FM 3-34.170/MCWP 3-17.4 (FM 5-170)

ENGINEER RECONNAISSANCE

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***FM 3-34.170/MCWP 3-17.4 (FM 5-170)**

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Engineer Reconnaissance

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Preface

Doctrine provides a military organization with unity of effort and a common philosophy, language, and purpose. This field manual provides doctrine for the application of engineer reconnaissance capabilities in support of the combined arms team conducting full spectrum operations.

Engineer reconnaissance, like chemical, biological, radiological, and nuclear (CBRN) and other technical applications, is not a form of reconnaissance (see chapter 3 for a discussion of the four forms of reconnaissance). Engineer reconnaissance is instead a focused application of special/unique capabilities supporting reconnaissance operations and is applicable over/pertinent to all four forms of reconnaissance. Field manual (FM) 3-34.170/Marine Corps Warfighting Publication (MCWP) 3-17.4 updates the FM that provides doctrinal guidance for engineer reconnaissance in support of full spectrum operations, including engineer reconnaissance in support of tactical operations as well as engineer technical reconnaissance support. This manual supersedes FM 5-170 and supports the doctrine found in FM 3-0, FM 3-34, and FM 6-0, and Field Manual Interim (FMI) 5-0.1. This manual will serve as a reference document for engineer commanders and staff, leaders, training developers, and doctrine developers throughout the Army and Marine Corps. It will also provide guidance to commanders for the employment of engineer reconnaissance capabilities in support of all operations. It is also the primary reference for engineer reconnaissance for Joint Publication (JP) 3-34.

This FM has an introduction and six chapters. It includes significant discussion on integrating the planning for engineer reconnaissance support within the planning doctrine in FM 5-0 and the command and control (C2) doctrine in FM 6-0. The introduction expands upon the manual's purpose and summarizes the doctrinal changes it contains. Chapter 1 provides a doctrinal framework for the provision of engineer reconnaissance capabilities resident within engineer functions and supporting the warfighting functions, describes a range of tactical to technical engineer reconnaissance capabilities, and provides capabilities and limitations of the engineer reconnaissance team (ERT). Chapter 2 provides doctrine for integrating the planning for engineer reconnaissance within information management and planning processes of the combined arms team. It specifically addresses integration of geospatial support and provides specific C2 considerations for integration of engineer reconnaissance. Chapter 3 provides doctrine for integrating the application of engineer reconnaissance within tactical reconnaissance operations of the combined arms team. It also addresses considerations for the sustainment of engineer reconnaissance elements. Chapter 4 provides doctrine for the conduct of ERT operations providing engineer reconnaissance support at the tactical end of the range described in Chapter 1. ERTs conduct zone, area, and route reconnaissance with a specified additional focus on required technical information. Chapters 5 and 6 provide doctrine for the conduct of engineer assessments and surveys which provide engineer reconnaissance support at the technical end of the range described in Chapter 1. Assessment and survey teams conduct reconnaissance specifically focused on collecting detailed technical information. Appendix B illustrates the preparation of required engineer reconnaissance reports and forms. Appendix C incorporates the smartcard tools developed for infrastructure assessment. Appendix D provides the environmental baseline assessment tool. Appendix H includes a collection of other useful tools and resources.

The target audience for this manual is focused at the brigade and below maneuver commander and supporting staff. This also includes nonorganic unit commanders and staffs that will support brigade and below maneuver organizations. Additionally, it is pertinent to other commanders and staffs at all echelons. This doctrine will assist branch schools in teaching the integration of engineer capabilities. Engineer involvement is a virtual certainty for nearly every military operation. FM 3-34.170 is intended to inform all Service components of the types of engineer reconnaissance tasks and the variety of capabilities available to perform them.

This FM is built directly on the doctrine articulated in the following manuals:

- FM 3-0.
- FM 3-20.96.
- FM 3-34.
- FM 3-34.221.
- FM 3-90.
- FM 3-90.6.
- FM 5-0.
- FM 5-7-30.
- FM 5-71-2.
- FM 5-71-3.
- FM 6-0.
- FMI 5-0.1.

Given the magnitude of doctrinal changes in recent years, becoming familiar with these documents is essential to effectively using this manual. It also applies to selected portions of engineer support across echelons and throughout the area of operations (AO). Doctrine in FM 3-34.170 applies across the spectrum of conflict (from peace to general war) and the operational components of full spectrum operations (offense, defense, and stability, or civil support). However, it is focused at the tactical level of war and support of the tactical commander's engineer reconnaissance needs.

Terms that have joint or Army definitions are identified in both the glossary and the text. Glossary terms: The glossary lists most terms used in FM 3-34.170 that have joint or Army definitions. Terms with an asterisk in the glossary indicate that this FM is the proponent FM (the authority). Text references: Definitions printed in boldface in the text indicate that this FM is the proponent FM. These terms and their definitions will be incorporated into the next revision of FM 1-02/Marine Corps Reference Publication (MCRP) 5-12A. For other definitions in the text, the term is italicized, and the number of the proponent FM follows the definition. As a dual service manual, references made to the United States (U.S.) Army, Soldiers, and brigade combat team (BCT) are interchangeable with and/or include the United States Marine Corps (USMC), Marines, and regimental combat team (RCT) unless stated otherwise in the text. Additionally, unless this publication states otherwise, masculine nouns or pronouns do not refer exclusively to men.

This FM applies to the Active Army, the Army National Guard (ARNG)/Army National Guard of the United States (ARNGUS), the United States Army Reserve (USAR) unless otherwise stated and to the USMC.

Headquarters, United States Army Training and Doctrine Command (TRADOC) is the proponent for this publication. The preparing agency is the Doctrine Division (DD), United States Army Engineer School (USAES). Send written comments and recommendations on DA Form 2028, *Recommended Changes to Publications and Blank Forms*, directly to Commandant, United States Army Engineer School, ATTN: ATZT-TDD-E, 320 MANSCEN Loop, Suite 220, Fort Leonard Wood, Missouri 64573-8929. Send comments and recommendations by e-mail to <leon.mdottddengdoc@conus.army.mil>.

Introduction

The three engineer functions are combat (with the capabilities and activities of mobility, countermobility, and survivability [M/CM/S]), general, and geospatial engineering. All three of these functions include significant reconnaissance capabilities. This manual focuses on engineer support to combined arms commanders at all levels for engineer reconnaissance support during full spectrum operations. It includes extensive discussion on integrating the planning for and conduct of engineer reconnaissance support within the tactical operations of the combined arms team. This manual discusses capability resident within combat engineer units to form and employ ERTs. It also describes the capability resident within general engineer elements to form and employ ERTs, augment combat engineer ERTs, or provide assessment and survey teams. Finally, geospatial engineering is used to enable reconnaissance operations and may play a large role, especially during the planning process.

Engineer reconnaissance, like CBRN and other technical applications, is not a form of reconnaissance (see chapter 3 for a discussion of the four forms of reconnaissance). Engineer reconnaissance is instead a focused application of special/unique capabilities supporting reconnaissance operations and is applicable over/pertinent to all four forms of reconnaissance. Engineer reconnaissance generated from and organized by the engineer functions provides a range of technical reconnaissance capabilities. Each of the functions provides varying degrees of technical expertise and effort within the assigned mission and tasks. The tasks and levels of expertise provided overlap from function to function. For example, there is no clean dividing line from the technical effort required for the combat engineering task of classifying a route for combat vehicle traffic to the general engineering task of conducting a road reconnaissance to estimate the effort required for the upgrade of a main supply route (MSR). The combat engineering task will effectively address classification of the route but will also provide information useful in the general engineer's estimate. Similarly the general engineer's estimate will effectively address the effort required for an upgrade and will provide information useful in the classification of the route. Geospatial engineering is employed in support of both and in varying degrees as required by the task and situation.

The engineer functions provide a menu of reconnaissance capabilities varying in linkages to warfighting functions and varying in degree of technical expertise and effort applied to the assigned mission and tasks. The capabilities are generated from and organized by both combat and general engineer units with overarching support from geospatial means. With few exceptions (discussed in chapter 1), these units do not have organized and dedicated reconnaissance elements within their structure. Rather, combat and/or general engineers are task-organized as required by the situation—based on mission, enemy, terrain and weather, troops and support available, time available, civil considerations (METT-T[C])—and may be teamed separately or with other elements from across engineer (or even various warfighting) functions.

Note. The Marine Corps and joint doctrine use METT-T without "civil considerations" being added.

FM 3-34.170 is a significant revision from FM 5-170, which it supersedes, and reflects considerable changes that have occurred over the 9 years since that manual was released. Many of the tactical tasks associated with engineer reconnaissance have remained essentially constant, but the operational environment (OE) has dramatically shifted. New requirements for technical information and new technologies available to the engineer have caused adjustments in reconnaissance challenges and capabilities. Another major change involves the Army's reorganization and restructuring to a modular force and the effects that this has on doctrine and operations. Changes that directly affect this manual include—

- The advent of the construct and term of assured mobility and its relationship to other doctrine (see FM 3-34).

- An acknowledgement of the importance of joint interdependence among the Services.
- The formalization of a planning tool that supports the engineer staff running estimate known as essential tasks for M/CM/S (see FM 3-34).
- The OE.
- The likelihood that the operations conducted will be joint, interagency, and multinational (see FM 3-0). The primary focus of joint engineer operations is to achieve the commander's intent by coordinating engineer support throughout the joint AO. All branches of Service possess organic engineer elements with varying degrees of technical and tactical capabilities. When available, units such as Navy construction battalion-engineers (Seabees), Air Force Rapid Engineer Deployable Heavy Operational Repair Squadron Engineer (RED HORSE), and Prime Base Engineer Emergency Force (Prime BEEF) organizations can augment the technical reconnaissance capability.
- The formalization of support requirements to homeland security. See JP 3-26 and FM 3-07.
- The frequency of contractors on the battlefield and their support for many of the tasks associated with general engineering. (See Army Regulation [AR] 715-9 and FM 3-100.21).
- Resulting changes in the basic design and organizational structures and equipment of engineer organizations to support the Army's ongoing transformation.
- The acknowledgement that nearly all operations will be conducted in the context of a joint, interagency, and multinational environment.

This FM includes the discussion of engineer reconnaissance in support of tactical operations as well as more technical engineer reconnaissance. It includes revised material from the current manual that guides engineer reconnaissance of roads, bridges, tunnels on routes, and other infrastructure components along a selected route and will discuss and integrate discussions of engineer reconnaissance in support of, M/CM/S operations. Changes in the structure of the force have not changed the basic principles of engineer employment, but they will adjust the C2 structure and force tailoring of engineer forces to support the BCT. Recent lessons learned include the need to define, develop, and provide a proponent manual for infrastructure reconnaissance and its memory aid for sewage, water, electricity, academics, trash, medical, safety, and other considerations (SWEAT-MSO) as well as reintegrate the discussion of clearing operations. Significant changes occur in this manual. This manual—

- Updates the discussion of the integration of engineer reconnaissance capabilities within the combined arms team.
- Describes a range of engineer reconnaissance capabilities from tactical to technical with overarching geospatial support.
- Establishes the ERT as an ad hoc, tactically focused reconnaissance capability.
- Establishes assessment and survey teams as an ad hoc, technically focused reconnaissance capability.
- Incorporates the capacity to augment with technical capabilities through field force engineering (FFE), multi-Service, interagency, contractor, and host nation (HN) capabilities.
- Changes "engineer recon" to an engineer resource assessment.
- Incorporates developing doctrine on infrastructure reconnaissance and environmental reconnaissance.
- Introduces or recaptures new doctrine on the reconnaissance of underground tunnels, as distinct from tunnels on routes as covered in the previous FM 5-170.

The engineer's contribution to operational success will always be highly desired/required by the commander. Demands for engineer reconnaissance support will often exceed capabilities as they are spread across and compete with the commander's needs for other engineer applications. The same engineer elements and capabilities are often required for each of these areas. Resolution of this competition is one of the goals of the planning process as the staff running estimate is created during mission analysis and the engineer coordinator (ENCOORD) identifies the specified and implied engineer tasks (may be more than M/CM/S) and their associated purposes. This results in the recommendation of essential tasks for M/CM/S to the supported commander.

Finally, this manual is written with the acknowledgement that the OE is much more variable than what doctrine was previously written against. Engineers must be prepared to go into any OE and perform its full range of reconnaissance tasks in support of the maneuver commander while dealing with a wide range of threats and other influences. It builds on the collective knowledge and wisdom gained through recent conduct of operations—combat as well as operations other than war—numerous exercises, and the deliberate process of informed reasoning throughout the Army. It is rooted in time-tested principles and fundamentals, while accommodating new technologies and diverse threats to national security.

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Chapter 1
Engineer Reconnaissance

Nothing is more worthy of attention of a good general than the endeavor to penetrate the designs of the enemy.

Niccolo Machiavelli

FM 1 and field manual interim (FMI) 5-0.1, describes "how Army forces fight" by describing an operational concept that is the core statement of Army doctrine. The Army's operational concept is full spectrum operations. The operational concept depends on the flexible combination of Army capabilities (combined arms) and joint capabilities (joint interdependence) integrated across the warfighting functions (WFFs) through mission command and the operations process. One of the fundamentals that underlie this concept and the basis for organization and operations of Army forces is combined arms. Combined arms is synchronized or simultaneous application of several arms—such as infantry, armor, field artillery, engineers, and aviation—to achieve an effect on the enemy that is greater than if each arm was used against the enemy separately or in sequence. Engineer support to the combined arms team adds key capabilities that ensure the team's freedom of maneuver and preserve the team's combat power. An important measure of effectiveness of the team's integration of lethal and nonlethal capabilities is the degree to which the commander can concentrate combat power at the critical place and time and the agility with which the commander can shift those concentrations to new situations. Engineer support also adds reconnaissance capabilities to improve the commander's situational understanding (SU) about the enemy and environment, enabling the concentration and agility needed. This chapter begins the discussion of engineer reconnaissance and the application of those capabilities integrated and synchronized with the other systems—warfighting functions—united by the combined arms commander toward the common purpose of accomplishing the mission.

ENGINEER FUNCTIONS

1-1. Engineer support capabilities are traditionally characterized as supporting the combined arms team with combat tasks (including mobility—breaching, clearing, and bridging; countermobility—emplacing and/or reinforcing obstacles; and survivability hardening and emplacement of fighting/protective positions), general tasks (including general construction and reinforcement of the combat tasks), and geospatial tasks (to include mapping and terrain analysis). The traditional engineer support capabilities are organized into three engineer functions: combat M/CM/S, general, and geospatial engineering. The engineer functions are useful in describing the various engineer support capabilities and associated linkages through the WFFs across the entire spectrum of operations. Engineer functions are similarly useful in organizing and describing a range of engineer reconnaissance capabilities that vary from a purely tactical focus to a purely technical focus linking through the warfighting functions to support the combined arms reconnaissance operation.

COMBAT ENGINEERING

1-2. Combat engineering is defined by JP 3-34 and JP 1-02 as those engineering capabilities and activities that support the maneuver of land combat forces and that require close support to those forces. Combat engineering consists of three types of capabilities and activities: M/CM/S.

1-3. Combat engineering includes those capabilities organic to and augmenting the BCTs/RCTs. Combat engineering provides tactical level engineer support to combat (offense and defense), stability, or civil support operations and is typically (although not always) focused on the support of close combat. It may be augmented at times with general engineering support but retains its focus on the integrated application of engineer capabilities to support the combined arms team's freedom of maneuver (mobility and countermobility) and protection (survivability). (See FM 3-34.2, FM 90-13, and FM 5-103 for more information on combat engineering.)

1-4. Combat engineer reconnaissance capabilities are similarly focused on supporting the WFFs of movement and maneuver and protection. These capabilities are typically fully integrated into the intelligence, surveillance, and reconnaissance (ISR) plan and targeted to improve the commander's understanding of the enemy's use of terrain and obstacles within the AO. Combat engineer reconnaissance can range from almost purely tactically focused to a fully integrated tactical reconnaissance focused on gathering technical information.

GENERAL ENGINEERING

1-5. General engineering is defined by JP 3-34 and JP 1-02 as those engineering capabilities and activities, other than combat engineering, that modify, maintain, or protect the physical environment. Examples include the construction, repair, maintenance, and operation of infrastructure, facilities, lines of communication and bases; terrain modification and repair; and selected explosive hazard activities. (See FM 5-104, FM 3-100.4; and FM 7-15 for additional information on general engineering.)

1-6. As mentioned in the definition, general engineering may be performed in direct support of combat operations which results in a gray area in distinguishing purely combat engineering from general engineering tasks at the tactical level. General engineering will typically not be associated with close combat. More distinguishable at the operational level, general engineering capabilities are applied to establish and maintain the infrastructure necessary for sustaining military operations in theater. At times, the military operation may extend general engineering support to restore facilities, power, and life-support systems within the infrastructure of the AO. This effort aids in the recovery and the transition to preconflict conditions or may be the objective of civil support operations. General engineering tasks—

- May include construction or repair of existing logistics-supported facilities, line of communications (LOC) and MSRs, airfields, ports, water wells, power plants, pipelines, and base camps/force bed down.
- May be performed by a combination of joint engineer units, civilian contractors, and host-nation (HN) forces.
- Usually require large amounts of construction materials, which must be planned and provided for in a timely manner.
- May include the production of construction materials.
- May include support to selecting real property for lease or operation and upgrading those facilities (to include hardening for protection).

1-7. General engineer reconnaissance capabilities are typically focused on technical requirements for the construction or repair of sustainment facilities. However; just as other general engineering capabilities may be applied in direct support of combat engineering, general engineer reconnaissance may similarly augment combat engineer capabilities at the tactical level. General engineer capabilities may be focused at the tactical or operational level but, in every case, introduce additional technical capabilities that are applied to improve the commander's understanding of the terrain, facilities, and infrastructure within the AO.