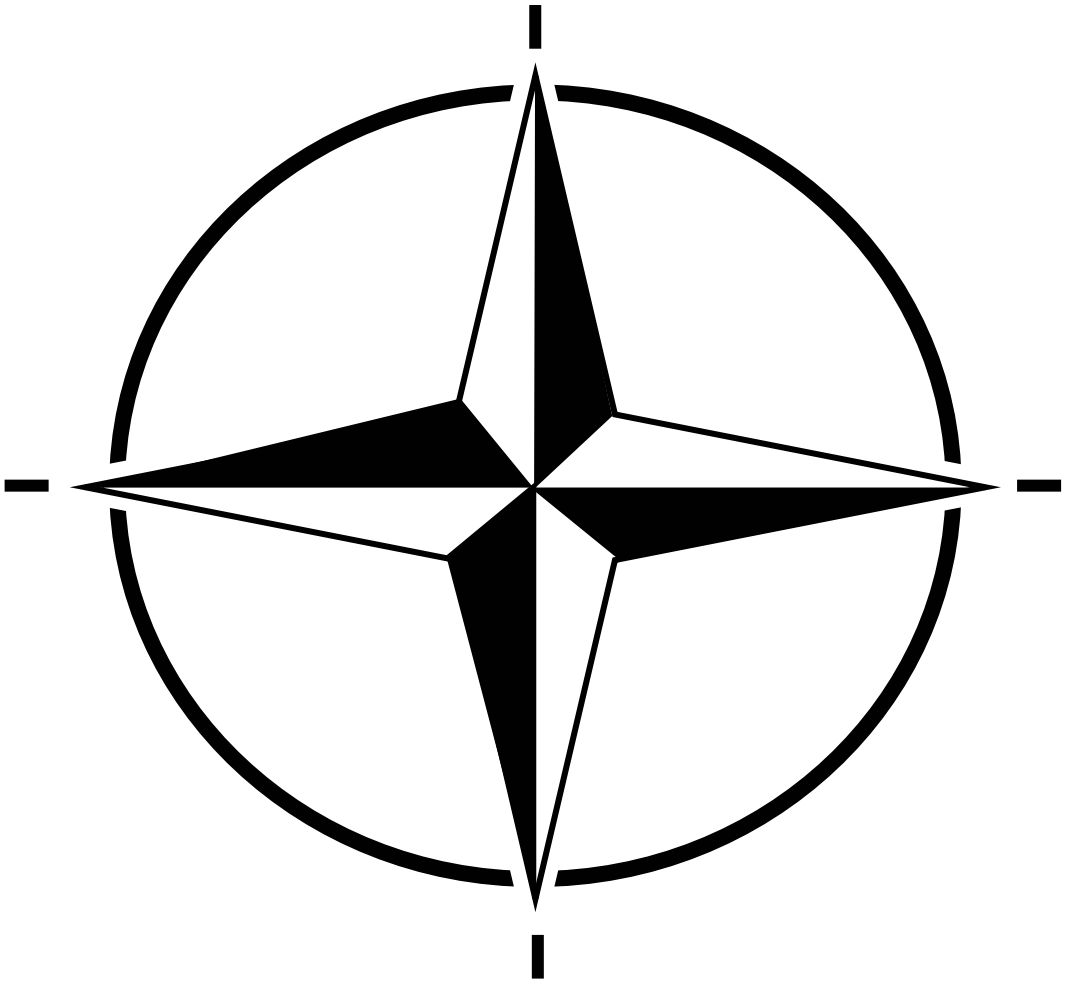

ALLIED DOCTRINE FOR MILITARY ENGINEER SUPPORT TO JOINT OPERATIONS
AJP-3.12 (A)

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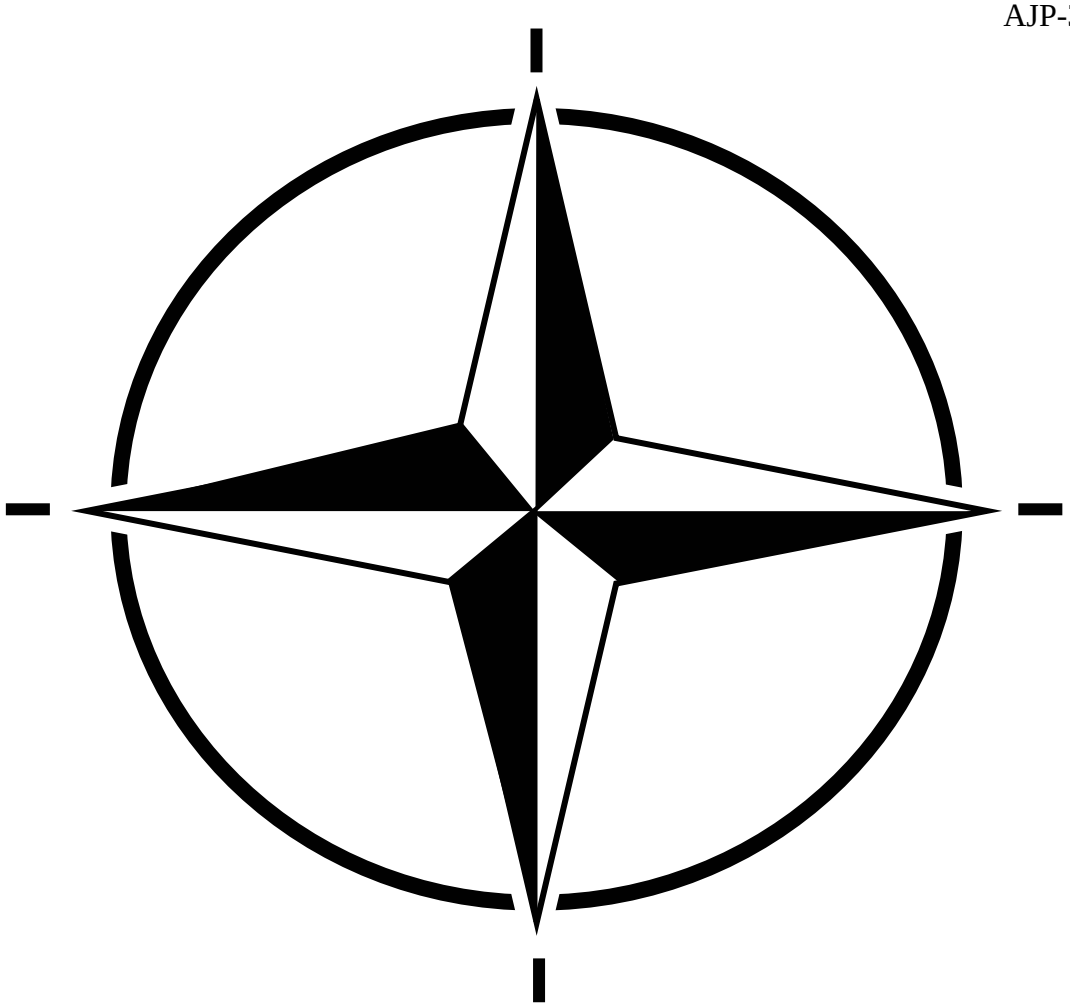

ALLIED DOCTRINE FOR MILITARY ENGINEER SUPPORT TO JOINT OPERATIONS
AJP-3.12 (A)

SEPTEMBER 2010

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NORTH ATLANTIC TREATY ORGANIZATION

NATO STANDARDIZATION AGENCY (NSA)

NATO LETTER OF PROMULGATION

28 September 2010

1. AJP-3.12(A) ALLIED DOCTRINE FOR MILITARY ENGINEER SUPPORT TO JOINT OPERATIONS is a NATO/PfP UNCLASSIFIED publication. The agreement of nations to use this publication is recorded in STANAG 2238.

2. AJP-3.12(A) is effective on receipt. It supersedes AJP-3.12, which shall be destroyed in accordance with the local procedure for the destruction of documents.

Cihangir Aksit, TUR Civ
Director, NATO Standardization Agency

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RESERVED FOR NATIONAL LETTER OF PROMULGATION

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RECORD OF CHANGES

Change Date	Date Entered	Effective Date	By Whom Entered

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RECORD OF RESERVATIONS

CHAPTER	RECORD OF RESERVATIONS BY NATIONS
General	BGR, ROU, SVK, USA
1	GBR
2	USA
3	GBR, USA

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RECORD OF SPECIFIC RESERVATIONS

[nation]	[detail of reservation]
BGR	1. In accordance with the international engagements signed by the Republic of Bulgaria, the Bulgarian Armed Forces will not use Anti-personnel mines and Booby-traps. 2. In the Bulgarian Armed Forces, the Geographic support and Environmental protection are not engineer support tasks.
GBR	a. Paragraph 0108.f(1). The term ‘explosive hazards’ has not been defined. The UK will consider the whole of 0108.f(1) to refer to Explosive Ordnance Disposal (EOD), removing the need for sub-paragraphs (a) and (b). b. Paragraph 0311.a. The term ‘explosive hazards’ has not been defined. The UK will consider the ‘explosive hazards’ (line 10) to refer to ‘Unexploded Explosive Ordnance (UXO)’, which has been defined. c. Paragraph 0311.a(3). ‘Explosive Remnants of War’ has not been defined though it can reasonably be included as a sub-set of Unexploded Explosive Ordnance (UXO). d. References to IEDD in paragraphs 0106 (last paragraph) and 0108.f(1)(a) are unnecessary and confusing as IEDD is a sub-set of Explosive Ordnance Disposal (EOD).
ROU	The geospatial, geomatic and geographic support are not RO engineer support missions; those missions are provided by other structures of national defense system. Construction and maintenance of rail and pipeline and dredging are not RO engineer mission support.
SVK	a) The position of JFEngr (or Chief Engr) and independent Engr Staff are not part of hte Armed Forces of the Slovak Republic. Engineers are incorporated in operational staff at tactical, operational and strategic levels. b) The environmental protection and geographic/geospatial are not engineers' responsibility in the Armed Forces of the Slovak Republic. c) Planning, funding and maintaining of infrastructure (expect of constructing and maintenance of airfields) are not engineers' responsibility in hte Armed Forces of the Slovak Republic.

USA	a. The United States (US) does not subscribe to the language in paragraph 0218 which states the combined joint explosive ordnance disposal cell (CJEODC) will set technical standards for explosive ordnance disposal (EOD). Rationale. Paragraph 0210b states the CJEODC will have no tasking authority and STANAG 2389 (Edition 2), "Minimum Standards of Proficiency for Trained Explosive Ordnance Disposal Personnel", sets the technical standards for EOD. b. The US does not subscribe to the latter portion of paragraph 0307 which states: "EOD, Mine Warfare and Barrier Policies. Distinct policies on EOD, mine warfare and barriers will need to be determined at strategic level or above. Each of these policy areas impacts differently on HN and TCNs and will affect the type and level of military engineer support required by the force. The JFENGR and staffs must advise on the planning and integration of different engineer assets, and implications of these policies on operations." With respect to potential humanitarian demining efforts, it is the policy of the United States that US military forces are prohibited from engaging in the physical detection, lifting, or destroying of land mines, except in limited circumstances. Rationale. While AJP-3.12 does not specifically mention humanitarian demining, it does discuss the use of EOD for mine clearance. The purpose of the proposed reservation is to alert readers of AJP-3.12 to the US national policy with respect to this area. Title 10 United States Code Section 401(a)(4) prohibits members of the Armed Forces of the United States from engaging in the physical detection, lifting, or destroying of land mines (unless the member does so for the concurrent purpose of supporting a US military operation). c. The US does not subscribe the text in paragraph 0318 which misuses effects and objectives terminology. Rationale. Effects are created or generated to support the achievement of objectives. Effects and objectives are not synonyms. d. The United States does not recognize the terms and definitions included in the text and glossary as being NATO agreed upon that: (1) Have not been approved through the Military Committee Terminology Conference (MCTC) and do not have a current terminology tracking form: counter-improvised explosive device and explosive hazards coordination cell, explosive hazards coordination cell (EHCC). (2) Are not used in the text or not adequately covered in text to derive a definition: CE Crisis establishment, CJTF Combined joint Task Force, J4 Joint logistics, JFEODCC Joint force explosive ordnance disposal coordination cell, JOPG Joint operations planning group, JRA Joint rear area and LCC Land component commander. (3) Are definitions that are misquoted from Allied Administrative Publication (AAP) - 6: force support engineering, unexploded explosive ordnance, combat support engineering and force support engineering. (4) Are terms for which this publication would not be source to define them: counter-improvised explosive device. (5) Terms for which the definition is missing: Bi-strategic command doctrine.

FOREWORD

0001. Allied Joint Publication (AJP) 3.12 (A) Allied Doctrine for Military Engineering Support to Joint Operations outlines the organization, roles and responsibilities of military engineers in support of the full range of Alliance missions. It derives its authority from and complements AJP-3 Allied Doctrine for Joint Operations which presents North Atlantic Treaty Organization (NATO) doctrine for planning and conducting joint operations.

0002. The terms 'engineer' and 'engineering' have a variety of meanings. This document is concerned with 'military engineering', which is used in the sense of that engineer activity undertaken, regardless of component or service, to shape the physical operating environment. It does not encompass the activities undertaken by those 'engineers' who maintain and repair vehicles and equipment.

0003. Military Engineering is a multifaceted activity. It is undertaken by all services and is a force multiplier across the full range of Alliance operations, particularly non-article 5 crisis response operations (CROs). It includes the use of military and civil engineering capability to support joint operations. As the Alliance Strategic Concept has evolved, the requirement for military engineering support has grown. Military engineers are particularly suited for rapid deployment in support of NATO operations worldwide.

0004. To meet the challenges of the evolving strategic and security environment, AJP-3.12 (A) provides doctrine reflective of existing organization, capabilities and best practices. It provides fundamental principles by which the military forces or elements thereof guide their actions. It is authoritative but requires judgment in application. Throughout this document the generic term joint force commander (JFC) is used and his chief engineer advisor is known as the joint force engineer (JFENGR). At the operational level[1], the impact of military engineering as a key campaign 'enabler' is of crucial significance.

0005. Military engineering plays a vital role in support of the joint force as a whole. Land based engineers play a key role in providing immediate support to ongoing and imminent operations in support of the maritime and air components and logistics. The coordination and control of engineers at joint force level, as envisaged in this publication, will ensure the best use of limited resources, both manpower and materiel, in meeting the various demands made by joint operations.

0006. Although intended for Alliance use, the doctrine is equally applicable for use by a coalition of NATO and non-NATO nations within the framework of any combined joint operation. It is aimed primarily at the joint force level. However, much of what it says is equally applicable at the component level, though recognizing that the engineering needs of the different components are not identical. Moreover, although this publication sees the need for dedicated engineer staffs at all levels to provide the appropriate advice to commanders and coordination of engineer effort, it is not fundamentally about structures and organization. It is about rationalizing what currently exists, by providing an appropriate

[1]. At the tactical level, combat engineer doctrine supporting air, land and maritime forces is mature and detailed within current AJP-3.2 *Allied Land Operations Doctrine*, AJP-3.2.2 *Command and Control of Allied Land Forces* and ATP-52 *Land Force Combat Engineer Doctrine*.

engineer focus in headquarters in order to enhance the delivery of military engineer support through improved engineer advice and coordination.

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CHAPTER 1

THE ALLIANCE CONCEPT OF MILITARY ENGINEER SUPPORT TO JOINT OPERATIONS

Section I - Introduction

0101. Since the end of the Cold War the scope and focus of military engineering in support of joint operations has changed. Modern NATO operations have increasingly been conducted on an expeditionary basis and there is a need to redefine military engineering policy, doctrine, concepts and roles. Military engineers must be prepared to provide a wide range of support to the joint force as a whole through the construction of operational infrastructure, military engineer support to force protection and through support to logistics. NATO, NATO headquarters (HQs) and the designated joint force commander will require military engineering advice throughout the operation, from the first stages of the planning process to the recovery and re-deployment of the joint force.

0102. A wide understanding of the joint engineer approach embodied in this doctrine will enhance the operational planning and execution of operations across the range of military activity. This is especially important when operations are to be conducted by allied, multinational or coalition forces, where failure to follow such doctrine and lack of a single joint and combined engineer staff may lead to competition for scarce host nation support (HNS) and local resources.

Section II - Fundamentals of Joint Operations: Implications for Military Engineering

0103. **Scope**. The nature and extent of military engineer support will vary according to the level of operation[2], the nature of the conflict, the strategic and operational environment, and the scale and scope of military operations. These issues are addressed further in later sections of this chapter.

0104. **Operational Areas**. Allied Administrative Publication (AAP-6) *NATO Glossary of Terms and Definitions (English and French)* describes 'Area of Responsibility – (AOR)' and the 'Joint Operational Area (JOA)'. In addition, operations may be classified as internal, adjacent or external to the NATO AOR[3]. The complexity of mounting campaigns and major joint operations increases when leaving the NATO AOR as less reliance can be placed on HNS. For expeditionary operations, the need to coordinate the use of engineer assets across components and to de-conflict demands for HNS will be critical responsibilities of the operational level HQ.

0105. **Joint Force Model**. AJP-01(C) Allied Joint Doctrine provides guidance on NATO's approach to joint operations. The planning and coordination of such operations will take place at the operational level, or higher, either within the existing NATO Command Structure (NCS) or by the establishment and deployment of a command and control (C2) structure tailored to specific mission requirements. The ability to implement military

[2]. See AJP-01(C), Allied Joint Doctrine.
[3]. See MCM-161-00, MC Input to MG 2000, 8 Nov 00.

engineer principles and provide advice to all levels of the NCS is a critical requirement for engineers. In order to implement the principles of joint operations as laid out in AJP-01(C)[4], it is essential that engineer adviser and/or engineer staff is established at each level of command. The engineer advisor and engineer staff must be placed so as to be able to advise and support the commander and all staff functions from the outset through planning, preparation, execution and transition of operations. A joint force command HQs, when designated, will include a JFENGR and joint force engineer staff[5]. The establishment of this single focus helps ensure that the necessary balance of engineer functions across the components are integrated and synchronized between national requirements.

Section III - Scope of Military Engineer Functions

0106. **Terminology**. Military engineering is that engineer activity undertaken, regardless of component or service, to shape the physical operating environment.[6] Military engineering incorporates support to manoeuvre and to the force as a whole, (combat support engineering and force support engineering), including military engineering functions such as engineer support to force protection, counter improvised explosive devices (C-IED), environmental protection, engineer intelligence and military search. According to Military Committee Policy for Military Engineering (MC 0560) dated 1 April 2008:

a. **Combat Support Engineering**. Combat support engineering encompasses those military engineer tasks associated with the direct support to current or imminent operations. It is conducted by the military engineers of any service or component to support land, air and maritime operations[7] with the emphasis on speed of execution.

b. **Force Support Engineering**. Force support engineering encompasses the deliberate, longer-term preparation for, and indirect support to ongoing or future operations as well as those military engineering tasks associated with sustaining the Joint Force throughout all stages of an operation.[8]

Combat support engineering and force support engineering both include military engineering functions such as geospatial or geomatic support, environmental protection, and engineer intelligence as well as engineer support to explosive ordnance disposal (EOD), improvised explosive devices disposal (IEDD), C-IED and force protection (FP).

0107. **Allocation of Engineer Effort**. The allocation of engineer effort between combat support and force support functions will vary with the nature of the operation, phase of the operation, mission requirements, shifts in weight of effort to support the commander's intent and CONOPS and with changes in the operational environment.

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[4]. See AJP 01(C), Chapter 4, Section I, para 0406

[5]. The component commands and joint logistics will each be supported by a chief engineer and engineer staff.

[6]. Military engineering does not encompass the activities undertaken by those 'engineers' who maintain, repair and operate vehicles, vessels, aircraft, weapon systems and equipment.

[7]. For example, the rapid repair of an airfield runway operating surface or, essential services and facilities post-attack, would be considered as combat support engineering.

[8]. Infrastructure and deployment support covers all actions implemented by engineers in order to carry out enhancement work for the well-being and the security of units; including rehabilitation of buildings, power plants, force protection structures, water supply, etc.

Section IV - Levels of Military Engineering

0108. **Military Strategic Level Engineering**. At the strategic level, engineer activity addresses four primary areas: force planning for engineering; engineering policy and doctrine; NATO infrastructure and associated NATO Security Investment Programme (NSIP) funding; and the engineering element of operation/exercise planning and execution. Regarding operations, strategic engineer activity focuses primarily on the provision of means and capabilities to generate, deploy, sustain and recover forces. Infrastructure is a critical aspect of enabling and sustaining force deployments and places a heavy demand on engineer capabilities. However, the requirement of combat support engineering cannot be ignored. At the strategic level, consideration of engineer issues will be essential to ensure that the engineer support to the operational and tactical commanders is given due weight. The military strategic HQ should be fully advised on:

a. The impact of terrain and infrastructure on plans and operations.

b. Military Engineer force generation requirements.

c. Strategic deployment and redeployment.

(1) Engineering contract support requirements

(2) Engineer support needed to maintain the strategic lines of communications (LOC)

d. Recommended strategic priorities for engineer support.

e. Engineer considerations affecting the joint targeting process.

f. Strategic guidance and policy for engineer support to:

(1) Countering explosive hazards.

(a) EOD and IEDD.

(b) C-IED.

(2) Humanitarian assistance.

(3) Environmental protection (EP).

(4) Infrastructure standards and funding.

(5) FP.

(6) Reconstruction and development.

(7) Civil authorities.

g. Input to rules of engagement (ROE).

h. Engineer interoperability, standardisation and co-operation.

i. Assistance and coordination of management of class IV supplies with logistic staff.

j. HNS engineer capability and capacity.

In addition, engineer activity should be fully considered in strategic level training, exercises (including the evaluation process) and the development of engineer capabilities.

0109. **Operational Level Military Engineering**. Priorities for engineer activity and associated allocation of resources will be determined in the operational planning process (OPP) in which the JFEngr and his staff must play a full part. Like the strategic commander, the Joint Force Commander (JFC) should have a JFENGR subject matter expert (SME), advising him on military engineering issues relating to execution of operational commander responsibilities listed in the Bilateral Strategic Command (Bi-SC) 80-90 (NATO Task List). The JFENGR may also act as the coordinating authority over the engineer assets throughout the components. The JFENGR staff develops, coordinates, monitors and assesses all engineer matters to support the full range of military operations. In addition, within the constraints, restraints and policies established by the strategic HQ, the JFENGR must advise the JFC on:

a. The development of military engineering policy and plans for operations.

b. Preparing and shaping the JOA.

c. Military Engineer support to joint manoeuvre.

d. Military Engineer support to stability operations.

e. Military Engineer contribution to the joint fires and targeting process.

f. Military Engineer support to FP.

g. Military Engineer support to sustaining the force including development and maintenance of the JOA infrastructure.

h. Military Engineer support to EP.

i. NSIP procedures and policies.

0110. **Tactical Level Engineering**. At the tactical level, although there may be a greater focus on manoeuvre support, survivability and longer-term sustainment will be necessary within all components. Engineer tactical doctrine for land forces is well established and the use of terms such as close engineer support (mobility, countermobility and survivability) and general engineer support to categorise engineer activities remains valid. However, tactical level engineering is not solely an activity within the land component. For example, engineers at the tactical level support the maritime component (e.g. amphibious operations by developing beach-heads); air component (e.g. by developing airfield infrastructure); and the Joint Logistics Support Group (JLSG) (e.g. by developing logistic infrastructure).

Section V - Joint Military Engineer Forces and Resources

0111. **Context**. In joint operations, engineer support will enhance strategic and operational mobility, develop and maintain the infrastructure for force projection, protect and sustain the joint force and develop the JOA for joint manoeuvre. It will also include provision of geographical information to support the joint force. The nature of engineer support will vary across the components.

0112. **Military Engineer Capabilities and Funding**. Assigned or generated engineer capabilities are essential to ensure that the JFC has the engineer resources at his disposal to execute theatre level engineer tasks. Whilst such capabilities may be found from Alliance nations, there will be occasions when operational level engineering has to be provided and financed from NATO common funds. If the situation requires, the NSIP will provide the funds for infrastructure to support the joint force.

0113. **Military Engineer Elements of the Joint Force**. Whilst nations may have varying national perspectives on categorizing forces, all components and the JLSG will include engineers within their assigned forces, but the extent and range of capabilities will vary. A flexible approach should be taken to providing cross-component engineer support when necessary to meet the JFC's intent. This will be particularly critical if joint force engineer support is required to reinforce other components at key stages in the campaign.

0114. **Other Military Engineer Capabilities**. HNS (both military and civilian) and civilian contractors may play an essential role in providing engineer support and therefore be considered as an additional source of assets to the joint force. The degree of reliance upon HNS will vary according to the JOA and the nature of the operation. The force must also be prepared to integrate other partner and non-NATO nations' forces, including engineer elements.

Section VI - Summary

0115. The likelihood of Alliance operations being expeditionary in nature has increased the requirement for engineer support across the joint force. Maximising the effect of scarce engineer assets requires a unified engineer chain of co-ordination.

0116. The balance of effort between force support engineering and combat support engineering varies with the type and phase of operation and also at the different levels of operation, strategic, operational and tactical. Engineer forces invariably have utility in both functions. Coordinating the available assets in support of the main effort will be a key role for the JFENGR and his equivalent at other levels of command.

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CHAPTER 2

ALLIED MILITARY ENGINEER COMMAND AND CONTROL

Section I - Introduction

0201. Effective command and control arrangements will facilitate the efficient employment and coordination of military engineer support. The JFENGR[9] should coordinate the military engineer effort in order to optimize support to operations. This chapter outlines the principles, structures and arrangements for effective engineer command and control.

Section II - Command and Control Principles[10]

0202. **Unity of Command**. The JFENGR is the principal engineer advisor to the JFC on all military engineer issues. The JFC may designate the JFENGR as the coordinating authority over the engineer assets throughout the joint force in order to ensure that capabilities and resources are used most effectively. The JFENGR will set engineering related technical standards across the joint force as appropriate. It is of the utmost importance that the JFENGR staff is fully integrated in the planning and execution of operations. The JFENGR staff is responsible to the force commander for providing clear focused and timely engineer advice and support. As such, members of the JFENG staff should be present in all relevant cross-functional working groups or cells.

0203. **Centralized Planning, Decentralized Execution**. In order to ensure optimum efficiency, use of available engineer resources should be planned centrally. In most cases, execution of tasks should be decentralized and delegated to the lowest appropriate level of command.

0204. **Early Involvement of Military Engineers**. Successful and timely completion of engineer work depends upon the availability of engineer resources (personnel, funding, stores and equipment). Close coordination with the intelligence and geomatics staffs will ensure accurate engineer intelligence is available. Timely engineer reconnaissance, as part of the operational liaison and reconnaissance team (OLRT) or similar element is essential to building a common operational picture (COP) to ensure synchronisation of engineer efforts. In order to mount a successful operation, engineers should participate in all aspects of the planning process from the outset.

0205. **Supporting/Supported Command Concept**. Key roles for the JFENGR will be to advise the JFC on available engineer assets and to coordinate the engineer effort across the components. The engineer effort may include that of force engineers, host nations (HNs), contractors, international organisations (IOs) and agencies. In addition, the JFENGR will provide information on the capabilities and limitations of the resources dedicated to provide support, and the potential impact on the supported mission. Components' engineer forces should not routinely be switched to support other components. However, it is the JFC's decision, with clear advice and guidance from the JFENGR, to move engineer assets

[9]. The term JFENGR is here used generically and should be taken to include the equivalent the chief engineer at all levels.
[10]. See AJP 01(C) *Allied Joint Doctrine*, Chapter 5.

between components. The JFENGR will advise on where spare capacity exists, and how it may best be used to support the campaign main effort.

0206. **Centralised Technical Authority**. General criteria and standards for infrastructure to meet the minimum military requirement (MMR) for NATO common funded projects will be fixed at the strategic level. Nevertheless, engineers employed on infrastructure and other engineering tasks must conform to the construction specifications and standards of the HN. If there are no HN standards, or these standards are inadequate, the JFENGR is responsible for advising the JFC on the standards to be adopted in the JOA[11].

Section III – Military Engineer Organisations

0207. Appropriate, well-structured and robust engineer staffs, headed by a Chief Engineer, are essential at all levels of HQ to provide commanders with engineer advice. The staffs should have a simple and clearly understood command chain. Wherever possible, peacetime establishments should reflect operational organisations.

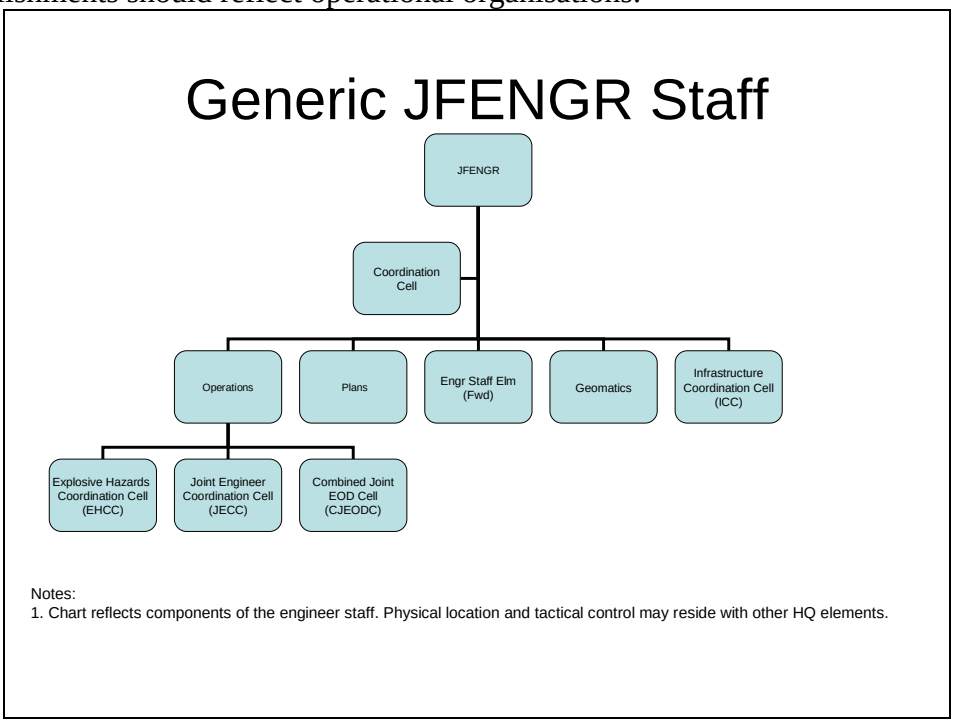

Figure 1-Generic JFENGR Staff

0208. **Generic Joint HQ Engineer Staff Organisation**. The joint force engineer coordination cell should normally be an independent cell within the joint force HQ, but if this is not possible it should be embedded in the joint operations centre with the authority to coordinate with the other coordination centres of the HQ[12].

0209. **Functional Areas**. The JFENGR is the principal engineer advisor to the JFC on all engineer issues. The senior engineer and his staff at the joint force and component command HQs, as well as at lower levels, will be the focal point for the planning and execution of all aspects of military engineering support to operations.

a. **Engineer Plans Staff**. The engineer plans staff supports the OPP. They will identify engineering support requirements, including Infrastructure, HNS and EP

[11]. See Bi SC 85-1, 1-7 page 1-2-19 and 1-3-63.
[12]. See AJP-3(A) *Allied Doctrine for Joint Operations* (0257).

requirements, and develop and maintain plans for the provision of this support. The staff will prepare commander's policy and guidance; and provide engineer input to concepts, doctrine, organisation and the force generation process. The engineer plans staff is responsible for providing advice and guidance on static infrastructure, EP, engineer support to FP, engineer logistic and resources matters, and for developing and supporting programmes of work, including NSIP funded projects.

b. **Engineer Operations Staff**. The primary focus of the engineer operations staff is, in conjunction with the operations and logistics staffs, to achieve the commander's intent by coordinating the combat support and force support engineering effort. The engineer operations staff will develop the engineer parts of orders, and manage and control engineer support to current operations (including coordinating the implementation of projects) in order to ensure that they continue to meet the commander's requirement. The engineer operations staff will support the intelligence process by providing expertise related to all hostile engineer units and assets, terrain, engineer resources, infrastructure and details of obstacles and explosive hazards. In any operational environment where is an IED threat, the engineer operations staff will normally establish the explosive hazards coordination cell to predict, track, distribute information on, and mitigate explosive hazards that affect the force. The staff will also develop and maintain an information / knowledge database which contain details of the available engineer capabilities and resources including construction materiel, engineer plant and machinery, contractors, labour and artisans.

0210. **EOD**[13]

a. **Command Status**. The command status of all EOD forces participating in an operation, coordinating authorities and tasking authorities will be clearly defined both in operation orders and within national and international directives. The JFC should have authorities over national contingent EOD forces and these authorities will be consistent with the missions to be accomplished.

b. **Combined Joint EOD Cell (CJEODC)**. A CJEODC may be established as a single cell in the senior Joint Force HQ, and is usually placed OPCON under the combined joint operations staff. The CJEODC is the focal point for the HQ for all EOD matters. It is responsible for advising the JFC and coordinating EOD matters with troop contributing nations (TCNs) and other organizations. It does not retain a tasking function. The JFENGR remains the primary advisor on all mobility support issues.

0211. **Infrastructure Coordination Cell (ICC)**[14]. Infrastructure engineering for logistics is but one of the force support engineering missions conducted by engineers in support of operations. If a multinational joint logistics centre (MJLC) / joint logistic support group (JLSG) is formed, an ICC may be established in the MJLC / JLSG to provide infrastructure advice and to develop, coordinate, and facilitate NATO common funded infrastructure projects, including environment and public works in support of logistic operations. JFENGR will provide the technical input and, through contracted or military means provide the necessary construction capability for critical infrastructure required to carry out logistic support to the force. Based on the operational requirement the JFENGR will advise on the

[13]. See ATP-72 *Interservice Explosive Ordnance Disposal on Multinational Deployments* for details.
[14]. See MC 0536 *Policy for Infrastructure Engineering for Logistics* and AJP-4.6 *Multinational Joint Logistics Centre Doctrine*.

required staff organization and strength of the ICC dependant upon the level of infrastructure coordination required and the range of engineering functions needed. The ICC will be tasked in coordination with JFENGR by the MJLC director or the JLSG commander based on JFC operational planning priorities. It executes tasks under functional guidance and technical authority of the JFENGR.

0212. **Specialist Engineer Resources**. Central coordination is essential to the efficient employment of engineer capabilities. Consideration should always be given to retaining control of specialist engineer resources e.g. well drilling, pipeline and rail line construction / repair, dredging, technical reconnaissance and modelling etc., at the highest practicable level. Where TCNs apply caveats regarding the use of specialist engineer resources, due regard should be given to the impact of these caveats on the ability of the Command to employ them.

Section IV - Host Nation Support

0213. HNS is civil and military assistance rendered in peace, crisis or war by a HN to NATO and/or other forces and NATO organizations, which are located on, operating on/from, or in transit through the HN's territory[15]. From an engineering perspective, it is important that liaison with the HN is established at the earliest opportunity. HN sovereignty must be respected in the planning and execution of engineering work on its territory. Compliance with HN planning regulations, engineering standards, codes of practice and law will normally be required. Consequently, much engineering activity may need to be coordinated with, and approved by HN authorities. If there are no HN standards or these standards are inadequate the JFENGR is responsible for advising the JFC on the standards to be adopted in the JOA. When requesting HN reviews or input, it must be considered that the quality of the work will often suffer if the effort is rushed. Work must be planned to allow others sufficient time to do their tasks. Critical or scarce HN engineer resources (material and manpower) need to be identified early in order to allow the JFENGR to coordinate their allocation.

0214. HNS arrangements such as memoranda of understanding (MOUs) and technical arrangements (TAs) may be pre-arranged by strategic commands (SCs), in accordance with Military Committee (MC) 334/2 NATO Principles and Policies for Host Nation Support, otherwise such agreements will have to be negotiated at the outset. These arrangements should include consideration of the provision of engineer resources. Throughout the operation, continuous liaison should be maintained with the HN to ensure that the HNS works effectively and remains flexible to changing situations through the duration of the operation. The JFENGR should participate in any board or committee established to achieve the efficient integration of HNS, such as a Joint HNS Steering Committee.

Section V - Summary

0215. The effectiveness of the engineer staff will depend on close cooperation and coordination between engineer staffs at all levels and across all components, following the established command chain. HQs at all levels of command need a Chief engineer supported by a well-structured engineer staff to advise the commander on engineer matters.

[15]. *AAP-6.*

0216. The engineer staff must coordinate with all other staff elements including special staffs in order to plan, coordinate, integrate and synchronize effective engineering support to the operation. The engineer staff must also cooperate closely with appropriate HN authorities, TCNs, civil organisations and agencies to ensure engineering support throughout the entire area of operation is properly coordinated and synchronized.

0217. In consultation with the JFC / operational level staff and the components commands (CCs) / tactical level staff, the JFENGR may exercise coordinating authority over all engineer assets and will set engineering - related technical standards as appropriate across the joint force.

0218. Similarly, in consultation with the JFC / operational level staff and the CCs / tactical level staff, the CJEODC may exercise coordinating authority over EOD assets and will set EOD - related technical standards as appropriate across the joint force.

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CHAPTER 3

ALLIED JOINT MILITARY ENGINEER PLANNING

Section I - Introduction

0301. Engineer tasks are invariably demanding in time, resources and manpower. The early identification of engineer support requirements is therefore critical and demands the involvement of engineers in the planning and reconnaissance process from the outset. Engineer input to the planning process is also required to ensure that engineer factors such as terrain and infrastructure, which may constrain the planning options, are fully considered.

0302. Engineer staffs at all levels will carry out planning that must be integrated not only horizontally across their HQs but also vertically with engineer staffs at superior and subordinate headquarters, and outwards to the HN, IOs, nongovernmental organizations (NGOs) and other relevant actors. Engineers have a significant contribution to make to the OPP at all levels and must be fully involved in campaign synchronisation.

Section II - Planning at the Strategic Level

0303. **Context**. At the strategic level, engineer planning helps set the stage for subsequent operations. Strategic level engineers employ ministerial guidance, intelligence estimates, and planning situations in the defence planning process to develop force proposals for nations to provide specific engineering forces / capabilities thus establishing a planned pool of forces for later force generation. At the same time, functional experts assess NATO infrastructure against the plans and develop capability packages or crisis response operation (CRO) urgent requirements (CURs) with strategic level engineers for funding under NSIP to meet planning requirements in association with the Infrastructure Development Plan. Generic HNS MOUs are established to facilitate operations. Finally, strategic level staff work through other planning requirements as identified in the Bi-Strategic Command Directive (Bi-SCD) 80-90 NATO Task List (NTL). This enables the strategic level to provide direction and guidance to the operational level commanders and allows the operational planning process to proceed. This direction and guidance from the strategic level will include: constraints and restraints on the conduct of the joint campaign and the targeting process; the strategic deployment of forces; consideration of participation by non-NATO countries; barrier, mines, EOD and C-IED policies; EP policy; priorities; resources and resource limitations. All of these will impact on the engineer support annex (usually titled Annex EE) to the operational plan (OPLAN).

0304. **Strategic Level Contribution to the Operations Infrastructure Funding Process**. The provision of funding for operationally required infrastructure will be accomplished using the NSIP mechanisms. Infrastructure requirements to address operational shortfalls may be met by execution and, if necessary, acceleration of existing capability packages; or by authorisation of engineer projects as urgent requirements. Engineer advice on operations infrastructure requirements will assist financial controller staff at the strategic level in determining disbursement of funding authorised by the NATO Infrastructure Committee. Requirements, normally generated at the tactical level, are validated and endorsed at the operational level and then submitted to the strategic level. The strategic level screens, harmonises and consolidates requirements before submitting them to NATO HQ.

0305. **Responsibilities in the absence of a Host Nation** When infrastructure is required in areas / countries where no indigenous HNS is available, Allied Command Operations (ACO) or a designated NATO agency will act as HN for implementing identified infrastructure requirements. The delineation of roles and responsibilities, and the allocation of tasks between the strategic and operational levels will be decided during the planning process. The JFENGR will advise the JFC on the criteria and standards for construction, safety and EP to be adopted.

0306. **Force Generation**. The strategic level is responsible for reviewing the JFC's concept of operations and statement of requirements (SOR) for forces. Upon acceptance of the SOR by the SC, nations are contacted for contributions to satisfy the SOR. Within this process the engineer input to the force generation process is essential and should take into account:

a. Likely tasks.

b. The operational environment.

c. Availability, quality and reliability of HNS and contractors.

d. Possible contribution and capabilities of partner and other non-NATO countries.

e. The requested timing of reception, staging and onward movement and eventual transfer of authority for engineering forces in the JOA.

0307. **EOD, Mine Warfare and Barrier Policies**. Distinct policies on EOD, mine warfare and barriers will need to be determined at strategic level or above. Each of these policy areas impacts differently on the HN and TCNs and will affect the type and level of military engineer support required by the force. The JFENGR and staffs must advise on the planning and integration of different engineer assets, and the implications of these policies on operations.

0308. **Environmental Protection**. Environmental protection is NATO's term for the application and integration of all aspects of environmental considerations as they apply to the conduct of military operations. Environmental considerations include the entire spectrum of environmental media, resources, or programs that may affect, or be affected by, the planning and execution of military operations. Factors that NATO takes into account in its planning include HN laws for environmental compliance, pollution prevention, waste management, conservation, heritage protection (natural and man-made), and protection of flora and fauna. In the absence of a HN, the JFENGR will advise the JFC on criteria and standards concerning environmental protection as adopted by NATO or other international conventions if applicable. Environmental damage may be an inevitable consequence of operations but taking account of applicable environmental considerations in the planning process can minimise these effects without compromising either operational or training requirements. With an understanding of applicable environmental legislation and regulations or other standards, commanders will be able to plan efficiently and act accordingly. By taking proper steps to assess, plan, train and execute the deployment and the mission, the commander will more effectively protect human health and essential environmental resources; he will reduce the occurrence of environmental accidents; and he can mitigate any damage that may be caused to the environment; thus limiting NATO's potential long-term liability.

Section III - Planning at the Operational Level

0309. **Context**. At the operational level, engineer staffs contribute to the OPP through participation in the appropriate operational planning group in developing the OPLAN, and by development of the engineer support annex. It is essential that engineers not only contribute to mission analysis, but work closely in co-ordination with all other staff divisions/functional areas. The engineer staff officer collaborates with other staff officers and provides engineer technical assistance during the development of other OPLAN annexes / appendices. The JFENGR must also coordinate closely with the engineers of the strategic and tactical levels. Requirements originating at the operational level will often require action at the strategic level; conversely, information needed at the strategic level may only be available within the JOA. In this process, engineers of all levels must explore all possibilities to streamline planning, accelerate preparation and maintain open lines of communication throughout the NATO hierarchy. Vertical coordination is as important as horizontal (inter-staff) coordination to achieving effective engineer plans.

0310. **Engineer Input to the Phases of the Operational Planning Process**.

a. **General**. The level of engineer input to the OPP will be determined by the operational requirements. HN engineer support may cover, or partially cover, some of these requirements. Available time, funding, resources and manpower will be limiting factors that ought to be taken into full account when planning for engineer tasks. The engineer contribution as an integral part of the OPP will be developed through the following five phases that are identified by the Bi-SC Guidelines for Operational Planning[16].

b. **Initiation Phase**. Until receipt of the initiating directive, engineer staffs will continue their routine training and data collection activities. If already aware of imminent changes to the political situation or the start of a new crisis, engineer staffs will intensify information collection and start designing a possible theatre infrastructure framework (TIF) together with generic funding requirements and conduct parallel planning with higher HQs whenever possible or feasible. Engineer annexes of applicable CONPLANs should be scrutinised and updated. Country databases will need to be maintained and should contain as much information as possible on terrain, infrastructure and in-country commercial capabilities in the area of interest. Engineering considerations during this step of planning include, but are not limited to:

- Terrain and related weather analysis in support of operational area/environment visualization.
- HN infrastructure and facilities assessment.
- Assessment of coalition and HN engineer capabilities.
- Additional digital mapping requirements for projected missions.
- Capabilities of assigned engineer forces.
- Threat engineer capabilities.
- Environmentally sensitive areas and other environmental considerations.
- Historic and cultural resources.
- Bed-down requirements for supported friendly force.
- LOCs and APOD and SPOD supportability.

[16]. See also AJP 5 *Allied Joint Doctrine for Operational Planning* (Draft 2006).

c. **Orientation Phase**. Engineer staffs will maintain close coordination with operational planning staffs and logistic planners as well as NATO and national intelligence collection agencies, in order to design engineer support options for all possible courses of action (COAs). They will advise on the optimal engineer support for the preferred COAs and draft possible engineer task organisations. If possible, engineer reconnaissance / survey missions should be launched to establish additional information about terrain, infrastructure and in-country commercial capabilities.

d. **Concept Development Phase**. Engineer staffs will assist the operational planners in developing COAs to be proposed to the commander. They will conduct the engineer portion of the COA analysis and determine the engineer support required. A TIF should be developed for each COA proposed to the commander. Engineer manning and augmentation requirements will also be taken into account for the implementation of an engineer crisis establishment (CE), as well as troop-to-task analysis for the formulation of the combined joint statement of requirements (CJSOR). At this point in planning the engineer considers the following:

(1) Specific engineer tasks necessary to support each COA.
(2) Identify and address any engineer factors that may influence or affect force deployment.
(3) Availability of engineer assets to meet requirements. Use of engineer planning factors (e.g. equipment, personnel and unit capabilities) is essential in determining engineer support for each COA.
(4) Engineer logistics requirements to support each COA.
(5) Construction requirements to support each COA.
(6) FP.
(7) Environmental Protection
(8) Engineer actions and capabilities plus the resources needed during transition from sustained combat operations to termination of joint operations.
(9) Identification and planning for engineer transition points.

e. **Plan Development Phase**. Once the commander has approved the development of an operational plan, engineer staffs will start to develop the engineer support annex to the OPLAN, including the priorities for engineer tasks, and assist operational planners in the development of the OPLAN. The TIF will be finalised together with the engineer CJSOR. Engineer staffs will be prepared to transition to CE organisation if required. Engineer support contracts will be ready for execution.

f. **Plan Review Phase**. Engineer staffs will participate in periodic reviews of existing plans. This will include updates to the TIF and commercial capabilities.

0311. **Engineer Staff Branches Contribution**. Engineer staffs must be fully integrated in the planning process from the outset in order to fully articulate the engineering constraints and capabilities across all components. The JFENGR and component engineer staffs are responsible for ensuring that all engineer issues are given due consideration within the OPP at their respective headquarters. Planning is a continuous process. At the operational level, the engineer staff will contribute the following to the planning process:

a. **Military Engineer Operations Staff**. Linking closely with operations, logistic and other appropriate staff, this element manages and controls the engineer aspects of preparation and execution of operations, including monitoring the friendly forces engineer order of battle and capabilities, operations and equipment, stocks of materiel, and timelines for completion of all current engineer tasks. In this regard

engineer operations staff will update engineer plans staff so that plans are based on current information. Additionally, engineer operations staff will support engineer plans staff in the identification of infrastructure, resources and operation and maintenance requirements generated by the OPLAN and they will provide guidance on explosive hazards (including EOD). In conjunction with the intelligence and other appropriate staff, engineer operations supports the intelligence preparation of the battlespace process and is responsible for management of critical engineer information, including:

(1) Availability and acquisition of construction materials and services.
(2) Existing infrastructure, such as ports and airfields, LOC, urban networks and service support facilities etc.
(3) Mines, unexploded explosive ordnance (UXO), explosive remnants of war (ERW) and IED including maintenance of relevant databases.
(4) Battle damage assessment.
(5) Own, HN, and the engineer capabilities of other forces in the theatre of operations.

b. **Military Engineer Plans Staff**. The engineer plans staff will closely cooperate with all planners through the Joint Operations Planning Group They are the focus for all other engineer staff elements for incorporation of specific issues into OPLANs, including engineer support annexes. They will advise the other engineer staff elements on priorities and necessary requirements in order to meet the commander's intent. They coordinate with other appropriate staffs and working groups, and assess the infrastructure requirements generated by the OPLAN. The engineer plans staff will support engineer operations staff in developing and managing engineer projects, and contracted engineer support, by provision of complementary subject matter expertise. Operating forces (and their support structures) have the potential to cause great and irreparable environmental damage, based on how and where they conduct operations. The engineer plans staffs will provide planning input for matters concerning EP and mitigation in the JOA. If environmental impacts are unavoidable, or their mitigation is infeasible, the JFENGR should advise on the most desirable COA and maintain a database to register all events with environmental impact.

Section IV - Engineer Input to Other Fora

0312. It is essential that engineers participate in decision making on all issues that have engineering consequences, such as roads, rail, seaports, airports, inland waterways, pipelines, de-mining, force protection, and related works.

0313. **Engineers and Geographic Support**. In many nations the provision of geomatic or geospatial support is an engineer responsibility. In NATO this support is usually functionally organized within J2. Operational requirements for geomatic or geospatial support are determined by the designated chief geographic officer in coordination with the JFENGR and others. Geomatics or geospatial support encompasses those tasks that provide geographic information and services to enhance awareness, understanding, and effective use of the operational environment for commanders and staffs across the full range of military operations. It includes terrain analysis and visualization of the operational environment through the development, management, analysis, dissemination, and display of accurate terrain and any other geospatially-referenced information. It also includes actionable information and intelligence derived from analysis of geospatially referenced information to facilitate military decision making. It forms the foundation upon which all other

information on the operational environment is layered to form the common operational picture. Terrain analysis may include, but is not limited to:

a. Assessment of cross-country movement, mobility corridors, and roads, incorporating effects of weather and load capacity.

b. Intervisibility and field of view analysis for observation posts, covered approaches, and potential sites for weapons, sensors and communications.

c. Ingress and egress routes for rotary-wing aircraft and tilt-rotor aircraft.

d. Identification of potential key terrain.

e. Obstacle crossing studies.

0314. **Engineers and Targeting**. Engineers should be involved in the targeting process, particularly to help shape and prepare the battlespace. Engineers will advise on the effects of targeting. They should participate both in the Joint Targeting Working Group and the Information Operations Working Group. Engineer involvement in the targeting process will help to ensure accurate tracking of potential effects e.g. UXO and damaged infrastructure as a result of attacks. Engineer advice in the targeting process will include:

a. Selection of targets that serve the operational purpose without constraining future operations such as:

(1) Targets that cannot easily be by-passed by the enemy.

(2) Targets and means of attack that can be overcome with own engineering equipment.

(3) Prohibited targets.

b. Early appreciation of damage that may raise a requirement for additional equipment, such as bridging, which may have to be acquired from NATO common funds.

c. Re-evaluation of engineer advice based on battle damage assessment.

0315. **Engineers and Civil-Military Cooperation (CIMIC)**[17]. CIMIC is an important aspect of all operations. JENGR and joint civil-military operations staffs must work closely in CIMIC planning and implementation. Engineers may contribute to reconstruction and development and support to the civil authorities. NATO common funding will only be available for this purpose where it serves the core minimum military requirement in direct support of the NATO mission. CIMIC and JFENGR cooperation achieves:

a. Avoidance of duplication of effort.

b. Sharing of general information on what is being planned and executed on the civilian side.

c. Consideration of cost share arrangements, in consultation with other staff branches.

[17]. See AJP-9 *NATO Civil-Military Cooperation (CIMIC) Doctrine* for details.

d. Involvement of sending nations' engineers with CIMIC works.

e. Consideration of civilian services to augment the force engineering capability.

f. Managing the balance between CIMIC requirements and available engineer effort.

0316. **Military Engineers and HNS**. Although joint logistics (or appropriate equivalent) is the lead for many aspects of HNS, there are potentially many HNS capabilities that are of direct concern to the engineers. Engineer plans staff must be aware of the potential, and limitations for HNS assets to support the overall engineer plan. Key aspects to consider include:

a. Engineer force capabilities.

b. Available resources.

c. Construction standards.

d. Environmental concerns.

e. Contractor capabilities and contracting procedures.

f. Socio-economic concerns.

g. Force protection concerns.

0317. **Military Engineers and Logistics**. Joint logistics (or appropriate equivalent) maintains overall responsibility in the JOA for the movement and sustainment of forces, coordinates logistic activities with the JFC's CIMIC and other staff, the HN, TCNs' national support elements, and the component commanders. Logistics is supported by a variety of specialists among which military engineering is one of the most significant within the JOA.[18] Infrastructure engineering support provided includes the construction, restoration, acquisition, repair, maintenance and disposal of those infrastructure facilities required to mount, deploy, accommodate, sustain, and re-deploy military forces, including the construction, restoration and maintenance of LOC and facilitation of EP.

Section V - Special Considerations for Military Engineer Planning

0318. As already stated, military engineers must be fully integrated into their respective HQ's planning process as a whole. There are a number of specific engineer areas of responsibility in the operational planning process. Engineers must take the lead on these issues and coordinate with other divisions.

a. **Funding Mechanisms**. The primary funding mechanisms for NATO operations are: national funding, multinational funding, joint funding, and common funding. Common funding is provided to NATO by the nations collectively.

[18]. Engineer support to logistics is described in MC 0526 *Infrastructure Engineering for Logistics Policy* and AJP 4 *Allied Joint Logistics Doctrine.*

b. **NATO Security Investment Programme (NSIP)**. One type of common funding is the NATO Security Investment Programme (NSIP). To attract common funding, there must be a military requirement, and the required capability must be "affordable" and "eligible" for common funding. Affordability refers to the priority of the requirement in comparison with other requirements. Eligibility refers to what may be procured within the rules of common funding. NSIP common funding eligibility focuses on the provision of infrastructure requirements which are over and above those which could reasonably be expected to be made available from national resources. For each CRO, the North Atlantic Council normally establishes special funding rules for the operation. The basic principle used in establishing these rules is that "costs lie where they fall." Common funding is provided for costs that are not attributable to a single nation. These typically include: theatre headquarters elements, shortfalls in strategic communications, and critical strategic theatre infrastructure[19].

c. **Military Budget**. The NATO Military Budget pays for O&M costs (that are not directly attributable to a nation) during Crisis Response Operations.

d. **Funding Requests**. A request for NATO common funding in support of a CRO is normally submitted through a document known as a CRO Urgent Requirement or CUR[20]. This document describes the problem to be solved (the requirement); what a successful solution will achieve (the effect) assesses the resources needed to deliver the solution and addresses the risks associated with the status quo. For CRO infrastructure, it is the engineers' task to assist in development of the operational requirement, examine options, recommend and define the technical solutions and promote the allocation of funding. Basic procedures for these requests are set out in Bi-SC Capability Package Directive (85-1) dated on 11 June 2007.

e. Given the constraints associated with common funding eligibility and approvals, it is critical that the CUR is solidly documented and that the staffing process begins as soon as infrastructure requirements are identified.

0319. **Resource Development Plan (RDP)**. The RDP provides commanders with an overall view of the resources required to support a particular operation. It incorporates not only infrastructure, as reflected in the Infrastructure Development Plan (IDP), but also those support requirements related to communication and information systems (CIS), manpower, operating budgets, etc. Engineer planning staffs must ensure that these other resource requirements reflect the impacts generated by CRO infrastructure and are included in the RDP.

0320. **Engineer Support Contracts**. Experience shows that there are rarely enough military engineers available to execute all engineer tasks. This is particularly true at the theatre level. This shortage may be partially overcome by the use of civilian construction and service contractors. Such contracts may be established in advance as part of routine contingency planning where the execution of the contract is linked with the activation of the plan by the North Atlantic Council. Coordination must occur with strategic and operational level engineer staffs and the appropriate CCs.

[19] PO(2005)0098 dated 18 October 2005 provides the basic framework for Funding Policy for Non-Article 5 NATO-Led Operations. This polcy framework is customized for each CRO as required.
[20] CURs were formerly known as Project Submission Requests (PSRs).

0321. **Theatre Engineer Materiel**. Critical engineer material needed to support theatre level capabilities may be procured, managed and distributed by the JFENGR. This material might include bridging for theatre MSRs, force protection stores for theatre HQ and scarce construction materials for theatre APODS or fuel depots. These materials will either have to be purchased, transferred from another JOA, or released from operational / strategic reserve stocks. It is an engineer task to identify JOA engineer materiel requirements, establish the appropriate controls and to coordinate provision of these with the respective component, joint logistics staffs and SC / joint force command staff.

0322. **Use of Military Engineer Personnel**. There will be a constant requirement to ensure concentration of engineer capability on the main effort. Supporting components must be prepared to provide engineer support to other components as directed by the JFC. Advising the JFC on such manning requirements and possibilities is a key role for the JFENGR.

0323. **Contracting**. For NSIP funded projects, contracting authority is delegated by the NATO Infrastructure Committee (IC). For CRO, this authority is typically delegated to SHAPE (minor capital projects), NAMSA (major capital projects) and NC3A (CIS projects). As a result, all engineer staffs will require a collocated contracting organisation to support delivery of SHAPE delegated NSIP projects as well as procurement of engineer services and materials funded through the NATO military budget. For major capital projects contracted directly by the NATO agencies, engineer staffs will be expected to support the agencies through provision of military advice regarding operational requirements, support to design reviews, input regarding contract evaluation criteria and technical assessment of contractor proposals.

Section VI - Summary

0324. Engineer input is essential to the operational planning process at all levels. The engineer staffs at all levels must coordinate not only horizontally across the staff divisions of their parent HQ but also vertically to the engineer staffs of superior and subordinate HQ as well as outwards to the HN, IOs, NGOs, and other relevant actors.

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CHAPTER 4

ENGINEER SUPPORT TO THE CONDUCT OF ALLIED JOINT OPERATIONS

Section I – Introduction

0401. This chapter explains the contribution made by engineers in the preparation and execution of Allied joint operations. It covers engineer support to all components, close support to combat operations and general support to the force. It describes the execution of engineer support to a joint force throughout the full range of potential NATO operations, from crisis through conflict to post-conflict.

Section II - Operational Principles

0402. Of the principles for joint and multinational operations[21] the following key principles are particularly applicable to engineer operations across all components:

a. **Unity of Effort**. The JFENGR is the principal advisor to the JFC for engineering matters. To ensure unity of effort, the JFENGR will assess the overall engineer situation and recommend any changes required to the allocation of available engineer resources across the force. Unity of effort is the key engineer principle, which governs the planning, execution and coordination of military engineering in order that the JFC's intent is accomplished in an efficient and timely manner.

b. **Definition of Objectives**. The JFENGR must ensure that strategic direction and guidance is transmitted clearly to the force engineers in the form of unambiguous missions and policies applicable at the operational and tactical levels. Guidance is particularly required on the extent of barrier operations, FP, humanitarian assistance, EOD, CIED, countermine, demining, ERW clearance, infrastructure, reconstruction and development, EP and restoration of essential services and facilities.

c. **Concentration of Force**. Centralised planning and coordination will enable available engineer support to be focused and applied at the time and place it is most required. This will require cooperation between components.

d. **Economy of Effort**. Engineer advice at the earliest stages of strategic and operational planning will allow most efficient use of resources. Since the execution of engineer tasks requires the judicious deployment and control of scarce personnel, equipment, and materials, their most economical and efficient use must always be sought. Scarcity of engineer units will require that civilian contractors execute appropriate engineer tasks where possible.

e. **Allocation of Priorities**. Priorities must be clear to commanders at all levels if engineer resources, including manpower and materiel, are to be used to best effect.

[21]. See AJP-01(C), *Allied Joint Doctrine*, Chapter 2.

Engineer representation must be well embodied within the planning process at all levels to advise on prioritisation of engineer effort and resources.

Section III – Military Engineer Support to the Conduct of Operations

0403. **Introduction.** Military engineering support incorporates both combat support engineering, involving close support to operations, and force support engineering to sustain the force. Engineer support enhances the JFC's ability to conduct all aspects of joint operations including his capability to project air, land and maritime assets, exploit key terrain and use LOC. Efficient use of scarce engineer resources is essential to provide effective support to joint operations and depends on early planning, recce, centralised coordination and decentralised execution. Operational manoeuvre and force protection support require the full range of combat support engineering capabilities. Combat support engineering maximises the effect of operational manoeuvre and joint fires and enhances preservation and protection of the force on operations. Combat engineers can undertake force support engineering tasks but with limitations. Force support engineering demands a high degree of expertise and planning, is resource and time intensive and can be executed by military or civilian engineers including NATO, HN or TCN resources. Engineer units are well equipped to be used in consequence management operations and disaster relief such as flooding, earth quakes etc. Support to the conduct of Allied joint operations requires the JFENGR to manage the continual reallocation of priority and effort between both categories of support and to have a clear understanding of all caveats, strengths, and capabilities of the different assigned forces.

0404. **Pre-Deployment.** Engineers play an essential role at the strategic and operational levels during the pre-deployment planning phase. They advise on the engineering constraints on strategic and operational options and the required engineer capabilities to support them. They also coordinate and prioritise engineer resources between commands.

a. **Reconnaissance**. Engineers must be included on the earliest reconnaissance of the intended operational area to allow essential engineer input to the planning process. A well-prepared analysis and a robust recce plan are essential to inform operational level planning.

b. **Research and Preparation**. Enabling works in preparation for the joint force to manoeuvre on land, sea and in the air begin with research into national infrastructure capacity. This will include preparation of agreements and contracts for support from HN agencies and companies[22], and the acquisition and transport to theatre of required engineer equipment and materiel. Engineers must conduct liaison with HN authorities at the earliest stages of preparation for operations to coordinate barrier agreements, restrictions on demolitions, EP considerations, and the availability of HN military and civilian manpower, equipment and materiel to support the engineer effort.

0405. **Deployment**.

a. **Initial Deployment Phase**. In the initial stages of the deployment phase the main effort of engineer support is to upgrade and maintain theatre infrastructure, in particular logistics facilities and installations. Sufficient engineer support is essential

[22]. The availability and sophistication of HNS will determine the required level of military engineer support for the deployed force and this must be considered during the force generation process.

to the deployment process and more engineers are needed than in other phases. The HN may provide all or some of this support where capable.

Engineer support will include but is not limited to:

(1) Assessing and recommending the most efficient use of existing infrastructure.

(2) Any necessary (re)construction and maintenance of airports of debarkation seaports of debarkation and rail points of debarkation.

(3) Development, clearing, preparation, reinforcement and maintenance of all routes, areas and installations which must be used by the force during RSOM, and ground LOCs.

(4) Engineer support to FP measures.

(5) Environmental impact assessments.[23]

b. **Subsequent Operations**. Following the initial deployment phase the main engineer effort switches to mobility, counter mobility and survivability support.

(1) **Mobility Support**. Mobility and freedom of movement (FOM) are essential to allow the commanders to execute their operations. This is true across the full range of operations under all threat levels and during all seasons. Engineers will play an important role in breaching, clearing and crossing operations. In less hostile environments, HNS or contractors may execute these tasks, coordinated by the JFENGR. The JFENGR also coordinates any necessary demining and clearance of UXO carried out by NATO troops, and possibly also NGOs or former warring factions.

(2) **Counter-mobility Support.** As the joint force moves to engage the enemy directly, engineer effort assists in shaping the battle-space, enhancing manmade and natural terrain through the use of obstacle systems. Legal aspects and barrier agreements with a HN must be considered. Clear guidance must be given with the ROE concerning the use of any kind of mines and explosives to avoid unnecessary collateral damage. Engineer input to the targeting process seeks to avoid unnecessary destruction of infrastructure.

(3) **Survivability Support**. Engineering support to enhanced survivability covers the whole range of engineering capabilities and differs in the full range of potential operations. In Non-Article 5 operations it will be mainly related to security measures on compounds and force protection by hardening of command and control and other facilities, provision of collective protection and removal of threats to troops from UXO and ERW. The JFENGR should advise on the necessary survivability measures to reach the agreed standard for the area of responsibility (AOR).

0406. **Sustainment**. Engineer support to the sustainment phase of an operation will include maintenance of operational infrastructure, continuing improvement to force protection and

[23]. An environmental impact assessment is both a policy and management tool. An environmental impact assessment assists to identify, predict and evaluate the foreseeable environmental consequence of a proposed activity.

general engineer support tasks. Wherever possible, the JFENGR should use contractors or HN instead of military engineers for this type of task.

0407. **Post-Conflict Operations**. Execution of a mission will usually include a post-conflict phase before redeployment. Engineer support typically includes infrastructure repair, battlefield clearance, liaison with NGOs, IOs and national authorities, and support to displaced persons and refugees. Military engineering capabilities are clearly well suited to humanitarian tasks. Some of these will support information operations themes and the strategic aim of normalisation. There is increased risk that the mission parameters will begin to expand in this phase. The JFENGR must ensure that close coordination is maintained with CIMIC and financial controller staff and that NATO resources are used only in tasks supporting the NATO mission and within relevant eligibility criteria.

0408. **Redeployment**. Engineer support in the redeployment phase is similar to that of the initial phase of deployment. Planning must identify the engineer resources and capabilities required for the latter stages of this phase to avoid premature release of essential troops to national control. When the redeployment takes place in a peaceful environment JFENGR must plan the handover of redundant NATO infrastructure to civilian authorities at an early stage. A comprehensive record of all engineer-related activities must be handed over to the authorities. When the redeployment takes place in a hostile environment JFENGR must be prepared to maintain FOM until the very end of the campaign. JFENGR must also be prepared to plan engineer support to force protection during redeployment when large amounts of personnel and equipment will gather in the point of embarkation.

Section IV – Specialist Engineer Contributions to Operations

0409. **Explosive Ordnance Disposal**. EOD support to operations is described in chapter 2 paragraph 0210. Combat engineers, under direct supervision of EOD, can be used to assist EOD elements with the disposal of large quantities of unexploded and abandoned munitions in order to reduce the significant threat to friendly force and the local civilian population. Engineer units, HNS and specialised agencies must work together to mitigate the risk but the responsibility for ERW clearance and managing munitions caches lies with the HN.

0410. **Military Search**. Military search is an all-arms responsibility. Military engineers may be trained as specialists in intermediate or advanced military search, or carry out basic search operations as part of their normal military function[24]. Engineers can also assist in determining whether it is safe for search operations to be conducted in or near damaged structures or close to other hazards and, where appropriate, design and build protective works to safeguard search operations.

0411. **Counter-Improvised Explosive Devices**. C-IED is an all-arms responsibility. Military engineers in specialist roles such as EOD and Geo, or trained in intermediate or advanced military search, may be very closely involved in C-IED operations to “defeat the device”. Non-specialist military engineer support may include engineering advice, protective works, and the destruction of explosives as described above. Military engineers and EOD will also contribute to “attacking the network” by exploiting IED finds to develop IED intelligence as well as contributing to targeting.

[24]. ATP-73 Vol 1 refers.

0412. **Training**. Military engineers may be required to contribute to multinational training of joint force units, NGO and IO personnel, local population, local security forces and if necessary warring factions. JFENGR and engineer units should be prepared to conduct this training, which is not limited just to mine and UXO awareness programmes.

0413. **Deception**. Engineer troops are a valuable combat indicator for the opposing forces' intelligence effort and can therefore play a key role in enhancing the credibility of a feint or deception plan. Once preparation for a specific operation is underway, engineers may also contribute by construction of dummy infrastructure, simulation of damage and manufacture of dummy equipment.

0414. **Infrastructure**. Engineers assist in the identification of operational infrastructure requirements and provide the technical expertise to develop and communicate them. They monitor the planning, design and construction of the required infrastructure[25]. Early planning of infrastructure requirements will be a significant contribution to preparing and shaping the battlespace for operations. At the theatre level, specialist military and civilian engineer staff will usually conduct the planning and design of infrastructure to be constructed by military engineers in support of the operation. They may also plan and design works to be constructed by civilian contractors. Some operational infrastructure projects will be eligible for NATO common funding and procedures have been developed to allow urgent requirements to be provided through the NSIP or the military budget[26]. The JFENGR and his staff will support and coordinate the project management and execution of all infrastructure projects in accordance with the TIF.

0415. **Military Engineering Support for Force Protection**. Engineers contribute to the overall FP effort by providing advice on appropriate physical protective measures, including obstacles, observation points, warning / detection systems, and mitigation of weapons effects on structures.

0416. **Environmental Protection**[27]. The impact of operations, including all military engineering, on the environment must be monitored during the operation and mitigation plans put in place to limit the effect.

Section V- Summary

0417. Engineer support to the joint force is essential to the conduct of all phases of a NATO operation. Engineer staff expertise and advice is required at headquarters of all levels from the earliest stages of the operation, as engineer issues will influence the potential options. Initially the focus of engineer effort is on operational infrastructure. During the operation this may switch to manoeuvre support. Engineer expertise and advice must be provided in a number of specialist areas to achieve the full range of mission objectives,

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[25]. Management of infrastructure funded by NSIP is conducted in accordance with Bi-SC Directive 85-1.
[26]. See BI-SC Directive 85-1.
[27]. STANAG 7141 refers.

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ABBREVIATIONS

This glossary contains abbreviations relevant to AJP-3.12(A) and is not meant to be exhaustive. The definitive and more comprehensive list of NATO agreed abbreviations is AAP-15. Abbreviations marked (*) new abbreviations and are being staffed for ratification within the context of this publication. They will be processed for inclusion in the NTDB and AAP-15 in due course.

AAP	Allied administrative publication
AJP	Allied joint publication
AOR	Area of responsibility
BI-SCD	Bilateral – strategic command doctrine
CC	Component command
CE	Crisis establishment
C-IED	Counter – improvised explosive device
CIMIC	Civil - military cooperation
CJEODC	Combined joint explosive ordnance disposal cell
CJTF	Combined joint task force
COA	Course of action
CONPLAN	Contingency Plan
CRO	Crisis response operation
CUR	CRO Urgent Requirement
EOD	Explosive ordnance disposal
EP	Environmental protection
ERW	Explosive remnants of war
FOM	Freedom of movement
HN	Host nation
HNS	Host nation support
ICC	Infrastructure coordination cell
IED	Improvised explosive device
IEDD	Improvised explosive device disposal
IO	International organization
J4	Joint logistics
JFC	Joint force ~~c~~ommander
JFENGR	Joint force engineer
JFEODCC	Joint force explosive ordnance disposal coordination cell
JLSG	Joint logistics support group
JOA	Joint operations area
JOPG	Joint operations planning group
JRA	Joint rear area

LCC	Land component commander
LOC	Lines of communication
MC	Military Committee
MJLC	Multinational joint logistics centre
MOU	Memorandum of understanding
NATO	North Atlantic Treaty Organization
NGO	Non-governmental organization
NSIP	NATO Security Investment Programme
OLRT	Operational liaison and reconnaissance team
OPP	Operational planning process
OPLAN	Operation plan
ROE	Rules of engagement
SC	Strategic command
SOR	Statement of requirements
TCN	Troop contributing nation
TIF	Theatre infrastructure framework
UXO	Unexploded explosive ordnance

TERMS AND DEFINITIONS

Bi-strategic command doctrine

combat support engineering
Military engineering tasks associated with the direct support to current or imminent operations. They are conducted by the military engineers of any service or component to support land, air and maritime operations with the emphasis on speed of execution.

coordinating authority
The authority granted to a commander or individual assigned responsibility for coordinating specific functions or activities involving forces of two or more countries or commands, or two or more services or two or more forces of the same service. He has the authority to require consultation between the agencies involved or their representatives, but does not have the authority to compel agreement. In case of disagreement between the agencies involved, he should attempt to obtain essential agreement by discussion. In the event he is unable to obtain essential agreement he shall refer the matter to the appropriate authority. *(AAP-6).*

counter - improvised explosive device (C-IED)
The collective efforts at all levels to defeat the IED System in order to reduce or eliminate the effects of all forms of IEDs used against friendly forces and non-combatants according to the mission.

environment
The surroundings in which an organization operates, including air, water, land, natural resources, flora, fauna, humans, and their interrelation. *(AAP-6).*

explosive hazards coordination cell (EHCC)
EHCC predicts tracks, distributes information on and mitigates explosive hazards within theatre that affect force application, focused logistics, protection and operational environment awareness. It establishes and maintains an explosive hazard database, conducts patterns analysis and investigates mines, IED strikes and UXO hazards area. The cell provides technical advice on the protection of explosive hazards including the development of TTPs and provides training updates to field units.

force protection
All measures and means to minimize the vulnerability of personnel, facilities, equipment and operations to any threat and in all situations, to preserve freedom of action and the operational effectiveness of the force. *(AAP-6).*

force support engineering
It encompasses the deliberate, longer-term preparation for, and indirect support to ongoing or future operations as well as those military engineering tasks associated with sustaining the Joint Force throughout all stages of an operation. *(MC0560).*

host nation support
Civil and military assistance rendered in peace, crisis or war by a host nation to NATO and/or other forces and NATO organizations which are located on, operating on/from, or in transit through the host nation’s territory. *(AAP-6).*

infrastructure
A term generally applicable for all fixed and permanent installations, fabrications, or facilities for the support and control of military forces. *(AAP-6).*

joint force engineer
The principal advisor to a joint force commander on all military engineering issues. *(AAP-6).*

military engineering
Engineer activity, comprising both force support engineering and combat support engineering undertaken, regardless of component or service, to shape the physical operating environment. *(AAP-6).*

unexploded explosive ordnance
Explosive ordnance which has been primed, fused, armed, or otherwise prepared for action and which has been fired, dropped, launched, projected or placed in such a manner as to constitute a hazard to operations, installations, personnel or material and remains unexploded either by malfunction or design or for any other cause. (AJP-3.15).