HANDBOOK

No. 15-12

JUN 15

The Brigade Engineer Battalion

A Leader's Guide

LESSONS AND BEST PRACTICES

CENTER FOR ARMY LESSONS LEARNED

SUPPORTING THE WARFIGHTER

The Brigade Engineer Battalion

A Leader's Guide

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Foreword

Years of conflict in Iraq and Afghanistan resulted in U.S. Army senior commanders reevaluating the doctrinal roles and responsibilities of combat and construction engineers. Army Doctrine Reference Publication (ADRP) 3.0, *Unified Land Operations,* maintains combined arms as the application of arms that multiplies Army forces' effectiveness in all operations. The decision to convert the brigade special troops battalion (BSTB) to a brigade combat team (BCT), brigade engineer battalion (BEB), enhances engineer mission support by providing the required engineer mission command and staff, as well as the organizational capability, within all BCT organizations.

The BSTB to BEB conversion process is ongoing with active and Army National Guard units. The timeline is expected to run through Fiscal Year (FY) 2018. Observations from initial FY 2014 National Training Center (NTC) rotations identified four common doctrinal areas that needed improvement. This handbook, prepared at the NTC's request, serves as a training support document for converting battalions. It is not an exhaustive how-to guide or standard operating procedure. It was written to function as a rapid reference source or smart book to answer most of the initial questions in the minds of those leaders tasked to reorganize, equip, train, and standup brigade engineer battalions (BEBs), providing just enough substance to familiarize readers with the basic information.

The primary source reference for the handbook is Army Techniques Publication 3-34.22, *Engineer Operations-Brigade Combat Team and Below*. Supplemental references also are cited throughout the handbook and in the References Section for additional information.

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The Brigade Engineer Battalion

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Chapter 1
Engineer Roles and Responsibilities

Maneuver commanders rely on engineers to add breadth and depth to the overall understanding of the operational environment. The engineer perspective shares a common understanding of the operational environment, while adding a degree of focus on those aspects within an engineering background. The engineer, employing the common analytical framework and a unique technical background, identifies significant and relevant challenges and opportunities of potential impact to the combined arms operation.

Brigade Combat Team Staff and Organization

Brigade combat team (BCT) staff sections are organized into functional and integrating cells. This organization may vary depending on the mission assigned to the BCT. The BCT staff usually organizes the following six functional cells:

- Sustainment.
- Intelligence.
- Operations.
- Network operations.
- Information collection.
- Civil affairs operations.

The brigade engineer battalion (BEB) commander is the brigade engineer in the BCT and advises the maneuver commander on how best to employ combat, general, and geospatial engineering capabilities in support of decisive action operations. The BEB provides organic engineer, military intelligence, signal, planning, and execution capabilities to the BCT.

Assistant Brigade Engineer Section

The engineer staff is responsible for coordinating engineer assets and operations for the command. When an organic engineer staff does not exist at the maneuver battalion level, the engineer staff is the senior engineer supporting that unit. When an engineer battalion is task-organized in support of a BCT, the BCT commander determines if a change will occur in engineer staff designation.

The assistant brigade engineer (ABE) section's primary duty is to coordinate engineer operations in support of the combined arms operation. The ABE section integrates specified and implied engineer tasks into the maneuver unit plan and ensures that supporting engineer units are integrated into mission planning, preparation, execution, and assessment activities.

Engineer Considerations for Information Collection

If the BCT elects to conduct separate information operations, targeting meeting, or conducts an internal cell meeting prior to the BCT-targeting meeting, the ABE or his representative participates. Engineer participation in targeting provides a medium for integrating the nonlethal effects of certain engineer capabilities. It also provides the ABE with an excellent opportunity to implement engineer requirements into the prioritization of information collection, public affairs (PA), and military information support operations (MISO) activities and the tasking of those limited assets within the BCT. The ABE coordinates with the BCT MISO officer for MISO surveys in local communities to compare pending engineering projects with local population desires.

Unified Land Operations

For offensive and defensive operations, engineer augmentation in the BCTs is usually required. The ABE assesses the requirement of additional engineer capability and capacity during mission analysis. Augmentation primarily comes from combat engineering, but also includes general engineering assets and capabilities. Other, more technically specialized engineering capabilities may provide support to BCT requirements for movement and maneuver, intelligence, protection, and sustainment. Engineer augmentation may come in teams, sections, platoons, or companies or under the mission command of a task-organized, multifunctional, battalion-sized engineer Task Force (TF) headquarters.

Stability and defense support of civil authorities change the nature and focus of much of the engineer support to the BCT. As with support for combat operations, engineer augmentation may come in teams, sections, platoons, or companies or under the mission command of a task-organized, multifunctional, battalion-sized engineer TF headquarters.

Brigade Engineer Battalion

The BEB in each of the BCTs provides a baseline of combat capabilities to which augmentation can be added. The ABE section within the BCT staff not only identifies augmentation that is required, but also coordinates its application. Each BCT also has organic geospatial engineering capabilities to provide a baseline of geospatial support.

The BCT commander will issue mission orders for organic units. The command and support relationship dictates whether the BEB will logistically support or coordinate support with the BCT, brigade support battalion, or other unit higher headquarters. Unless the BCT directs otherwise, the BEB retains command and support relationships with organic and attached units, regardless of location on the battlefield. The companies may be further task-organized to maneuver TFs, the cavalry squadron, or a subordinate company or troop.

Headquarters and Headquarters Company, Engineer Battalion, in the BCT

The headquarters and headquarters company (HHC) consists of the battalion headquarters section; company headquarters; chemical, biological, radiological, and nuclear (CBRN) reconnaissance platoon; sustainment medical cell; and sustainment unit ministry team. The HHC commander assists the engineer battalion commander in designating the location of the HHC operations center. The company provides all sustainment functions necessary for the battalion to successfully accomplish its mission. The location of the company is directed by the battalion commander.

- **Battalion Headquarters.** The engineer battalion headquarters consists of a command section and its staff sections. Staff sections consist of personnel (S-1), intelligence (S-2), operations (S-3), sustainment (S-4), and communications (S-6). The BEB main command post (CP) normally co-locates with the BCT main CP and establishes future operations, current operations, and plans cells. The staff sections describe their setup in a tactical standard operating procedure (TACSOP). The BEB tactical CP center normally co-locates with the BCT's tactical action center.
- **Command Section.** The battalion command section is the commander, executive officer, and command sergeant major. In coordination with the commander, this section executes mission command over subordinate companies, elements, and staff sections. The command section ensures all subordinate elements receive administrative/logistical support within the capabilities of the organization.
- **S-1, Personnel.** The S-1 section is responsible for personnel administration. The S-1 is responsible for tracking the many specialized military occupational skills of the battalion. Other functions of the S-1 include the following:
    - Monitoring and analyzing personnel strength and projecting future personnel requirements.
    - Requesting, receiving, processing, and delivering replacement personnel.
    - Managing casualty operations.
    - Planning and supervising morale support activities, awards, and administration of discipline.
    - Providing personnel service support including finance, postal services, and legal services.
    - Normally provides PA functions when a PA team or detachment is not attached.

- **S-2, Intelligence.** If the BCT commander assigns the BEB an area of operations (AO), the battalion S-2 focuses on that area and is responsible for the collection and analysis of information about enemy forces and activity in it. The BEB intelligence cell may need to monitor security operations and produce intelligence about the AO as well. Key functions of the BEB intelligence cell include the following:
  - Coordinating intelligence preparation of the battlefield/battlespace (IPB) for battalion staff planning, decisionmaking, and targeting that focuses on the BEB's AO.
  - Coordinating with the BEB staff and recommending priority information requirements (PIRs) as part of the commander's critical information requirements.
  - Serving as the BEB collection manager (nominating collection requirements for all BEB collection assets to the BEB's S-3).
  - Coordinating directly with the BCT S-2 on all matters of local intelligence collection, analysis, and management.
  - Providing all-source intelligence that answers the BEB commander's PIRs and other intelligence requirements.
  - Monitoring and maintaining the current situation regarding local enemy and environmental factors, and updating IPB and the intelligence estimate.
  - Identifying and evaluating battalion information collections.
- **S-3, Operations.** The S-3 section is the principal staff element responsible for training, operations, and plans. The section assists the ABE in describing the terrain management plan within the BCT AO and developing the scheme of engineer operations. Normal functions of the S-3 section include the following:
  - Preparing, coordinating, authenticating, publishing, and distributing the TACSOP, operations orders, fragmentary orders, and warning orders.
  - Reviewing and coordinating subordinate plans and actions.
  - Coordinating and directing terrain management.
  - Recommending priorities for allocating critical command resources and support.
  - Coordinating and synchronizing the employment of all BEB assets in support of the BCT maneuver plan across the BCT AO.
  - Assisting the commander directly in controlling, preparation for, and execution of operations.
  - Staffing, executing, and supervising operational security.

- Coordinating civil military operations when augmented.
- Providing overwatch and supervision to the fire support noncommissioned officers (NCOs) in planning and preparations for rear area fires.
- Coordinating requests for Army aviation support and close air support.
- Coordinating with the commander, executive officer, and S-6 to establish, oversee, and supervise battle staff information management activities for the CP.
- Coordinating fires for scatterable mines for the BCT assigned AO.
- Planning and coordinating for ammunition and demolition.
- As part of the S-3 staff, the CBRN staff NCO provides technical advice to the battalion commander and the battalion staff. The CBRN NCO also performs the following:
  - Predicts and templates the contaminated areas and effects of enemy CBRN strikes.
  - Disseminates information received via the CBRN warning and reporting system.
  - Recommends.
  - Monitors requirements.
  - Determines the mission oriented protective posture level and gear.
  - Provides the operational exposure guidance requirements.
  - Addresses requirements for other related activities.
  - Acts as the liaison between assigned and attached chemical units and the brigade staff.

- **S-4, Sustainment.** The S-4 section is the principal staff element responsible for coordinating the integration of supply, maintenance, transportation, and services for the battalion and all augmenting units. The S-4 section monitors the operations of the HHC support platoon in feeding, fueling, performing maintenance, and other logistical operations within the battalion. The S-4 is also responsible for the following:
  - Projecting requirements and coordinating all classes of supply, except Class VIII (medical), according to the commander's priorities, with the BCT/battalion S-3 and higher- and lower-sustainment staff.

- Monitoring and analyzing equipment and logistic readiness status within the battalion.
- Developing and synchronizing sustainment plans to include supply, transportation, maintenance, and services.
- Developing the internal logistics estimate.
- Keeping the staff informed of mission supportability from an internal logistics viewpoint.
- Acquiring and assigning facilities.
- Managing the property book and ensuring with the commander that command supply discipline programs are integrated.
- Working with the BCT S-4 to manage engineer specific Class IV and Class V material for the BCT.
- In conjunction with the S-3, the S-4 prepares the unit administrative movement order for moves. The S-4 develops and maintains administrative movement plans for all modes of transportation. Unit movement plans include the following:
  - Security requirements.
  - Logistics coordination requirements.
  - Load plans for vehicle, aircraft, and rail cars.
  - Duties of unit movement personnel.
  - Preparation of transportation documents.
  - Description (weight, length, width, and height) of outsized or unusual cargo.

- **S-6, Communications.** The S-6 section is primarily responsible for internal communications, which includes network management, information dissemination management, communications equipment, and information assurance. Duties of the S-6 section include the following:
  - Advise the commander on communications requirements.
  - Establish, manage, and maintain communications links.
  - Plan and coordinate network terminals.
  - Determine system requirements needed for support based on the tactical situation.
  - Inform the commander of primary and alternate communications capabilities.
  - Recommend database configurations.

- ○ Establish and enforce network policies and procedures.
- ○ Prepare signal estimates.
- ○ Advise the commander and other users on the requirements, capabilities, and use of the available systems.
- ○ Coordinate signal interfaces with those not operating with Army battle command systems.
- ○ Monitor the status of all engineer battalion communications assets. Monitoring responsibilities include network equipment (installed, operated, and maintained by the section) and other general purpose user-operated systems.
- ○ Coordinate signal requirements for units attached or under operational control to the engineer battalion.
- ○ Communication integration of all attached units.

Engineer Companies

Two engineer companies provide the BCT with the minimum capability to support offensive and defensive tasks. This includes bypass, mark, and breach obstacles; assist in the assault of fortified positions; emplace obstacles to shape terrain; construct or enhance survivability positions; conduct route reconnaissance and information collection; identify and clear explosive hazards during decisive action operations. Each company is slightly different, but the primary focus is to support the combat engineering discipline with limited mobility, counter-mobility, and survivability capabilities. The engineer companies are not normally held in reserve and can be cross-task organized internally to the BCT to meet mission requirements.

ALPHA Company

Alpha company provides combat engineer support, and it consists of a company headquarters, two combat engineer platoons, and one engineer support platoon. The company provides mobility, counter-mobility, survivability, and limited construction support to the BCT. The combat engineer platoons provide the BCT with assets for breaching and obstacle emplacement. The engineer support platoon consists of a platoon headquarters; a horizontal squad that provides specialized engineer equipment to support limited general engineering tasks assigned to the company; and a breach squad that provides specialized equipment to support mobility, counter-mobility, and sustainment tasks assigned to the company. In a Stryker (armored fighting vehicle) BCT, Alpha company has a company headquarters and two combat engineer platoons, a horizontal squad, and bridge section. The breach squad of the Stryker BCT is limited to mine-clearing line charges and proofing equipment in the company.

The Stryker BCT also has the Volcano (scatterable mine delivery system). The infantry (airborne) BCT has a bridge for rapid emplacement, but all other bridging capabilities must be augmented by the EAB engineers. (See Appendix B for ALPHA Company's organizaitonal chart.)

BRAVO Company

Bravo company is slightly different in the armor, infantry, infantry (airborne), and Stryker BCTs. Bravo Company is generally of the same composition as Alpha company, but it has an additional route clearance platoon. This platoon provides the detection and neutralization of explosive hazards and reduces obstacles along routes that enable force projection and logistics. This route clearance platoon can sustain lines of communication (LOCs) as members of the combined arms team or autonomously in a low-threat environment. The armor and infantry organization for this company is organized the same; however, the breach section contains different equipment and capabilities. The breach section consists of bridging, whereas, the infantry BCT and infantry (airborne) BCT breach section consists of mine-clearing line charges. (See Appendix C for BRAVO Company's organizational chart.)

Echelon-Above-Brigade Enablers

During offensive and defensive operations, the BCT requires augmentation through baseline elements that could include an engineer battalion headquarters. Other specialized engineering units and equipment may also provide mission-tailored engineer support when their unique engineer capabilities are required.

Engineer Headquarters Units

Engineer headquarters units are the basis for integrating engineer functions, elements, and capabilities from all components of the Army. They consist of the theater engineer command (TEC), engineer brigade, and engineer battalion. Each has a staff that allows the commander to provide mission command for assorted and various engineer organizations. Each is also capable of providing mission command for other selected non-engineer units to support multifunctional missions (i.e., combined arms breaching and combined arms gap crossing). The TEC provides mission command for all assigned or attached Army engineer brigades and other engineer units and missions for the combatant or Joint task force commander.

The engineer brigade is one of the Army-functional brigades and provides mission command for up to five engineer battalions at the division and corps levels. The engineer battalion is typically found within the engineer brigade or maneuver enhancement brigade (MEB) or in support of a BCT. The U.S. Army Corps of Engineers may task organize a forward engineer support team for specified areas where other engineer organizational capability or

capacity does not exist (i.e., water well drilling or structural engineering expertise).

When in support of a BCT, an engineer battalion typically conducts engineer missions and controls any mix of up to five mission-tailored engineer companies. The engineer battalion headquarters is capable of providing mission command for either combat or general engineering missions when they have been task-organized to perform in these roles. The battalion may be focused on a single mission such as route clearance, security construction, or cache interrogation and reduction. The engineer battalion may be organized to perform as a breach force command when the BCT is conducting a combined arms breach. During a gap or river crossing operation, the engineer battalion is able to be designated as the crossing site command. When conducting construction or explosive hazard (EH) clearance missions, the battalion receives construction design, survey, or EH teams to facilitate these missions, in addition to the capacity already in the battalion. It may be task organized to do all three at the same time or during the same operation.

Echelon-Above-Brigade Engineering Units

Engineering units include combat and general engineering units. These units are used to augment the organic engineer capabilities of a BCT and may be task organized under an engineer battalion headquarters to serve under a variety of larger headquarters, providing the specific tailored capabilities needed to support any particular mission requirements.

- **Engineer Battalion.** The engineer battalion is typically capable of planning, integrating, and directing the execution of combat and general engineering missions conducted by up to five assigned engineer companies. Engineer battalions are typically assigned to the engineer brigade, within the MEB, or in support of a BCT. When supporting a BCT, the battalion may be focused on a single mission, for example route clearance or construction. The battalion may also be organized to perform as a breach force command during BCT combined arms breaching operations. During a gap-crossing operation, the battalion provides the option to be designated as the crossing-site command.
- **Sapper Company.** The sapper company executes combat and general engineering tasks in support of BCTs and support brigades to enable force application, focused logistics, and protection. The sapper company varies in design, though all are organized with three sapper platoons. Airborne- and air assault-capable sapper companies have the unique ability to employ air-droppable, rapid runway repair kits in support of forcible-entry operations.

- **Mobility Augmentation Company (MAC).** The MAC conducts assault gap crossings, conducts mounted and dismounted breaches, and emplaces obstacles in support of BCTs and support brigades to enable force application, focused logistics, and protection. The MAC is equipped with a variety of assault-breaching and counter-mobility equipment. It is organized with two assault breach platoons and one obstacle platoon.
- **Clearance Company.** The clearance company conducts detection and limited improvised explosive device (IED) neutralization along routes and within areas of support to enable force application, focused logistics, and protection. The company provides mission command for three to five route, area, or sapper platoons.
- **Mine Dog Detachment.** Mine dog detachments support the BCT by providing unique EH detection capability. The mine dog detachment support infrastructure requirements are largely dependent on military police sustainment.
- **Engineer Support Company.** The engineer support company provides rapid runway repair, constructs tactical unmanned aircraft system airfields and landing zones, performs initial base camp construction, and repairs and maintains ground LOCs. An engineer support company is equipped with a variety of earth moving equipment and is organized with two rapidly deployable, equipment-light platoons and one rapidly deployable, equipment-medium platoon.
- **Multi-role Bridge Company (MRBC).** The MRBC is required for hasty crossings of gaps greater than 18 meters. One or more MRBCs are required to support deliberate gap crossings, wet or dry. The MRBC is organized with a company headquarters, two bridge platoons, and a support platoon. The company has maintenance, equipment, park, and mess sections, which allow it to function as a single entity when performing gap-crossing operations.
- **Horizontal and Vertical Companies.** The horizontal company and vertical company have a construction focus and are capable of constructing, rehabilitating, repairing, maintaining, and modifying landing strips, airfields, CPs, main supply routes, supply installations, building structures, bridges, and other related aspects of infrastructure. The basic capabilities of these construction units can be expanded significantly through the augmentation of specialized personnel and equipment to provide bituminous mixing and paving, quarrying and crushing, and major horizontal construction projects such as highways, storage facilities, and airfields. Additional augmentation could also include pipeline construction or dive support, depending on the type and scope of the construction mission.

- **Explosive Hazards Coordination Cell.** The explosive hazards coordination cell's mission is to gather and track EH incidents, maintain the land mine database, provide pattern analysis of EH incidents, and provide technical advice on EH to enable the land component commander to predict, track, distribute information on, and mitigate EHs within the theater. Capabilities include the following:
  - Establishing, maintaining, and sharing the EH database within the Joint operations area, while assigned to the engineer brigade.
  - Ensuring accuracy of EH information distribution via the knowledge management system.
  - Coordinating site evaluations, strike incident investigations for up to four sites simultaneously, or unit training for up to four sites simultaneously.
  - Assisting intelligence, surveillance, and reconnaissance planners with EH pattern analysis and intelligence collection management.
  - Coordinating technical and tactical training for the BCTs.
  - Providing updated tactics, techniques, and procedures and guidance for route and area clearance.
- **Explosive Ordnance Clearance Agent (EOCA).** EOCA personnel are combat engineers trained to perform limited battlefield/battlespace disposal of mines, explosive booby traps/IEDs, and unexploded ordnance (UXO) during clearing missions. During reduction tasks in support of breaching, the limitations placed on EOCA-certified engineers do not apply. That is, all engineers reducing explosive obstacles in support of breaching are authorized to destroy or remove all mines, explosive booby traps/IEDs, and UXO that are impeding friendly maneuver. They are not limited by the EOCA guide or UXO supplemental list.

  When conducting clearing operations, EOCA-certified engineers can remotely identify and detonate those explosive devices for which they are specifically trained and authorized as detailed in the EOCA identification guide and supplemental list of EOCA ordnance. The EOCA guide is produced by the Explosive Ordnance Disposal (EOD) Directorate and approved by the EOD technology division. The theater EOD commander normally publishes a UXO supplemental list. EOCA capabilities include the following:
  - **Explosive Ordnance Reconnaissance.** EOCA personnel are trained to perform remote and manual reconnaissance of suspect explosive ordnance to determine if it is listed in the EOCA identification guide and supplemental EOCA ordnance list.

- **Explosive Ordnance Identification.** While combat engineers are trained in demolitions, mines, and various explosive obstacles, the EOCA certification adds the capability to identify explosive ordnance listed in the EOCA identification guide and the supplemental EOCA ordnance list. Leaders use the EOD Support Report (# E-040) to account for the items the EOCA cannot positively identify.
- **Explosive Ordnance Area Marking.** EOCA personnel mark the explosive ordnance area according to the standard explosive-hazard marking system.
- **Increased Survivability Support.** EOCA personnel can support survivability efforts to isolate a blast and fragmentation danger area of the identified UXO. EOCAs will advise the on-scene commander about the recommended personnel and equipment protective measures. If the explosive ordnance is identified as "89mm and below," the recommended standoff distance is 381 meters. For explosive ordnance "90mm and above," the recommended standoff is 600 meters. Commanders should increase survivability efforts to protect personnel and equipment from the blast effects when personnel/equipment must remain in the hazard area.
- **Explosive Ordnance Disposal.** EOCA personnel are authorized to destroy by detonation explosive ordnance identified in the EOCA identification guide and supplemental list of EOCA ordnance.
- **Explosive Ordnance Move.** EOCA personnel are not trained to move explosive ordnance. Under certain conditions, EOCA personnel may use remote devices (robots or other means) to move explosive devices where speed is required and the commander's acceptable risk require the device to be moved.

Sister Service Engineer Capabilities

Each Service has baseline engineering units and capabilities that stem from their traditional roles and associations to meet specific operational needs and to support accomplishing a variety of mission requirements in any operational environment. Multinational, interagency, nongovernmental organization, and intergovernmental organization engineer capabilities can be a valuable addition to U.S. military engineer forces. Host nation, multinational, and U.S. civilian contractors may possess certain engineering capabilities specifically adapted to the local environment in addition to providing labor, material, infrastructure, and services.

- **Navy Engineers.** U.S. Navy construction battalion engineers, organized under the NATO Composite Force, have rapidly deployable

general engineering units of various sizes and configurations, tailored to provide responsiveness and flexibility. Seabees provide advanced base construction (airfields, LOCs, upgrade and maintenance, battle damage repair, underwater and amphibious structures, and logistic facilities). Navy engineers also provide engineering support to the U.S. Marine Corps at various levels, including functioning as a major subordinate command to a Marine Air-Ground Task Force (MAGTF). The Navy does not have combat engineers.

- **Marine Corps Engineers.** The Marine Corps engineer's primary tasking is combat engineering and limited general engineering in support of MAGTFs. The Marine Corps has limited geospatial engineering capabilities, which reside in the intelligence branch of the Marine Corps, with one topographic platoon supporting each Marine Expeditionary Force.
- **Air Force Engineers.** A primary task for U.S. Air Force engineers is enabling rapid global mobility for airlift, bombers, and fighters and supporting other manned and unmanned aerial weapons systems. Air Force engineers are trained and equipped with organic capabilities to support all aspects of airfield operations where heavy strategic airlift, bombers, or fighters operate on a daily or frequent basis. The Air Force has the capability to rapidly deploy general engineering units organized as part of an air and space expeditionary TF to open, establish, and maintain airbase power projection platforms.

Chapter 2
Engineer Support to Combat Operations

Offensive Operations

Offensive operations aim at defeating, destroying, or neutralizing the enemy. A commander may conduct offensive operations to deprive the enemy of resources, seize decisive terrain, develop intelligence, hold an enemy in position, or facilitate other friendly operations. Engineer operations in support of offensive operations focus on enabling movement and maneuver.

The engineer running estimate provides the framework for the engineer staff to synchronize and integrate engineer support into offensive operations. Engineer staffs at the appropriate echelon coordinate engineer reconnaissance to support the collection of necessary obstacle intelligence (OBSTINTEL) and other technical information. They also coordinate the movement and positioning of any required engineer augmentation assets such as combat and general engineering. General engineering assets require added time for movement with their heavy and wheeled equipment. Though the focus of supporting offensive operations is on mobility, there may be requirements for protective positions for artillery systems, air defense artillery systems, logistics positions, and stationary mission command facilities. During the early planning stages, terrain analysis teams can provide information on soil conditions, vegetative concealment, and terrain masking along marching routes to facilitate survivability for the force.

Characteristics

Surprise, concentration, audacity, and tempo characterize successful offensive operations. Attacks are force or terrain-oriented and facilitate the defeat of the enemy or the continuation of the attack.

- **Surprise.** Engineers achieve surprise through obstacle reduction and the use of situational obstacles. They enable surprise by rapidly overcoming obstacles, thus increasing the force tempo.
- **Concentration.** Engineers begin the concentration planning by integrating geospatial products and predicting threat obstacles. This effort is further enhanced with the employment of engineer reconnaissance, which can provide the necessary OBSTINTEL and other technical information essential for detailed planning.
- **Audacity.** Engineers operating in a decentralized role, who comprehend the commander's intent, can enable the commander to see the operational environment and anticipate future operations.
- **Tempo.** Rapid mobility operations by engineers keep the maneuver force tempo. The ability to quickly reduce, mark, and guide the

supported maneuver unit through an obstacle is the engineer's hallmark. The imperative of maintaining mobility and momentum is highlighted as forces focus on achieving the fundamentals of avoid, neutralize, and protect.

Types of Offensive Operations

The four types of offensive operations are movement to contact, attack, exploitation, and pursuit.

- **Movement to Contact.** The priority for combat engineering support is typically mobility, although it may rapidly shift to countermobility in anticipation of an enemy attack. Considerations for engineers are based on mission variables. The task organization of engineers for a mission training center must balance task-organizing mobility capabilities with the lead element to optimize response time and tempo without increasing the risk to the mobility of the main body or limiting the ability to mass-breaching assets against complex obstacles. Time and distance factors (based on the terrain) for employing engineer assets and the potentially extreme challenges of task-organizing on the move and linking up engineers with maneuver units that may be in contact are significant considerations used in determining the ultimate task organization and positioning of combat engineer assets within maneuver formations.
    - **Security Force.** Engineers may augment the security force to reconnoiter obstacles and assist in gathering OBSTINTEL to refine breach-planning operations for follow-on forces.
    - **Advance Guard.** The composition of the advance guard is based on mission variables. Engineers may augment or follow the lead elements to locate, bypass, or breach obstacles along the main body axis of advance to ensure the uninterrupted advance of the main body. Engineers use OBSTINTEL and combat information from the security force to facilitate breaching operations. The advance guard is usually the main effort until the main body is committed.
    - **Main Body.** The main body contains the bulk of force combat elements and is arrayed to achieve all-around security. It keys its movement to the advance guard. Engineers located within the main body are poised to support its deployment and rapid maneuver to the decisive point on the battlefield to destroy the enemy.

  - **Flank and Rear Guard.** These elements remain at a distance from the main body to prevent the enemy from surprising the main body with direct fires. Situational obstacles are used to help secure the flank. Obstacle control measures and clearly defined triggers are critical in effectively employing situational obstacles.

- **Attack.** Task organization of engineers depends on the factors of mission, enemy, terrain and weather, troops, time available, and civil considerations (most commonly referred to as METT-TC) and should occur early enough to ensure adequate time for rehearsals with the gaining or supported unit. The employment of engineer reconnaissance as part of the intelligence, surveillance, and reconnaissance effort helps generate OBSTINTEL, which provides the necessary detailed picture of the enemy situation. If breaching operations are anticipated, the breaching organization is established based on detailed reverse planning. Engineer priority of effort is toward mobility, with the priority of support to the main effort. Countermobility effort, primarily through the employment of situational obstacles, is initially directed at supporting the isolation and fixing of enemy forces and protecting the flanks. Upon seizure of the objective and depending on the follow-on mission, engineers are prepared to conduct countermobility and survivability operations in support of a defense, while mobility operations center on clearing obstacles or improving lanes to support friendly movement.
- **Exploitation.** Exploitation is normally not conducted below the brigade combat team (BCT)-level. The BCT attacks rapidly over a broad front to prevent the enemy from establishing a defense, organizing an effective rear guard, withdrawing, or regaining balance. The BCT secures objectives, severs escape routes, and destroys all enemy forces. The exploitation mission demands a force with a significant mobility advantage over the enemy engineers support an exploitation by breaching obstacles to facilitate the maneuver of ground forces, keeping supply routes open and emplacing situational obstacles to protect the flanks.
- **Pursuit.** A pursuit is normally not conducted at the BCT level unless it is augmented with additional aviation assets or ground maneuver units. When conducted, the goal of a pursuit is to fix the enemy between the direct-pressure and encircling forces, then, destroy it. The direct-pressure and encircling forces require engineers to be forward in movement formations to quickly breach any obstacles that cannot be bypassed, thus ensuring unimpeded movement. Engineers also conduct countermobility and survivability tasks in support of the encircling force.

Offensive Operations Sustainment Considerations

When preparing for offensive operations, engineer planners must consider several situations. For example, when a maneuver battalion changes from search-and-attack to an approach march or a hasty attack, great shifts in engineer sustainment plans are not normally required. However, other adjustments in operations, such as transitioning to the defense, may cause a significant change in sustainment focus or emphasis. Because of this, engineer planners must ensure that the supported unit S-4 sustainment plan is organized to help the sustainment executor be proactive regarding a change of mission without interrupting engineer-related sustainment. In planning offensive operations, it is important to perform the following:

- Position vital, engineer-related sustainment supplies, e.g., explosives and Class III, well forward within supported unit combat trains.
- Use air resupply when possible.
- Use previously planned and configured engineer logistic packages of supplies when possible.
- Plan for the resupply of Class V mine-clearing line charge and Volcano (scatterable mine delivery system) reloads.
- Plan for the resupply of lane-marking material.
- Plan for increased engineer equipment maintenance needs.
- Use host nation or captured-enemy engineer supplies, especially haul assets for bulky Class IV and V supplies when possible.
- Increase lines of communication (LOCs), air and ground, through mobility operations to support the area of operations' expansion, logistics traffic increase, and casualty evacuation. Operations include engineer reconnaissance, route clearance, forward aviation combat engineering source, and others.
- Plan and prepare for replacement operations based on known and projected engineer losses.

Forms of Maneuver

The maneuver commander selects the form of maneuver based on analysis of mission variables. An operation may contain several forms of offensive maneuver. The five forms of maneuver include the following:

- Envelopment.
- Turning movement.
- Frontal attack.
- Penetration.
- Infiltration.

Envelopment

Engineer support priorities for envelopment include enabling the mobility of the enveloping force and providing protection for its extended flanks. Engineers plot known and predicted enemy obstacles to determine if there is an assailable flank. Breaching an obstacle system can provide the maneuver commander with the flank he needs; therefore, enemy obstacles and terrain must be adequately studied.

The maneuver force that makes up the enveloping force normally organizes for breaching operations. Once committed, the enveloping force must have the capability to breach unforeseen obstacles with minimal delay and maneuver

Main Effort. Engineer support to the main effort is broken into two separate areas that require dedicated engineer forces to provide the following:

- Mobility for the enveloping force.
- Protection of the enveloping-force extended flanks.
- Engineer support to protect enveloping-force flanks centers on situational obstacles, which are planned at the brigade level.

A key aspect of mobility support to the main effort is maintaining the enveloping-force LOC. Engineers organic to the BCT have limited sustainment capability and rely on engineer-above-brigade assets for augmentation, which should be determined early in the planning phase.

Actions on the Objective. To provide engineer support to actions on the objective, the engineer staff must understand the enveloping-force mission. Fundamental to this understanding is the engineer's involvement with the S-2 in the intelligence preparation of the battlefield/battlespace (IPB) process. The mission of the enveloping force may be to attack and defeat or destroy a defending enemy force or reserve. The priority of engineer effort is still mobility. The task organization must provide attacking battalions with the capability to breach protective obstacles. However, the mission may be to secure key terrain that denies the enemy's use of LOCs. The enveloping force may then establish blocking positions. Therefore, engineer support to actions on the objective may also require countermobility and survivability operations. The organic engineer units can provide only limited survivability support. In these cases, the engineer staff, through wargaming, ensures that the enveloping force has the assets to maintain its mobility during the attack, protect its flanks, and establish effective blocking positions.

Fixing Force. While the main effort of engineer support and concentration of the engineer force is with the enveloping force, engineer requirements for the fixing force must not be discounted. When the envelopment is

successfully executed, the fixing force is likely to be the only force required to breach extensive obstacles. More importantly, the success of the main effort may depend on the ability of the fixing force to penetrate the prepared defenses and fix the enemy during the movement of the enveloping force. This causes the enemy to fight in two directions.

The engineer role in the fixing force is normally limited in scope because of support priorities to the enveloping force. The engineer staff carefully analyzes the requirements of the fixing force. This may require focusing on the maneuver plan two levels down through close coordination with the engineer and maneuver force commanders. However, the engineer staff can reduce the risk by initially focusing OBSTINTEL collection to confirm or deny assumptions made about the enemy situation facing the fixing force. Adequate engineer augmentation reduces the need to accept certain types of risk.

Turning Movement

The commander directing a turning movement task-organizes resources into a turning force, a main body, and a reserve. Each of these forces conducts security and reconnaissance operations. The turning force or the main body can conduct the echelon decisive operation, given the appropriate mission variables.

- **Main Effort.**
  - Engineer support to the main effort requires dedicated engineer forces to perform the following:
    - Conduct engineer reconnaissance and provide geospatial support.
    - Provide mobility including the reduction of obstacles.
    - Protect the flanks.
    - Provide countermobility and survivability on the objective.
  - A key aspect of mobility support to the main effort is maintaining the turning-force LOC. In a turning movement, the LOC for the turning force can quickly become extended, shifted in response to the attack, or threatened by bypassed enemy units, echelons above brigade (EAB) assets for augmentation.
- **Actions on the Objective.** To provide engineer support to actions on the objective, the engineer staff must understand the scheme of maneuver. Fundamental to this understanding is engineer staff involvement with the S-2 in the IPB process. Success of the turning movement implies the potential requirement to transition to the defense to support the maneuver force fight against counterattacking enemy forces.

Frontal Attack

Engineers are involved with maintaining the mobility of the force, with little opportunity to shift engineer assets once committed. A commander conducting a frontal attack organizes the unit into an element for reconnaissance and security operations, a main body, and a reserve. The mission variables dictate the specific task organization. A frontal attack should almost always include significant combat engineer augmentation.

- **Main Effort.** Engineer requirements are associated with each of the elements of this force, but are likely to be massed to ensure success of the decisive action. This is generally in support of the main effort. Engineer support to the main effort is broken into the following areas:
    - ○ Conduct reconnaissance and provide geospatial support.
    - ○ Provide mobility, including the reduction of obstacles.
    - ○ Participate in a combined arms breach as required.
    - ○ Protect the flanks.
- **Actions on the Objective.** To provide engineer support to actions on the objective, engineers must understand the frontal attack mission. When the attacking unit can no longer advance, it adopts a defensive posture. Whether on the objective or not, engineers must be able to rapidly transition in support of maneuver element defensive operations.

Penetration

A successful penetration requires the concentration of all combat multipliers, including the use of night, stealth, and covered and concealed terrain. Penetrations have the following three stages:

- Breaching enemy main defensive positions.
- Widening the gap created to secure the flanks by enveloping one or both of the newly exposed flanks.
- Seizing the objective with its associated subsequent exploitation.

Main Effort. Engineers support a penetration by providing the main effort with overwhelming mobility to rupture enemy obstacles. This remains the engineer priority of support until a penetration is achieved. It requires the engineer staff to mass obstacle reduction assets in the main effort. Penetration requires the rapid projection of combat power to maintain the momentum of the attack and quickly divide the enemy force. To do so requires creating more lanes along a narrower front than normally associated with breaching operations. Therefore, mass and redundancy drive engineer task organization to the main effort. Mass is commonly achieved by weighting the main effort with task-organized EAB engineer

augmentation, based on the generally high number of essential tasks for mobility/countermobility/survivability associated with the main effort.

Countermobility. Depending on the enemy situation, countermobility may quickly become the priority of effort to help defeat counterattacks against lodgment. Follow-and-support forces are normally used to secure lodgment and defeat counterattacks. Therefore, engineers must perform the following:

- Anticipate the size of the counterattack force.
- Analyze likely assessment agents.
- Allocate the countermobility assets needed to disrupt or fix counterattack forces.

Engineer planners must design obstacle belts that permit the use of tactical and situational obstacles. Consideration must be given to future operations. Forces securing lodgment require flexible, responsive obstacle capabilities, such as a scatterable mine.

Exploitation. Once the objective is secured, the engineer priority shifts to assisting the force in exploiting its success by ensuring the mobility of the exploiting subordinate units. To facilitate the exploitation, the engineer staff must ensure that the scheme of engineer operations allows for rapid development of a lane network within the penetration. The lane network must support the uninterrupted forward passage of the reserve to subsequent objectives and the flow of sustainment to forces in the penetration. Once the force has passed through the lanes, responsibility is passed to outside forces to improve and maintain the lane network.

Infiltration

Infiltrations require extensive reconnaissance to be successful. Engineer aspects of reconnaissance include the following:

- Identifying the enemy disposition across the area to be infiltrated.
- Identifying infiltration lanes.
- Locating assault positions for the attacking force.
- Identifying enemy weaknesses.
- Observing enemy activity.

Intelligence Preparation of the Battlefield. Engineer reconnaissance assists the commander in determining the method of infiltration, the task organization, and the size of the infiltrating units. Obstacle information is collected to fulfill OBSTINTEL requirements. Reconnaissance is also vital in determining actual routes and whether single or multiple infiltration lanes are used.

Existing gaps in the enemy defensive system and the locations of enemy security elements must be identified. Natural obstacles and predicted enemy

obstacles must also be considered. Engineers infiltrating with the cavalry squadron and battalion scouts verify, report, mark, and reduce obstacles along the infiltration lanes.

The engineer staff develops intelligence requirements (IRs) for inclusion in the S-2 collection plan. In addition to the IR developed in support of the infiltration itself, others are identified specifically at the objective area. The engineer reconnaissance team may be identified to support selected reconnaissance requirements. Examples of IR include the following:

- Location, type, density, and employment method of obstacles in and around the objective.
- Recommended location for the point of presence (POP).
- Potential breach lanes for attacking units and the level of survivability of the enemy forces on the objective.
- Possible enemy counterattack routes in support of the objective.
- Critical infrastructure that needs protection.

Mobility. Mobility is the main focus of engineer units during an infiltration, with priority of support to the main effort along the infiltration lane. Due to the decentralized nature of the maneuver, providing task- organized engineer support to each infiltrating unit may not be feasible. Maneuver units must be trained and capable of executing the mobility operations anticipated on infiltration lanes. The requirement for dedicated support during the infiltration is minimized through the following:

- Detailed predictive analysis by staff planners, represented on an enemy situational template.
- Accurate and timely intelligence updates provided by engineers working with scouts during reconnaissance.
- Detailed combined arms rehearsals.

Actions on the Objective. To provide adequate support to maneuver battalions and the cavalry squadron during actions on the objective, detailed engineer planning at the brigade centers on war-gaming likely contingencies and transitions. Engineers may be task-organized to one or more maneuver battalions or the cavalry squadron in a command relationship during the infiltration and for subsequent actions on the objective. Subsequent, on-order missions (defense) may dictate a change in the task organization of engineer units. They may need to change from a command relationship to a support relationship with maneuver battalions or the cavalry squadron. This is done to speed up the response of engineer units and ensure responsive sustainment support.

Sustainment. Infiltrations often require clearing extended main supply routes (MSRs) from the line of departure (LD) to the attacking force. MSRs

become particularly vital when the objective is secured and the attacking force requires Class V resupply, ground medical evacuation, barrier materials, engineer equipment, or situational-obstacle material for a hasty defense. The infiltrating force bypasses obstacles and focuses on those enemy forces that may interdict high-speed avenue of approach and MSRs.

Chapter 3
Integrating the Brigade Engineer Battalion

The application of engineer-force tailoring and limited engineer resources requires flexible task organization and the ability of engineers to rapidly transition within the area of operation (AO) to meet mission requirements. Commanders and planners must understand this setting and the inherent mission command challenges they face when integrating engineer capabilities to support operations. This chapter addresses the following:

- Engineer application of organic units and augmentation in support of units for commanders and planners.
- Enginneer resource planning.
- Considerations for engineers as integrated members of the combined arms team.
- Construct and format of essential tasks for the mobility, countermobility, and survivability concept and the engineer-staff running estimate to assist planners in integrating operations.
- Overview of integrating processes and continuing activities that contribute to the overall operations process.

Command and Support Relationships

Additional engineer units augmenting the brigade combat team (BCT) are task-organized to the BCT in a command or support relationship, depending on the mission requirements. Those units and engineer units organic to the BCT may also be task-organized to a maneuver task force or the cavalry squadron or be subordinate to a company or troop. Command relationships prescribe the supporting engineer unit's chain of command

Commanders establish support relationships when subordination of one unit to another is inappropriate; typically when maximum flexibility is needed to rapidly move key engineer capabilities between multiple units. All command, administrative, and logistical responsibilities remain with the parent unit in a support relationship. The parent-unit commander organizes the unit and allocates tasks in a manner that effectively meets the needs of the supported commander. Support relationships are graduated from a supporting relationship between two units (direct support [DS], typically in the offense) to a broad level of support extended to all units under the control of the higher headquarters (general support [GS], typically in the defense). In a DS relationship, the supporting unit answers directly to the supported commander's request for support. A DS relationship is used when it is anticipated that a change to the engineer task organization may require frequent shifting of an engineer unit to multiple locations. In a GS relationship, the supporting unit receives all missions and support from

its parent unit and the supporting unit aids the unit as a whole, but not as any particular part or subdivision. A GS relationship is appropriate when central control and flexibility in employing limited engineer forces is required. Engineers in sustainment areas are usually employed using a GS relationship.

Command Post Functions

Command posts (CPs) are facilities for exercising mission command. CP staff and equipment are arranged to facilitate coordination, the smooth exchange of information, and rapid decisionmaking. Well-designed CPs integrate command and staff efforts by matching CP manning, equipment, information systems, and procedures against its internal layout and utilities. Organizing the CP into functional and integrating cells promotes efficiency and coordination. CP configurations and layouts vary between units and echelons. Units establish detailed standard operating procedures (SOPs) to ensure CP efficiency and ease in personnel training. These SOPs must be followed and regularly revised.

Information Management

Proper information management ensures that the commander receives relevant insight to make timely decisions shared by one of the four management components (i.e., people, process, tools, and organization). The staff must be able to predict (or deduce) these insights in order for the commander to make timely decisions. The engineer's role in information management is to provide the commander with engineer-specific insight based on knowledge and prediction (or deduction). The commander's critical information requirements (CCIRs) predict what the enemy will do, rather than take information presented and react to actions that have occurred. Two key pieces of information management are derived from asking "So what?" and "Who else needs to know?" The staff provides information to higher, adjacent, and lower organizations that provides those staffs with higher fidelity of the common operational picture (COP) of assets task organized to the engineer battalion.

Engineer staffs incorporate the six tactical operations functions (receive information, distribute information, analyze information, make recommendations, integrate resources, and synchronize resources) as part of the routine to inform the engineer commander when decisions need to be made.

The commander applies judgment to relevant information to reach situational understanding. The potential volume of information provided to the commander could be overwhelming — adversely affecting sound and timely decisionmaking. Utilizing relevant information helps prevent information overload. The commander establishes CCIRs to define relevant information to the staff.

Battle Tracking

Battle tracking involves monitoring elements of the COP that are tied to forecasted outcomes. Each engineer CP supporting the BCT (organic or augmenting) is responsible for tracking the progress of the tactical operation. Because organic engineer-company parent organizations differ between the three types of BCTs, the information flow may differ. This tracking includes all subordinate echelons above brigade (EAB) engineer units that augment BCTs responsible for ensuring their CPs maintain a COP of engineer work lines and effort, tracks engineer execution, and passes the information to the supported unit's CP and next-higher engineer organization or staff. When a supporting engineer battalion is task-organized to a BCT, it gathers reports from its subordinate units and forwards them to the BCT main CP.

Battle tracking for engineer forces includes, but is not limited to, the following:

- Friendly and enemy engineer unit locations and combat power.
- Status of CCIRs.
- Current and future engineer missions.
- Obstacle control measures.
- Planned and executed obstacles.
- Friendly and enemy survivability preparations.
- Obstacle locations.
- Friendly and enemy breach sites and lanes.
- Condition of existing lines of communication.
- Condition of gap-crossing sites.
- Results of engineer reconnaissance.
- Barrier material availability and location.
- Key engineer Class V (mines, mine clearing line charge) loads, 25-millimeter ammunition, explosives) stock levels.
- Critical infrastructure — sewer, water, electricity, trash, medical, and safety.

Command Post Functions

The engineer staff is responsible for tracking and making recommendations to the commander as part of the following CP functions:

- Receive sub-unit information.
- Distribute information horizontally and vertically.

- Analyze information for relevance to engineer functions.
- Make recommendations to the command.
- Integrate engineer resources and those assigned to the battalion.
- Synchronize resources.

Geospatial Support

All three types of BCTs have an organic geospatial engineering team that performs analysis, management, and dissemination of geospatial data and products in support of brigade planning, preparation, execution, and assessment. It maintains the brigade COP on the brigade server and provides updates to the brigade portion of the theater geospatial database (TGD). The team primarily supports the S-2 and S-3 (especially the assistant brigade engineer), but also supports other staff and subordinate units as directed. The team works with the intelligence staff to fuse intelligence and geospatial information into a COP for the commander. The brigade-level team is too small to provide continuous support to the S-2, but forms improvised geospatial intelligence cells as necessary to support operations. The geospatial engineering team requires access to the classified tactical local-area network and secret internet protocol router network to update and disseminate geospatial information and products. The geospatial engineering team has the capability to:

- Generate and analyze terrain data.
- Prepare decision graphics.
- Produce image maps.
- Provide three-dimensional terrain perspective views.
- Manage the TGD.
- Update maps.
- Produce tactical decision aids.
- Produce intelligence preparation of the battlefield/battlespace (IPB) overlays.
- Operate on a 24-hour basis.

Geospatial engineering provides commanders with terrain analysis and visualization, which improves situational awareness and enhances decisionmaking during planning, preparation, execution, and assessment. Some example applications of tactical decision aids include the following:

- Promoting the timely development of the modified combined-obstacle overlay during IPB to identify avenues of approach, mobility corridors, and choke points.

- Enhancing rehearsals with the use of three-dimensional fly-through or simulations.
- Facilitating the positioning and routing of ground and aerial surveillance assets through visibility analysis (indivisibility lines and flight-line masking).

Brigade Combat Team Enabler Integration

Engineers provide focused and specific support to various units within and augmenting the BCT. Much of the following discussion has to do with the hardening aspects of survivability (see ATP 3-37.34/MCRP 3-17.6, *Survivability Operations*) and the requirement for engineer support to properly protect vital equipment and personnel. Another significant aspect may be engineer reconnaissance (see FM 3-34.170, *Engineer Reconnaissance*). Most often, organic engineers are focused on and dedicated to the tactical mission in support of maneuver units within the BCT. Many of the tasks are performed by augmenting engineer units, although combat engineers organic to the BCT may also perform them.

Artillery

Most engineer missions supporting field artillery units and assets are through survivability operations. Artillery units often require engineer support to construct survivability positions for individual howitzers, fire direction centers, and radars. These survivability positions are built to protect Soldiers and equipment from the effects of direct and indirect fires.

The Q36 and Q37 radars are used by artillery units to facilitate counter-fire missions. These are valuable assets to the BCT commander and often a high priority for protection. Most often, berms are used around radars to protect them from enemy fires. These radars are high-valve targets for enemy forces and have no armor or self-protection capability. During operations, engineer planners must consider survivability for these assets.

Projected smoke planning is critical when obscuration is required, as mechanical smoke is only available from EAB smoke companies, from the reserve component.

Air Defense Artillery (ADA)

Engineer support to ADA units and assets is focused on hardening and other survivability tasks. ADA assets may include radars used to detect incoming aircraft or tactical ballistic missiles. These radars and firing systems may require the construction of berms to protect them from enemy action. Though the BCT does not have any organic ADA units, it can expect to be routinely augmented with ADA capabilities. The BCT can also expect to have corps- and division-controlled ADA assets positioned within the BCT's AO, which may require a survivability effort from the BCT task-organized engineer force.

In heavily wooded or jungle terrain, ADA units may require engineers to clear fields of fire to facilitate missile launch or direct-fire engagements by Avenger air-defense systems. Augmenting engineer equipment and capabilities may be required to meet these tasks. When static, these weapon systems may require survivability positions that protect Soldiers and the system, but also allow the full use of the air defense components of the vehicle.

Aviation

Engineer support to aviation units and assets focuses on forward aviation combat engineering tasks. These tasks can often be met by organic BCT engineers, but most likely require augmenting engineers for many of the general engineering tasks.

Organic engineers within the BCT can quickly berm temporary aviation revetments to protect aircraft from the effects of enemy fires. When aircraft parking areas become more permanent, general engineering support is required to emplace gabion barriers®. These gabion barriers provide proper survivability and protection to aircraft. (See ATP 3-37.34/MCRP 3-17.6 for details on constructing aircraft revetments.)

Combat engineers may support aviation units in the use of forward arming and refueling points (FARPs) during combat operations. Organic engineers can provide some support, but augmenting engineers bring capabilities not found in the organic engineer companies. FARPs may require survivability support most often by emplacement of berms. This berm emplacement may include the aircraft and ammunition or fuel being stored nearby. Locations chosen to establish a FARP may require preparation (clearing and grubbing). The armored combat earthmover and deployable, universal combat earthmover can do many of these tasks, but bulldozers are better-suited for heavy vegetation. It may also be necessary for engineers to construct small trenches in which to place fuel hoses. This prevents damage to the hoses by vehicular traffic.

Organic combat engineers can provide clearing and leveling for launch and recovery sites for the tactical unmanned aircraft systems (UASs) found at the BCT level and below. General engineering augmentation is required to support operational-level UASs, which are larger and require an airstrip for takeoff and landing. If paving is required, engineer planners must ensure coordination for paving and concrete augmentation.

Military Police (MP)

Engineer support to MP units and assets within the BCT include the potential requirement to support the construction of temporary and permanent detainment facilities. These facilities may range in size, based on special requirements and the tactical situation. Combat engineers can assist in the construction of temporary facilities using concertina and other barrier

materials. Temporary facilities may require sustainment and improvement, and permanent facilities require support from augmenting engineer vertical and horizontal construction units. When a permanent facility is constructed, power-generation support from prime power units may also be required.

MP and host nation police headquarters may require survivability support. Combat engineers can provide lower-end hardening of facilities by constructing berms or emplacing gabion barriers. More permanent hardening requires augmentation by construction units.

MP may also require support when constructing vehicle checkpoints and traffic control posts. Engineer planners coordinate with planners from the provost marshal cell for this and similar types of support. (See ATP 3-37.34/MCRP 3-17.6.)

Military Intelligence (MI)

Engineer support to MI units may include engineer reconnaissance assets and survivability support for specific intelligence sites and assets (UAS launch and recovery sites). Tactical UAS found at the BCT level and below require smaller, less advanced launch and recovery sites to conduct operations. Organic engineers may be required to assist detachments in clearing and preparing launch and recovery areas including clearing vegetation and leveling sites. Larger UAS found at the operational level of command may require extensive engineer augmentation support, such as an airstrip (some UASs under U.S. Air Force control require a paved runway). When supporting these units in the BCT's AO, augmentation by general engineering units is required to construct and maintain runways. If paving is necessary, engineer planners must ensure coordination for paving and concrete detachment augmentation.

Chemical, Biological, Radiological, and Nuclear (CBRN)

Engineer support to CBRN units and assets may be extensive if the BCT faces a significant CBRN threat. When CBRN decontamination is required, organic engineer companies may be tasked to assist in the construction of decontamination sites. Most often, engineer support includes digging sumps and drainage ditches to control wastewater runoff associated with decontamination.

Engineers may also be tasked to construct combat roads and trails to improve access to the site. Engineer units coordinate with decontamination units to construct the decontamination site and ensure that site standards are met. For large-scale decontamination, general engineering units may be required to meet the demands.

Signal

Engineering support to signal units consist primarily of geospatial and survivability support. Terrain visualization products help signal

planners plot communication coverage. Survivability support is aimed at protecting critical signal sites and assets. When signal nodes impact power consumption capacity of a location, non-tactical power generation may require prime power unit support.

Civil Affairs

Engineer support to civil affairs (CA) units and assets may be significant and linked to the CA plan. (See FM 3-34.170 and FM 3-34.400, *General Engineering*, for additional information on infrastructure reconnaissance and its relationship to CA operations.)

Sustainment

Engineer planners must be constantly aware of the necessary requirements of supporting sustainment operations, and the engineer assets providing this support typically come from EAB engineer organizations. The following paragraphs are intended as a reminder to engineer planners of sustainment considerations when conducting the engineer running estimate and developing orders. (See FM 3-34.400 for information on general engineering construction support that may be conducted in support of sustainment operations in general.)

Heliports. One or more landing zones (LZs) or heliports may be required to support operations. When operating in austere environments, rotary-wing aircraft are used for transport, medical evacuation, and resupply. The brigade support medical company of the brigade support battalion requires an LZ close to its Role-2 medical treatment facility to facilitate medical evacuation by air ambulance. Engineers can utilize geotextile materials or dust-inhibiting fluids to reduce the effects of erosion and dust.

Airfields. The brigade support battalion (BSB) may position on or near airfields capable of landing larger, fixed-wing aircraft. Airfield maintenance and construction may be required to continue air operations from the brigade support area. General engineering units are required to accomplish these tasks.

Supply Routes. The use of dedicated supply routes is critical for the sustainment of the BCT. Engineer units may be required to repair and maintain main supply routes (MSRs) to ensure mobility for sustainment elements. These requirements are typically large-scale tasks and require general engineering units to meet the demand. Depending on the condition of supply routes, it may be necessary to have multiple engineer units supporting this operation. Engineer planners should consider augmentation by an additional engineer battalion (or even a brigade) when supporting significant MSR requirements. Bridging support may be required to continue uninterrupted sustainment along MSRs.

Ammunition Transfer Points. Ammunition transfer points within the BCT require berm emplacement or trenching to protect resources. Large trenches may be constructed where ammunition can be stored and protected. These trenches and berms also mitigate the effects of blast if they receive an enemy direct hit.

Fuel Sites. Locations where bulk fuel is stored must be protected. Engineers provide horizontal and vertical construction support for distribution systems.

Survivability. The headquarters of most units supporting sustainment have limited protection and require survivability support. Initially, organic engineer units may be able to provide limited berm emplacement and setup gabion barriers for protection, but maneuver tasks usually take precedence. General engineering organizations augmenting the BCT are best suited to support the BSB and the BCT sustainment area. Sustainment area units may require vertical and horizontal construction support, especially as the sustainment area becomes more permanent.

Power Generation

The augmentation of power generation support may be necessary, especially if the BCT is responsible for the construction or maintenance of a base camp or forward operating base (FOB). Prime power teams are uniquely designed to provide this support, especially if the nature of the base camp or FOB includes multiple collocated sustainment units. General engineering is required to facilitate and assist in the creation of a power distribution system. (See ATP 3-34.40 for more information about power distribution systems.)

Pioneering

Combat and general engineering units have the ability to construct a variety of lifting devices and other enablers through the use of their pioneering skills. This includes the construction of gin poles, shears, timber-trestle bridges, three-rope bridges, ramps, and other devices that assist with lifting and loading heavy objects. These are especially useful in maintenance areas where forklifts and cranes may be under intensive use or other bridging is not available or appropriate.

References

ADP 3-90, *Offense and Defense*, 31 AUG 2012.

ADP 5.0, *The Operations Process,* 17 MAY 2012.

ADP 6-0, *Mission Command*, 17 MAY 2012.

ADP 6-22, *Army Leadership*, 1 AUG 2012.

ATTP 3-34.23, *Engineer Operations-Echelons Above Brigade Combat Team*, 8 JUL 2010.

ATP 2-19.4, *Brigade Combat Team Intelligence Techniques*, 10 FEB 2015.

ATP 3-34.22, *Engineer Operations-Brigade Combat Team and Below*, 5 DEC 2014.

ATP 3-37.34/MCRP 3-17.6, *Survivability Operations*, 28 JUN 2013.

FM 3-34.170, *Engineer Reconnaissance,* 25 MAR 2008.

FM 3-34.210, *Explosive Hazards Operations*, 27 MAR 2007.

FM 3-34.400, *General Engineering*, 9 DEC 2008.

BEB Executive Summery, FEB 2015.

Resources:

Provided links for both United States Army Central Army Registry, Army Knowledge Network (AKO), Joint Lessons Learned Information Site (JLLIS), and Army Training Network (ATN). Included hyperlinks to all Individual and Collective Tasks, Unit Task Lists, BCT METLs, and Drills. All links provided are CAC protected.

United States Central Army Registry 052 series.

Engineer Specific Systems:

Volcano Minefield.

05-03-2011, *Emplace a Volcano Minefield*.

05-3-2001, *Emplace Situational Obstacles*.

GTA 05-10-042, *Volcano Preventive Maintenance Checks and Services (PMCS).*

Modular Pack Mine System (MOPMS).

052-192-1249, *Operate a Modular Mine System (MOPMS)*.

05-3-2012, *Emplace a Modular-Pack Mine System (MOPMS) Disrupt or Fix Minefield.*

GTA 05-10-041, *Maintaining, Employing, and Operating the Modular Pack Mine System (MOPMS) and the Remote Control Unit (RCU)*.

Assault Breacher Vehicle.

05-5-1013, *Create A Lane Through An Obstacle Using An Assault Breacher Vehicle (ABV).*

05-5-3011, *Install a Linear Demolition Charge (LDC) and Rocket onto an Assault Breacher Vehicle (ABV).*

05-5-D1013, *Evacuate the Assault Breacher Vehicle (ABV).*

05-5-D1012, *Jettison the Line Demolition Charge (LDC) From the Armored Breacher Vehicle (ABV).*

05-5-D3011, *Fire a Line Demolition Charge System (LDCS) From An Assault Breacher Vehicle (ABV).*

Networked Munitions.

05-3-0021, *Emplace a Munition Field (Networked Munitions)*.

Army Training Network.

Combined Arms Training Strategies (CATS) by BEB Company Structure:

HHC, BDE ENG BN, ABCT (05316R500)
HHC, BDE ENG BN, IBCT (05316R600)
HHC, BDE ENG BN, IBCT (ABN) (05316R800)
HHC, BRIGADE ENGINEER BN, SBCT (05316R700)

CMBT ENG CO, BEB, ABCT (05319R500)
CMBT ENG CO, BEB, ABCT (05329R500)
CMBT ENG CO, BEB, IBCT (05319R600)
CMBT ENG CO, BEB, IBCT (05329R600)
CMBT ENG CO, BEB, IBCT (ABN) (05319R800)
CMBT ENG CO, BEB, IBCT (ABN) (05329R800)
COMBAT ENGINEER CO, BEB, SBCT (05329R700)
COMBAT ENGINEER CO, BEB, SBCT (05319R700)

MI COMPANY (BEB) (34120R000)

BDE SIG CO (SBCT) (11103R300)

ANTIARMOR CO (SBCT) (07093R300)

Additional Links:

HQDA Standardized METL.

Combat Training Centers.

Army Accelerated Conversion-Army 2020.

IBCT/ABCT/SBCT METLs.

Engineer School Knowledge Network.

Maneuver Support Knowledge Network (requires DOD e-mail certificate to access).

Maneuver Support Center of Excellence, Lessons Learned Program, Community of Practice.

Appendix A

Acronyms

ABE	assistant brigade engineer
ADA	air defense artillery
AO	area of operation
BEB	brigade engineer battalion
BCT	brigade combat team
BSB	brigade support battalion
CA	civil affairs
CBRN	chemical, biological, radiological, and nuclear
CCIR	commander's critical information requirement
Class III	petroleum, oil, and lubricants
Class IV	construction materiel
Class V	ammunition
Class VIII	medical supplies
COP	common operational picture
CP	command post
DS	direct support
EAB	echelons above brigade
EH	explosive hazard
EOCA	explosive ordnance clearance agent
EOD	explosive ordnance disposal
FARP	forward arming and refueling point
FOB	forward operating base
GS	general support
HHC	headquarters and headquarters company
IED	improvised explosive device

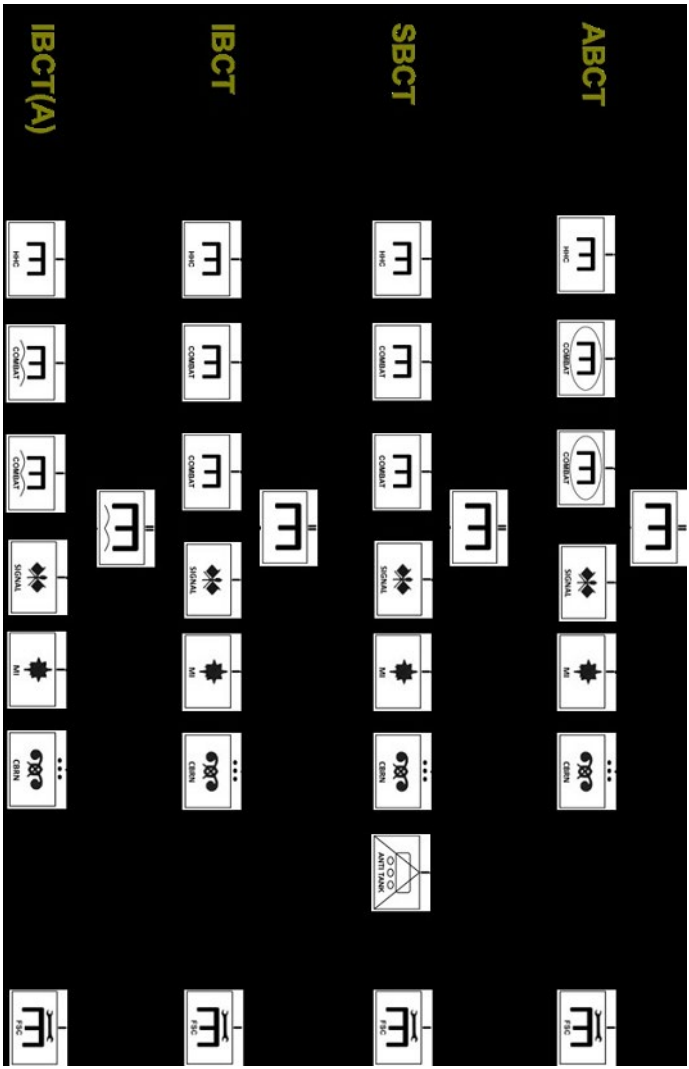
IPB	intelligence preparation of the battlefield/battlespace
IR	intelligence requirement
LD	line of departure
LOC	line of communication
LZ	landing zone
MAC	mobility augmentation company
MAGTF	Marine Air-Ground Task Force
MEB	maneuver enhancement brigade
METT-TC	mission, enemy, terrain and weather, troops, time available, and civil considerations
MI	military intelligence
MISO	military information support operations
MP	military police
MRBC	multi-role bridge company
MSR	main supply route
NCO	noncommissioned officer
OBSTINTEL	obstacle intelligence
PA	public affairs
PIR	priority information requirement
POP	point of presence
S-1	personnel
S-2	intelligence
S-3	operations
S-4	sustainment
S-6	communications
SOP	standard operating procedure
TACSOP	tactical standard operating procedure
TEC	theater engineer command

TF	task force
TGD	theater geospatial database
UAS	unmanned aircraft system
UXO	unexploded ordnance

Appendix B

ALPHA Company Organizational Chart

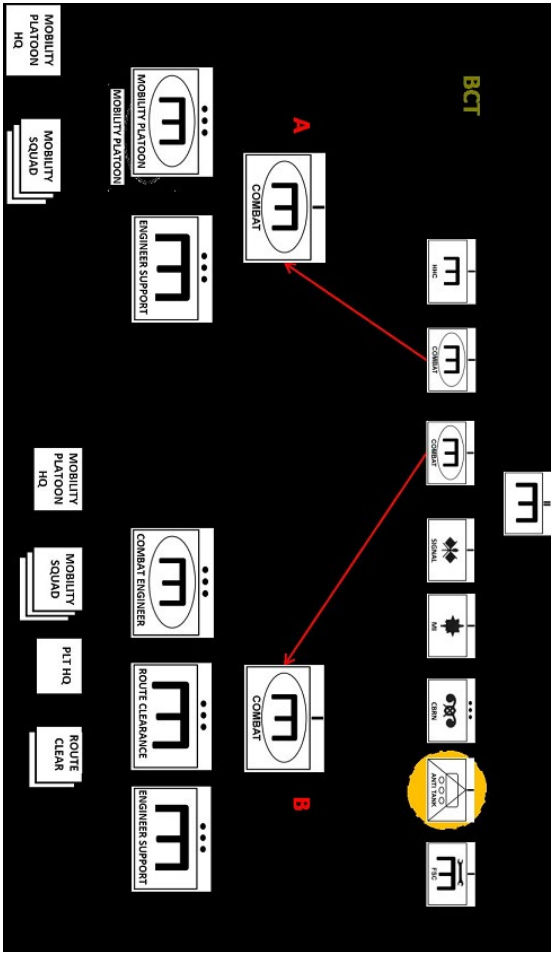
This organizational chart for ALPHA Company reflects its capability to provide mobility, countermobility, survivability, and limited construction support to a Brigade Combat Team (BCT), to include a Stryker BCT.



Appendix C

BRAVO Company Organizational Chart

This organizational chart for BRAVO Company illustrates the is similarities to ALPHA Company with an additional route clearance platoon that provides the detection and neutralization of explosive hazards and reduces obstacles along routes that enable force projection and logistics. The breach section also contains different equipment and capabilities for bridging.



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