning in all aspects of the MDMP for subterranean operations to ensure synchronization and unity of effort. Planning includes identifying requirements, reviewing available assets, preparing a maintenance estimate, comparing requirements to capabilities, and adjusting maintenance priorities to meet the mission requirement. Maintenance planning is included in the overall sustainment concept of support. Maintenance planners must understand the overall mission and concept of operations for maneuver forces to prioritize and weight maintenance support to the main effort. Maintenance planners must be able to recommend to the BSB command, BCT XO, and BCT commander how to task organize for optimal maintenance capability. They must be able to recommend the cross leveling of system maintainers to ensure adequate maintenance capability is available to support the main effort.

7-79. The BCT S-4 and support operations officer work together to determine how many key systems identified are mission ready and then work with the FSCs to prioritize their work around shortfalls in the key systems working from highest to lowest priority. The staffs wargame the subterranean operation during MDMP and prepare an estimate from projected system losses and gains during each stage of the operation.

7-80. Most equipment specifically for use in subterranean combat such as breathing apparatuses, air jammers, and robotics is nonstandard or commercial off-the-shelf purchases. Maintenance for these systems, beyond operator preventive maintenance, is typically included in the purchase contract. Depending on contractual arrangements and the security environment, a field service representative can move forward and perform maintenance at or near the point of failure. Alternatively, the unit evacuates the equipment to a field service representative located at the field trains command post or BSA. Some items may have parts kits that may allow the field maintenance company to repair them. EOD, CBRN, and engineer units can fix some component assemblies for their robots and specialty equipment. Field service representatives make other repairs.

7-81. Units maintain standard equipment with normal, established two-level maintenance procedures if it is an Army program of record equipment. Units must make special considerations and effort to repair nonstandard equipment or commercial off the shelf items. Refer to individual equipment technical manuals and ATP 4-33 for additional information.

RECOVERY

7-82. Recovery is the process of repairing, retrieving, and freeing immobile, inoperative materiel from the point where it was disabled or abandoned. To support battlefield recovery operations, maintenance planners should echelon dedicated recovery assets throughout the BSA, field, combat, and company trains for optimum support of the BCT. Standard recovery may not apply for subterranean operations where unique terrain challenges may hinder recovery efforts.

7-83. Commanders must emphasize the use of self and like vehicle recovery methods during subterranean operations to the greatest extent possible. The FSC commander, maintenance warrant officer, and supported

battalion S-4 coordinate recovery operations supporting the commander's priorities by balancing the overall repair effort, available resources, and the tactical situation during subterranean and other operations.

7-84. The FSC has recovery assets located in the recovery section and field maintenance team within the field maintenance platoon. The FSC commander along with the maintenance warrant officer, or maintenance noncommissioned officer in charge, and the battalion S-4 track and manage recovery operations.

7-85. The field maintenance company of the BSB is responsible for recovering the BSB's organic equipment and providing limited backup support with wreckers or tracked recovery vehicles when requirements exceed a supported unit's capability. Maintenance planners must establish recovery priorities when recovery assets are limited. These depend on the commander's need for an item and the tactical situation.

7-86. The battalion S-4, the unit's maintenance warrant officer, and FSC commander are responsible for developing the maneuver battalion's repair and recovery plan. They develop a plan of action for repair and recovery of the disabled equipment based on the subordinate units in the battalion's request for assistance. The maintenance plan includes battle damage assessment, priority for support, tactical situation, forecasted workload, and availability of maintenance and recovery personnel.

7-87. Recovery for manned vehicles differs very little from operations above ground. Drivers and crews should evaluate the situation and determine if they can safely self-recover the vehicle with the available resources or use a like or larger vehicle before calling on support from a higher level. Issues that may impede recovery operations related to subterranean operations include confined spaces, wet surface, steep inclines, and rough terrain. Small, unmanned vehicles are typically easier to recover than larger vehicles. Larger, unmanned vehicles may require evacuation by a like size or larger vehicle.

Note. Recovery is a dangerous job. Before any recovery operation, do calculations, inspect tackle, and keep rigging references handy. A haphazard approach to recovery can lead to injury, death, or damaged equipment.

Self-recovery

7-88. Self-recovery starts at the location where the equipment becomes disabled. The operator or crew uses the basic issue items and additional authorized list or on-vehicle equipment items to perform self-recovery. When the equipment has a mechanical failure, the operator or crew uses the equipment's technical manual to perform troubleshooting procedures with the tools available in the basic issue items and additional authorized list or on-vehicle equipment. When self-recovery fails, the operator or crew can request assistance from available like vehicles.

Like-recovery

7-89. Soldiers utilize like-vehicle recovery when self-vehicle recovery fails. The principle is to use another piece of equipment "of the same weight class or heavier" to extract the disabled or damaged equipment by using tow bars, chains, tow cables, winches or allied kinetic energy recovery rope.

7-90. Using like vehicles is usually the quickest method of recovery because they are readily available. On dry, level hardstand in first gear or reverse, the average vehicle exerts a force equal to its own weight. Soldiers attempting like-vehicle recovery on vehicles that are not equipped with lifting shackles must attach a tow chain to the main structural members. While using chains or cables, you may have to use a break vehicle. Most tracked vehicles have their final drive removed. Terrain conditions affect the towing capability of a vehicle. These conditions may require two or more vehicles to exert the same force one vehicle could under ideal conditions. When the situation does not permit recovery by a like vehicle, Soldiers may be able to employ a winch. Most often, the approach to the disabled vehicle does not provide good traction. A winch is a more positive source of effort since its towing capability is not dependent on terrain conditions.

Note. A snapped winch line can be deadly. All personnel observing should stand at least one length of the whole payed-out cable away from and opposite of the angle of pull when the cable is under stress. This allows greater reaction time for personnel to move out of the path of flying objects if a cable or other attaching hardware breaks.

7-91. Winches utilize rigging, the process of assembling simple machines or tackle systems and using them, to multiply the available force to overcome total resistance. The product of these forces is mechanical advantage. Mechanical advantage is a small amount of force applied over a long distance to move a heavy load a short distance. Mechanical advantage is required whenever the load resistance is greater than the capacity of the available vehicle.

7-92. Soldiers utilize anchors to provide solid points of attachment for rigging during recovery operations. The number of anchors required for a recovery operation depends on the specific rigging required for that task. Multiple anchors may be required to provide additional points of attachment to achieve the desired mechanical advantage. Whenever possible or practical, utilize natural anchors to expedite the rigging and recovery process.

7-93. Vehicles are often the most readily available sources for anchors. Natural anchors are not always readily available and manmade anchors require significant effort to construct. Soldiers can utilize a vehicle, which also offers flexibility in placement, as an anchor to assist in the process.

7-94. Rigging techniques used depend on terrain, the types of recovery and inoperable vehicle, the distance between the recovery vehicle and the casualty vehicle, and weight of the tackle. Tackle is a combination of cables and blocks used to gain a mechanical advantage.

7-95. Before towing or recovering a disabled vehicle, check the vehicle's technical manual to ensure all physical and safety features are considered (for example, automatic transmissions, fail-safe braking systems, and articulation). Soldiers must follow these safety precautions to ensure they do not damage the disabled vehicle further during recovery. Refer to ATP 4-31 for detailed information regarding recovery.

Dedicated Recovery Vehicles

7-96. Soldiers coordinate with their respective field maintenance team for recovery support only when self-recovery or like-vehicle recovery techniques cannot support the recovery operation. Members of the field maintenance team coordinate recovery support from the BSB field maintenance company if needed. The methods of recovery performed with special purpose vehicles are winching, lifting, and towing. Tracked or wheeled recovery assets are only practical in Tier II or III subterranean structures where ample space, ventilation and a stabilized work surfaces are present.

Repurposing Equipment for Breaching

7-97. Various types of maintenance equipment are available for use as ad hoc mechanical breaching tools. Vehicles provide a ready means of wrenching doors from their hinges or dragging large chunks of debris aside. If winches are available, they can apply mechanical advantage to breaching in the same manner utilized in recovery operations. Alternatively, units can use a vehicle and chains to breach. See chapter 5 for more information about techniques for breaching.

Note. Only trained personnel wearing proper protective clothing, ear, and eye protection should operate cutting equipment. Improper operation may result in explosions or fire.

Welding

7-98. Cutting and welding equipment can also be re-purposed. Utilization of cutting systems requires transportation of related equipment, and power supply. Cutting is a hazardous operation and safety is a key consideration. Gases such as helium, argon, and carbon dioxide displace oxygen in the air and can lead to

suffocation, particularly when cutting in confined or enclosed space. Respiratory protection may be required if work practices and ventilation do not reduce exposures to safe levels.

7-99. The Army utilizes three types of cutting systems: Exothermic, plasma, and acetylene. The service and recovery section of the brigade support battalion's field service company typically has one or more of these cutting systems.

7-100. An exothermic cutting system uses cutting rods to cut or melt virtually any known material to include ferrous and nonferrous metals, rubber, nylon, stainless steel, cast iron, plastics, fiberglass, and concrete. The system requires a power source and a bottled oxygen source for operation. Once ignited the rod continues to burn as long as the oxygen supply remains on. The rod liquefies the material it touches and uses the burned materiel for fuel.

7-101. Plasma cutting is a process that cuts through electrically conductive materials by means of an accelerated jet of hot plasma. Welders can use plasma cutting on other conductive metals and alloys including copper, brass, titanium, Monel, Inconel, and cast iron. The melting temperature of some of those metals and alloys makes them difficult to cut with a good quality edge.

7-102. An acetylene torch uses fuel gases and oxygen to cut metals. The equipment used for oxyacetylene cutting consists of an oxygen and acetylene source provided by a portable or stationary bottle, along with a cutting attachment or a separate cutting torch. Other equipment requirements include a method to light the torch, and wrenches to operate the various connections on the cylinders, regulators, and torches. Additionally, Soldiers may use acetylene torches to cut metals under water. Refer to TC 9-237 for additional information on welding and cutting systems. For commercial off-the-shelf systems, refer to the manufacturer's user manual.

Note. Smoke and fumes generated during the cutting process are hazardous to your health. Leaking gases may cause injury or death. Use ventilation to keep air-breathing zone clear and comfortable.

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Appendix A

Subterranean Medical Considerations

This appendix provides guidance for planning and providing timely and effective treatment for Soldiers who have become ill or injured while conducting operations in subterranean environments.

RISK MULTIPLIERS IN A SUBTERRANEAN ENVIRONMENT

A-1. Health threats common to underground facility and subterranean environments include disease, trauma, and behavioral health issues. It is important to note that there are no differences in how injuries sustained in subterranean operations and those in any other operational environment are treated.

A-2. However, there are conditions common to underground facility and subterranean environments that have the potential to increase the number of casualties, the severity of wounds, and the psychological stress and its impact on Soldiers operating in these environments. These conditions include—

- Confined spaces.
- Little or no light.
- Fear of being trapped or buried alive.
- Lack of cover or concealment.
- Disorienting in both time and space.

EFFECTS OF OPERATING IN CONFINED SPACES COMBINED WITH LITTLE OR NO LIGHT

A-3. Conducting combat operations in confined spaces with little or no ambient light has the potential to increase both the type and severity of traumatic injuries. Combat and operational stress reactions experienced by Soldiers operating in these environments tend to increase significantly as well.

A-4. The physical effects of fighting in confined spaces constructed from concrete, stone, or densely packed earth are of particular concern. The primary physical risk is associated with blast waves from explosives neither absorbed nor attenuated by the environment. The subterranean environment amplifies and directs their wounding effects outward for great distances. Other physical risks from the environment include reduced air quality and concentrated exposure to toxic gases from weapon systems or other sources (natural and manmade). The construction material of the facility (concrete versus dirt) also has the potential to increased wounding effects of small arms to Soldiers through spall and ricocheting small arms projectiles.

A-5. The psychological effects of fighting in confined spaces with little or no ambient light may include cases of claustrophobia or increased severity of combat and operational stress reactions.

DISEASE

A-6. Soldiers can encounter numerous diseases in underground facilities and subterranean environments including—

- Hanta virus.
- Histoplasmosis.
- Rabies.
- Marburg hemorrhagic fever.

- Leptospirosis.
- Tick-borne relapsing fever.
- Other arthropod-borne diseases.

TRAUMA

A-7. Traumatic injuries may be encountered in underground facilities and subterranean environments including—

- Asphyxiation.
- Abrasions.
- Ballistic injuries (bullet wounds, secondary fragment wounds).
- Blast overpressure injuries.
- Burns.
- CBRN agents (toxic industrial materials and chemicals).
- Contusions.
- Crush injuries.
- Dust impaction injury.
- Fractures.
- Lacerations.
- Rodent bites.
- Snake bites.
- Spider bites.
- Sprains.
- Strains.
- Traumatic brain injury.

BEHAVIORAL HEALTH ISSUES

A-8. Soldiers encounter behavioral health issues in underground facilities and subterranean environments including—

- Claustrophobia.
- Combat and operational stress reactions.
- Survivor's guilt.
- Moral injury

EMOTIONAL, MORAL, AND SPIRITUAL HEALTH ISSUES

A-9. Psychosocial research regarding subterranean spaces identifies four major issues of concern for Soldiers in subterranean spaces; they are isolation, perceived control, negative culture-based associations, and perceived security. The spiritual, philosophical, and psychological frameworks shaping our culture, Soldiers, and professional ethos influence the effectiveness of units in a subterranean space. Subterranean environments may reduce a Soldier's sense of purpose and commitment, causing them to lose combat effectiveness sooner than anticipated due to the psychological and physiological stress of these environments.

A-10. Understanding how Soldiers respond to operations in subterranean environments requires consideration of spiritual, philosophical, and cultural perspectives. Most perspectives provide a concept of the afterlife, underworld, or death that includes some form of darkness, isolation, and lack of control. As a result, Soldiers may have powerful emotional reactions. These may include an overwhelming sense of fear or momentary loss of their moral compass leading to illegal or immoral actions.

A-11. Unprepared and untrained units and Soldiers lacking professional ethics, trust, and positive unit climates could exhibit a propensity for immoral and unethical decisions and actions creating increased potential for moral injury and post-traumatic stress. Training focused on character formation, moral leadership, and ethical reasoning under dynamic and complex conditions increases moral courage and commitment to the Army ethic, thereby fostering increased endurance and post-operations wellbeing. Chaplain sections and unit ministry teams can support this type of training (See FM 1-05 and ATP 1-05.04 for more information.)

BLAST INJURIES

A-12. Blast injuries, especially blast overpressure injuries, present unique challenges to leaders and medical personnel conducting combat operations in underground facilities and subterranean environments. Anytime Soldiers are in close proximity to an explosion in a underground facility or subterranean environment personnel must be suspected as having sustained blast overpressure injuries. (See table A-1, page A-4.)

A-13. In a subterranean environment, with substantial risks for overpressure injuries, it is crucial to perform traumatic brain injury screenings as quickly as possible. It can often be under recognized, given the more obvious severity of other injuries which are likely to be incurred. When exposed to a potentially traumatic brain injury causing event, it is imperative for Soldiers to be quickly evaluated and evacuated to an appropriate role of care to minimize brain damage and potentially death. (See table A-2, page A-5.)

Note. Up to 10 percent of all blast survivors have significant eye injuries. These injuries involve perforations from high-velocity projectiles that can occur with minimal initial discomfort, and may present days, weeks, or months after the event. Symptoms include eye pain or irritation, foreign body sensation, altered vision, periorbital swelling or contusions. Findings can include decreased visual acuity, hyphemia, globe perforation, subconjunctival hemorrhage, foreign body, or lid lacerations. Liberal referral for ophthalmologic screening is encouraged.

Table A-1. Medical considerations for blast injuries

• Clinical signs of blast-related abdominal injuries can be initially silent until signs of acute abdomen or sepsis are advanced.
• Standard penetrating and blunt trauma to any surface of the body is the most common injury seen among survivors. Primary blast lung and blast abdomen are associated with a high mortality rate. “Blast lung” is the most common fatal injury among initial survivors.
• Blast lung presents soon after exposure. Confirmed by finding a “butterfly” pattern on chest X-ray. Prophylactic chest tubes (thoracotomy) are recommended prior to general anesthesia or air transport.
• Medics may overlook auditory system injuries and concussions.
• The symptoms of mild TBI and posttraumatic stress disorder can be identical.
• Isolated TM rupture is not a marker of morbidity; however, traumatic amputation of any limb is a marker for multi-system injuries.
• Air embolism is common, and can present as stroke, myocardial infarction, acute abdomen, blindness, deafness, spinal cord injury, or claudication. Hyperbaric oxygen therapy may be effective in some cases.
• Compartment syndrome, rhabdomyolysis, and acute renal failure are associated with structural collapse, prolonged extrication, severe burns, and some poisonings.
• Consider the possibility of exposure to inhaled toxins and poisonings (for example, CO, CN) released by explosives.
• Wounds can contaminated. Consider delayed primary closure and assess tetanus status. Ensure close follow-up of wounds, head injuries, eye, ear, and stress-related complaints.
• Medics may need to write instructions to communicate with patients due to tinnitus and sudden temporary or permanent deafness.
Legend: CN – tear gas, CO – carbon monoxide, TBI – traumatic brain injury, TM – tympanic membrane

Table A-2. Mechanisms of blast injury quick reference chart

CATEGORY	CHARACTERISTICS	BODY PART AFFECTED	TYPES OF INJURIES
Primary	• Unique to high explosives, results from the impact of the over pressurization wave with body surfaces.	• Gas filled structures are most susceptible: • Lungs. • Stomach and intestine. • Middle ear.	• Blast lung (pulmonary barotrauma). • Tympanic membrane rupture and middle ear damage. • Abdominal hemorrhage and perforation. • Globe (eye) rupture. • Concussion (TBI without physical signs of head injury).
Secondary	• Results from flying debris and bomb fragments.	• Any body part may be affected.	• Penetrating ballistic (fragmentation) or blunt injuries. • Eye penetration (can be occult).
Tertiary	• Results from individuals being thrown by the blast wind.	• Any body part may be affected.	• Fracture and traumatic amputation. • Closed and open brain injury.
Quaternary	• All explosion-related injuries, illnesses, or diseases not due to primary, secondary, or tertiary mechanisms. • Includes exacerbation or complications of existing conditions.	• Any body part may be affected.	• Burns (flash, partial, and full thickness). • Crush injuries, closed and open brain injury. • Asthma, COPD, or other breathing problems from dust, smoke, or toxic fumes. • Angina, hyperglycemia, hypertension.

Legend: COPD – chronic obstructive pulmonary disease, TBI – traumatic brain injury

TACTICAL COMBAT CASUALTY CARE

A-14. The limitations of the environment may prevent establishing the battalion aid station and employing medical evacuation assets inside the underground facility or subterranean environment. Units must quickly provide combat casualty care through self-aid, buddy-aid, and combat lifesavers by locating, acquiring, treating, and evacuating the injured. Refer to the most current Tactical Combat Casualty Care Guidelines for additional information.

A-15. Veterinarians and military working dog handlers should train medical personnel in canine tactical combat casualty care procedures. Units should train at least two select first responders on basic canine handling and medical techniques for situations when the handler is down. Many of the principles for human care are similar for canines with some of the following differences. Consider injured or stressed canines unpredictable. They may bite even their own handler. Care providers should consider applying a muzzle prior to handling a conscious canine when no contraindications to muzzling exist and it is tactically feasible. The injuries that may prevent the use of a muzzle include upper airway obstruction, respiratory complications,

severe facial trauma, heat-related injuries, vomiting, and unresponsiveness. Canines operating in a tactical environment should wear a body type harness to assist in extraction and deployment. Direct pressure secured with a circumferential pressure dressing remains the primary means of controlling external hemorrhage in canines. Commercial human C-A-T tourniquets tend not to adequately control upper extremity hemorrhages in canines due to the anatomical conformation of the canine limb. An improvised tourniquet application is a last resort for distal extremity, tail wounds, or amputations only after Soldiers cannot control the hemorrhage by direct pressure alone. Refer to ATP 3-39.34 for additional information.

A-16. Apply the basic principles of CBRN casualty management in the same manner as other casualties. Threats to life require prompt recognition and intervention. Medics and first responders may address nonlife-threatening injuries when clinically appropriate. Early recognition and categorization of CBRN-exposed patients is the foundation for further management, and is key not only for initiating patient treatment but also for preventing contamination of medical personnel, equipment, and facilities. Thorough and appropriate decontamination is a core skill that requires planning and practice. Attention to details such as preventing hypothermia in patients undergoing decontamination and clinical reassessment at each stage of the process reduces unnecessary loss of life. Practitioners in the CBRN care chain must master the basic life saving measures such as airway management and resuscitation under these challenging conditions. Refer to Joint Trauma System Clinical Practice Guideline CBRN Injury, Part I: Initial Response to CBRN Agents (CPG ID: 69), dated May 2018, for additional information. This publication can be found at the Department of Defense Trauma Registry website.

A-17. Commanders and first sergeants must appoint, equip, and train additional combat lifesavers and litter teams to evacuate casualties to CCPs and onward to the extraction point.

Appendix B
Training

Preparing for subterranean operations requires education, facilities, training, and rehearsals. Soldiers need to master skills associated with new equipment, adapt tactics and procedures, and become confident conducting operations in a new environment, both as individuals and as a member of team.

Mastering fundamentals while training in conditions that simulate a subterranean environment increases Soldier's operational effectiveness and confidence. Attributes such as adaptability and critical thinking enhances the operational performance necessary to fight, win, and survive in a complex subterranean environment.

TRAINING OBJECTIVES

B-1. To develop the problem-solving capabilities and the ability to apply subterranean operations proficiency in theater, training, and education should be outcome based and Soldier centric. Leaders, staffs, and Soldiers must be able to conduct unified land operations while operating within a complex subterranean environment. They do this by demonstrating the ability to plan and execute doctrinally sound operations using their organic assets and enablers to defeat a wide variety of threats. The following sections describe recommended considerations and techniques for planning subterranean training for individuals, small teams, and staffs.

INDIVIDUAL AND SMALL TEAM SKILL TRAINING

B-2. Individual Soldier skills to prepare for operations in a subterranean environment are fundamental for the unit's overall success. These skills build the Soldier physically and psychologically to fight, survive, and win in underground operations.

B-3. Soldiers and small teams can practice these skills in the unit area, local training area, and on small arms range at the unit's home station. Training tasks should focus on the following key components of shoot, move, communicate, medicate, and sustain:

- Engage targets with assigned weapon utilizing thermal optics and infrared lasers during day and night while wearing MOPP 4.
- Conduct combat focused physical training in protective masks and progressively increasing the duration and intensity.
- Conduct patient carries, drags, and two and four Soldier litter carries while wearing full field equipment and in MOPP 4. Increase complexity from flat terrain by going up and down hills, over uneven terrain, and by moving into and through tight doorways, stairwells, and tunnels.
- Evaluate and treat a casualty while in MOPP 4 gear.
- Practice hand and arm signals, easily recognizable commands, and communication techniques using protective masks while conducting buddy, team, and squad movement techniques in open terrain and urban terrain in low and no light conditions.
- Practice team and squad urban movement techniques in full tactical gear, MOPP 4, and ballistic shields, and NVGs graduating to urban terrain and tunnels.
- Increase technical proficiency at the team and squad level in subterranean related equipment. Practice the use of robots and military working dogs in subterranean passageways and buildings. Employ CBRN sensors, air quality monitors, communications, and other enabling systems.

- Practice manual mapping and marking techniques of a building, ultimately graduating to under low light and no-light conditions.
- Identify and mark explosive hazards and booby traps.
- Integrate enablers, both within the BCT and those from outside organizations, into small unit training events.

STAFF TRAINING

B-4. Commanders and chiefs of staff should exercise their staff personnel in subterranean operational planning using simple vignettes to exercise the staff rapid planning process. By incorporating the planning considerations of chapters 3 and 4, staff sections can conduct IPB and mission analysis on any complex urban and subterranean location. These exercises assist the commander to ensure staff personnel understand their commander's intent and guidance, become proficient in their respective warfighting function, and how to quickly plan in a time-constrained environment.

TRAINING FACILITIES

B-5. Every Army installation, with a BCT or other organization that is expected to perform operations in a subterranean environment, should commit resources to build a subterranean trainnig facility. While these facilities vary greatly by location based on the resources and land available, number of units that are expected to use the facility, and other local priorities they should be designed and built to meet the following specifications:

- Incorporate multiple breach points to facilitate as many forms of breaching as practical including manual, ballistic, thermal, and explosive. The appropriate back blast considerations must be included if designed for explosive breaching.
- Construct facility using concrete and steel if possible. This provides a realistic training area and assists in reducing the effectiveness of standard communication equipment.
- The facility should be large enough to incorporate an entire Infantry platoon and still require additional Soldiers to secure the facility. This size allows units to prepare, plan, and execute transitions between elements and incorporate enablers and additional reinforcements into the fight.
- Subterranean training facilities should be compartmentalized and expandable, which allows tailoring to various sized units and more or less complex missions. Stairwells, ramps, catwalks, and other appropriate complex subterranean terrain such as confined spaces, culverts, and adits included.
- The facility should have lighting that can be turned on and off, built-in surveillance to assist with opposing force situational awareness and after-actions reviews, and large fans to simulate a ventilation system and increase ambient noise.
- The training facility should be compatible with simulated munitions and other training devices to make the environment as realistic as possible.
- Customizable CBRN labs that facilitate sensitive site exploitation and clearing considerations.

B-6. Operating in subterranean facilities is METT-TC dependent. Therefore, units should be able to train and rehearse in various sized passageways and facilities while being exposed to a variety of challenges that are prevelant, or significantly more challenging, in a subterranean environment when developing and refining their SOPs.

B-7. When conducting home base training, units should allocate all available assets and facilities to replicate conditions and considerations expected to occur while operating in a subterranean environment. This should include intelligence-driven scenarios with desired outcomes. This should also include operating under limited to zero visibility and CBRN conditions.

IMPROVISED FACILITIES

B-8. Not all training for subterranean operations requires a subterranean facility. Glass house drills (or tape drills) for rooms and intersections can be conducted anywhere along with the various individual and small unit tasks that can be expected during these operations.

B-9. Units train using available structures, outcome based scenarios, and current enemy templates. Examples such as low-visibilty operations, CBRN environments, barricaded defensive fighting positions, and built up structures should be incorporated into the training. Conducting training using a variety of enablers permits a commander with the opportunity to exercise command and control while employing all available assets. Availability to train in similar or matching terrain and conditions increases operational effectiveness and identifies critical capability gaps across all warfighting functions.

B-10. Confined space trainers familiarize Soldiers with operating in confined spaces common to many subterranean systems. The confined space trainer may also be used to identify Soldiers who are uncomfortable with or not prepared mentally or physically to operate in close, confined, and dark spaces that restrict mobility and visibility.

B-11. One method of building confined space trainers is to use an 8-foot x 8-foot x 40-foot steel, intermodal shipping container. Inside the shipping container are six main tunnels, three stacked vertically on each interior wall in the container. The container's center remains open to allow instructors to access each passageway throughout the length of the container and to control the exercise inside the trainer. The tunnels are approximately 28-inches wide and 25 to 28 inches in height. The lower right tunnel and mid-level tunnel incorporate sections of plastic culvert material 24 inches in diameter. These containers provide Soldiers and units with the ability to—

- Train squads and platoons in a subterranean environment.
- Allow instructors the ability to observe Soldiers throughout entire complex.
- Confirm Soldiers' ability to operate in dark confined spaces.
- Train individual Soldier movement in small confined spaces.
- Force leaders to decide individual Soldier protection level, weapon, and equipment load.
- Expose Soldiers to vertical and horizontal shafts and converts.
- Train in an urban training site (Simunitions).

B-12. Figure B-1 shows that the end sections of the tunnel may be removed for access to the tunnels. Tunnels are constructed of standard, construction grade lumber and plywood. All tunnels run the length of the shipping container. Individual tunnels are connected in different locations to the door of the shipping container and to other tunnels through vertical, horizontal, and diagonal tunnel connections.

Figure B-1. Exterior example of confined space trainer

B-13. Confined space trainer construction materials are listed below (see figure B-2):

- Intermodal shipping container, steel, 40-foot (quantity:1).
- Plastic culvert, 24-inches diameter.
- Lumber, 2 inches x 4 inches x 16 feet (quantity: 94).
- Lumber, 2 inches x 6 inches x 16 feet (quantity: 40).
- Plywood, 1/2 inch x 4 feet x 8 feet (quantity: 60 units).
- Ventilator turbine, roof 12 inch (quantity: 9 units).
- Nail, 2-3/8 inch, galvanized (quantity: 5 boxes).
- Rubber pad, 1/2 inch x 36 inch x 36 inch (quantity: 20 units).

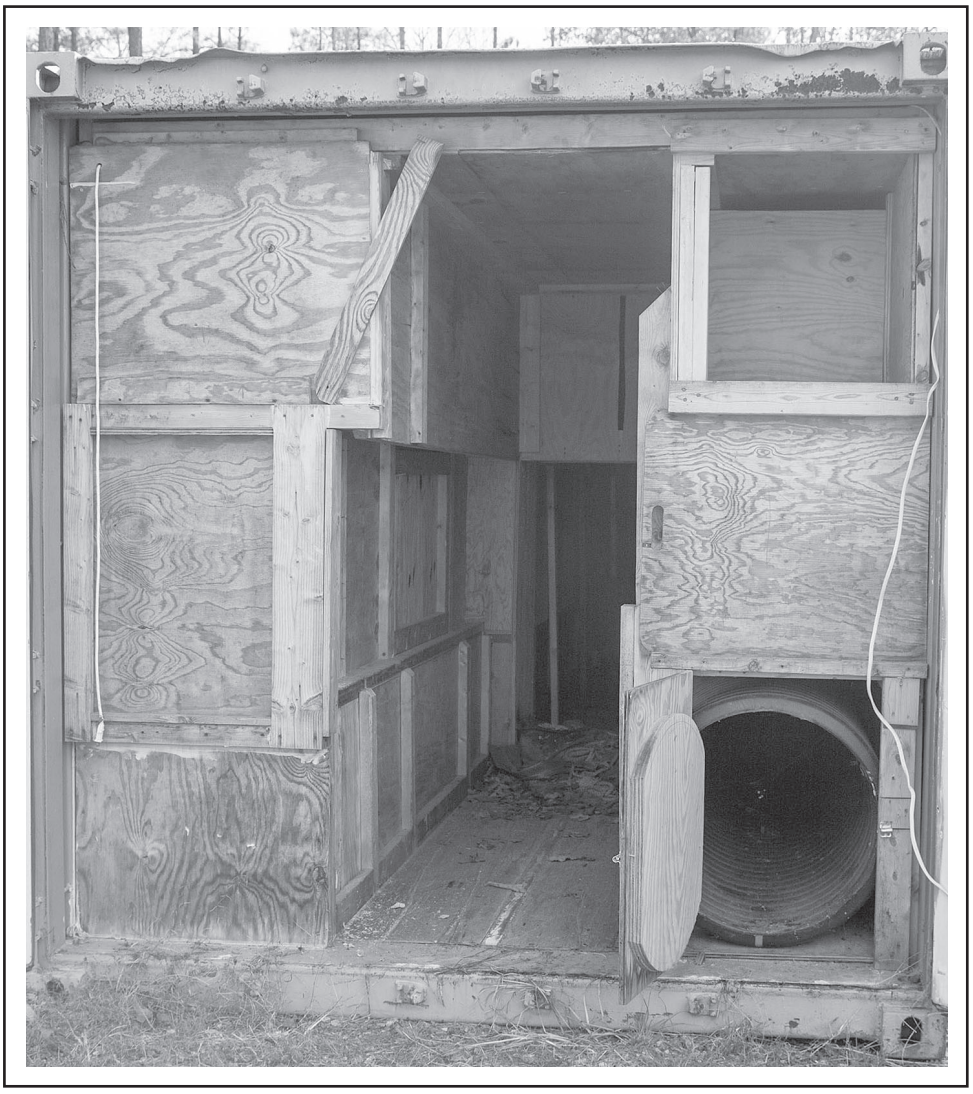

Figure B-2. Interior of confined space trainer, example

B-14. Capabilites of the subterranean trainer are listed below:

- Platoon to company size objective with adjacent targets.
- Breaching (mechanical, ballistic, thermal, and explosives).
- Large maneuver area with multiple entry and exit points.

- Simunitions.
- Vertical and horizontal shaft entry.

B-15. Subterranean trainer construction materials (see figure B-3) are listed below:

- Shipping container, intermodal shipping container, steel, 8 feet x 8 feet x 20 feet (quantity: 6 units).
- Concrete arch forms, 32 feet x 6 feet x 6 feet (quantity: 5 units). Concrete culvert, 14 feet x 10 feet x 8 feet (quantity: 14 units).
- Plastic culvert, 48 inches diameter x 20 feet in length (quantity: 1 unit).
- Lumber, pressure treated, 6 inches x 6 inches x 10 feet (quantity: 1200 board feet).
- Lumber, plywood 3/4 inch x 4 feet x 8 feet (quantity: 30 units).
- Lumber, 2 inch x 6 inch x 8 feet (quantity: 800 board feet).
- Steel pipe, 1-inch diameter x 2 feet (quantity: 16 units for ladder rungs).
- Heavy duty tarp, 20 feet x 20 feet (quantity: 2 units).
- Straps, adjustable ratchet, 2 inch x 20 feet (to secure plastic culvert) (quantity: 2 units).
- Liquid nails, heavy duty construction (quantity: 48 cartridges).
- Expandable foam spray, maximum (max) fill (used to seal cracks between culverts and shipping containers) (quantity: 2 kits).
- Screws, deck 2-1/2 inch (quantity: 10 units in 25-pound boxes).
- Assorted lag bolts, nails, wood screws, concrete anchors, bolts, washers, nuts (quantity depends on design features).

Figure B-3. Subterranean trainer, example

B-16. Soldiers operating within a subterranean environment have to breach barricades using ballistic, mechanical, and thermal methods. The following information describes various breach trainers that can be built using shipping containers and other materials.

B-17. The first breach trainer is located at the entrance of the subterranean training system. It enables Soldiers to train on assaulting the entrance and conducting mechanical and thermal breaching methods of a simulated entrance door.

B-18. Entrance breach trainer construction materials are listed below:

- Lumber, pressure treated 6 inches x 6 inches x 8 feet (quantity: 2 units).
- Lumber, pressure treated 6 inches x 6 inches x 10 feet (quantity: 1 unit).
- Bolts, 8 inches for attaching timbers to concrete (quantity: 4 units).
- Lag bolts with washers and nuts (quantity: 14 units).
- Angle, structural, 1/4 inch x 2 inches x 8 feet (quantity: 2 units).
- Steel plate, 3/16 inch x 3 inches x 8 inches (quantity: 2 units).
- Steep plate, 1/4 inch x 2 inches x 3 inches (quantity: 2 units).

B-19. The next breach trainer is located inside the subterranean trainer. Units use it to train mechanical breaching in a subterranean environment.

B-20. Interior breach trainer construction materials are listed below:

- Doors, solid core, 36-inches x 78 inches (quantity: 2 units).
- Steel plate, 3/16 inch x 36 inches x 78 inches (quantity: 2 units).
- Hinge, tee (quantity: 15 pair).
- Hinge, door, 4 inches (quantity: 15 packages).
- Rolled steel, 1/2 inch x 4 inches x 36 inches (quantity: 8 units).
- Angle, structural, 1/4 inch x 3 inches x 8 feet (quantity: 4 units welded together to form two U-shaped channels).
- Angle, structural, 1/4 inch x 2 inches x 12 inches (quantity: 2 units).
- Lumber, 2 inches x 4 inches x 8 feet (quantity: 3 units).
- Lumber, plywood, 3/4 inch x 48 inches x 96 inches (quantity: 6 units).
- Eyebolts (quantity: 2 units).
- Fasteners (assorted screws, bolts, nuts, washers).

DEPARTMENT OF DEFENSE FACILITIES

B-21. Department of Defense installations and combat training centers have urban operations sites. Each site has underground networks where units can practice, refine, and drill techniques for subterranean operations. Many local emergency response organizations have firehouses or like facilities that units may be able to utilize for confined space training. The following military installations have subterranean networks and facilities. Considerations such as security clearances, funding, and scheduling must be considered when planning and resourcing training at the following facilities:

- Fort Hood, Texas.
- Fort Wainwright, Alaska.
- Camp Atterbury Seymour, Indiana.
- Muscatatuck Urban Training Center, Indiana.
- Tunnel Warfare Center, China Lake, California.
- Yuma Proving Grounds, Arizona.
- Dugway Proving Ground, Utah.
- Sandia National Laboratories, New Mexico.
- Camp Stanley, Republic of Korea.

B-22. Units training for the subterranean environment must rehearse in various conditions such as low-visibility, confined spaces, restricted fires, limited use of communications, and reduced global positioning system reliability. Units should also apply these conditions to a CBRN environment. Training should allow for rehearsals, contingencies, and injects designed to appropriately challenge the unit being trained. Units must provide sufficient time to allow repetitions to increase proficiency, challenge leader critical-thinking, and foster adaptability within the unit.

SUPPORTING COLLECTIVE TASK

B-23. Refer to tables B-1 through B-4, pages B-9 through B-10:

Table B-1. Task 07-PLT-9029, Enter and clear an underground facility (platoon)

Supporting References			
Reference Identification	**Reference Name**	**Required**	**Primary**
ATP 3-21.8	The Infantry Platoon and Squad	Yes	No
ATP 3-21.51	Subterranean Operations	Yes	Yes
ATTP 3-06.11	Combined Arms Operations in Urban Terrian	Yes	No
Conditions: The platoon is conducting operations in a live training environment as part of a company or larger force. The platoon receives an operation order to enter and clear an underground facility at the location and time specified. The platoon is conducting operations at night in a dynamic and complex operational environment against a hybrid threat. The order includes all control measures necessary to enter and clear an underground facility. The platoon has communications with higher, adjacent, and subordinate elements. All necessary personnel and equipment are available. The platoon has guidance on rules of engagement.			

Table B-2. Task 07-CO-9029, Enter and clear an underground facility (company)

Supporting References			
Reference Identification	**Reference Name**	**Required**	**Primary**
ATP 3-21.51	Subterranean Operations	Yes	Yes
ATTP 3-06.11	Combined Arms Operations in Urban Terrain	Yes	No
ATP 3-21.10	Infantry Rifle Company	Yes	No
Conditions: The company is conducting operations in a live training environment as part of a battalion or larger force and receives an OPORD to enter and clear an underground facility at the location and time specified. The company is conducting operations at night in a dynamic and complex operational environment against a hybrid threat. The intelligence reports indicate that the facility had occupants of unknown hostility to friendly forces. The order includes all control measures necessary to control, enter, and clear an underground facility. The company has communications with higher, adjacent, and subordinate elements. The company has received guidance on the rules of engagement.			

Table B-3. Task 07-BN-9029, Attack an underground facility (battalion)

Supporting References			
Reference Identification	**Reference Name**	**Required**	**Primary**
ATP 3-21.51	Subterranean Operations	Yes	Yes
ATTP 3-06.11	Combined Arms Operations in Urban Terrain	Yes	No
ATP 3-21.20	Infantry Batallion	Yes	No
Conditions: The battalion is training as part of a brigade combat team or a larger force and receives an OPORD to conduct an attack of an underground facility. The battalion is conducting operations in a dynamic and complex environment against a hybrid threat. The order includes all applicable overlays and graphics, area of operations boundaries, and control measures. All necessary personnel and equipment is available. The battalion has established communications with higher, adjacent, subordinate, and supporting elements. The battalion has received guidance on the rules of engagement.			

Table B-4. Task 07-BDE-9029, Attack an underground facility (brigade)

Supporting References			
Reference Identification	**Reference Name**	**Required**	**Primary**
ATP 3-21.51	Subterranean Operations	Yes	Yes
ATTP 3-06.11	Combined Arms Operations in Urban Terrain	Yes	No
FM 3-90-1	Offense and Defense, Volume 1	Yes	No
FM 3-96	Brigade Combat Team	Yes	No
Conditions: The brigade is conducting operations in a live training environment independently or as part of a division or larger force and receives an OPORD to conduct an attack of an underground facility. The brigade is conducting operations at night in a dynamic and complex environment against a hybrid threat. The order includes all applicable overlays, graphics, boundaries, and control measures. All necessary personnel and equipment are available. The brigade has established communications with higher, adjacent, subordinate, and supporting elements. The brigade has received guidance on rules of engagement.			

Glossary

The glossary lists acronyms and terms with Army or joint definitions. Where Army and joint definitions differ, (Army) precedes the definition. ATP 3-21.51 is not a proponent for any terms. The glossary lists the proponent manual for other terms in parentheses after the definition.

SECTION I – ACRONYMS AND ABBREVIATIONS

ABCT	Armored brigade combat team
ADA	air defense artillery
ADP	Army doctrine publication
AR	Army regulation
ATP	Army techniques publication
BCT	brigade combat team
BDE	brigade
BEB	brigade engineering battalion
BN	battalion
BSA	brigade support area
BSB	brigade support battalion
CASEVAC	casualty evacuation
CAV	Cavalry
CBRN	chemical, biological, radiological, and nuclear
CCIR	commander's critical information requirement
CCP	casualty collection point
CO	company
COA	course of action
CP	command post
DTG	date-time group
DA	Department of the Army
DD	Department of Defense
DOD	Department of Defense
EAB	echelons above brigade
EOD	explosive ordnance disposal
FA	field artillery
FLE	forward logistics element
FM	field manual
FSC	forward support company
IPB	intelligence preparation of the battlefield
JP	joint publication

JTF	joint task force
IBCT	Infantry brigade combat team
IN	Infantry
LOGPAC	logistics package
MCWP	Marine Corps warfighting publication
MDMP	military decisionmaking process
METT-TC	mission, enemy, terrain and weather, troops and support available, time available, and civil considerations
MOPP	mission-oriented protective posture
mm	millimeter
MP	military police
NTTP	Navy tactics, techniques, and procedures
NVG	night vision goggle
OPCON	operational control
OPORD	operation order
PL	phase line
PLT	platoon
S-2	brigade or battalion intelligence staff officer
S-3	battalion or brigade operations staff officer
S-4	battalion or brigade logistics staff officer
SBCT	Stryker brigade combat team
SOF	special operations forces
SOP	standard operating procedure
TC	training circular
TLP	troop leading procedures
UAS	unmanned aircraft system
WARNORD	warning order
WMD	weapons of mass destruction
XO	executive officer

SECTION II – TERMS

assessment

Determination of the progress toward accomplishing a task, creating an effect, or achieving an objective. (ADP 5-0)

breach

A tactical mission task in which the unit employs all available means to break through or establish a passage through an enemy defense, obstacle, minefield, or fortification. (FM 3-90-1)

bypass

A tactical mission task in which the commander directs the unit to maneuver around an obstacle, position, or enemy force to maintain the momentum of the operation while deliberately avoiding combat with an enemy force. (FM 3-90-1)

clear

A tactical mission task that requires the commander to remove all enemy forces and eliminate organized resistance within an assigned area. (FM 3-90-1)

contain

A tactical mission task that requires the commander to stop, hold, or surround enemy forces or to cause them to center their activity on a given front and prevent them from withdrawing any part of their forces for use elsewhere. (FM 3-90-1)

control

A tactical mission task that requires the commander to maintain physical influence over a specified area to prevent its use by an enemy or to create conditions necessary for successful friendly operations. (FM 3-90-1)

critical asset security

The protection and security of personnel and physical assets or information that is analyzed and deemed essential to the operation and success of the mission and to resources required for protection. (ADP 3-37)

cyberspace operations

(DOD) The employment of cyberspace capabilities where the primary purpose is to achieve objectives in or through cyberspace. (JP 3-0)

execution

Putting a plan into action by applying combat power to accomplish the mission and adjusting operations based on changes in the situation. (ADP 5-0)

geospatial intelligence

(DOD) The exploitation and analysis of imagery and geospatial information to describe, assess, and visually depict physical features and geographically referenced activities on the Earth. Geospatial intelligence consists of imagery, imagery intelligence, and geospatial information. (JP 2-03)

human intelligence

The collection by a trained human intelligence collector of foreign information from people and multimedia to identify elements, intentions, composition, strength, dispositions, tactics, equipment, and capabilities. (ADP 2-0)

hybrid threat

The diverse and dynamic combination of regular forces, irregular forces, terrorists, or criminal elements acting in concert to achieve mutually benefitting effects.

measurement and signature intelligence

Information produced by quantitative and qualitative analysis of physical attributes of targets and events to characterize, locate, and identify targets and events, and derived from specialized, technically derived measurements of physical phenomenon intrinsic to an object or event. (JP 2-0)

mission statement

(DOD) A short sentence or paragraph that describes the organization’s essential tasks, purpose, and action containing the elements of who, what, when, where, and why. (JP 5-0)

neutralize

(Army) A tactical mission task that results in rendering enemy personnel or materiel incapable of interfering with a particular operation. (FM 3-90-1)

open-source intelligence

(DOD) Relevant information derived from the systematic collection, processing, and analysis of publicly available information in response to known or anticipated intelligence requirements. (JP 2-0)

planning

The art and science of understanding a situation, envisioning a desired future, and determining effective ways to bring that future about t. (ADP 5-0)

preparation

Those activities performed by units and Soldiers to improve their ability to execute an operation. (ADP 5-0)

risk management

(DOD) The process to identify, assess, and control risks and make decisions that balance risk cost with mission benefits. Also called RM. (JP 3-0)

signals intelligence

Intelligence derived from communications, electronic, and foreign instrumentation signals. (JP 2-0)

tactical mission task

The specific activity performed by a unit while executing a form of tactical operation or form of maneuver. It may be expressed in terms of either actions by a friendly force or effects on an enemy force. (FM 3-90-1)

technical intelligence

(DOD) Intelligence derived from the collection, processing, analysis, and exploitation of data and information pertaining to foreign equipment and materiel for the purposes of preventing technological surprise, assessing foreign scientific and technical capabilities, and developing countermeasures designed to neutralize an adversary's technological advantages. (JP 2-0)

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ATP 3-21.5
01 November 2019

By Order of the Secretary of the Army:

JAMES C. MCCONVILLE
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