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THESIS

COST/BENEFIT ANALYSIS AND JOB DESIGN
FOR NAVAL CONSTRUCTION FORCE
LIAISON OFFICER BILLETS
ON MARINE EXPEDITIONARY FORCE STAFFS

by

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December, 1992

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THIS THESIS PROVIDES A COST/BENEFIT ANALYSIS AND JOB DESIGN FOR THE PLACEMENT OF NAVAL CONSTRUCTION FORCE (NCF) LIAISON OFFICER BILLETS ON EACH MARINE EXPEDITIONARY FORCE (MEF) STAFF. THE THREE MEFs ARE THE LARGEST, MOST CAPABLE FORM OF A MARINE AIR-GROUND TASK FORCE (MAGTF). EACH MEF HAS BEEN AUTHORIZED A BILLET FOR A NAVY CIVIL ENGINEER CORPS (CEC) LIEUTENANT AS THE NCF LIAISON OFFICER.

THE NCF (OR SEABEES) HAVE SUPPORTED THE MARINE CORPS WITH A WIDE RANGE OF ADVANCED-BASE CONSTRUCTION FROM THE ORIGIN OF THE SEABEES DURING WORLD WAR II THROUGH THE PERSIAN GULF WAR. DISCUSSION OF THIS SUPPORT ROLE AND THE ORGANIZATIONAL/COMMAND RELATIONSHIPS BETWEEN THE NCF AND THE MARINE CORPS IS PROVIDED.

DISCUSSION OF THE BENEFITS AND COSTS EXPECTED TO BE REALIZED FROM THESE BILLETS WILL LEAD TO A PROPOSED JOB DESIGN. THIS DESIGN OF RESPONSIBILI-

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TIES ATTEMPTS TO OPTIMIZE RESULTS FROM THE BILLETS. JOB CHARACTERISTICS FOR WORK MOTIVATION FOR THE OFFICERS ASSIGNED ARE ALSO CONSIDERED.

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COST/BENEFIT ANALYSIS AND JOB DESIGN FOR NAVAL CONSTRUCTION FORCE LIAISON OFFICER BILLETS ON MARINE EXPEDITIONARY FORCE STAFFS

by

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ABSTRACT

This thesis provides a cost/benefit analysis and job design for the placement of Naval Construction Force (NCF) Liaison Officer billets on each Marine Expeditionary Force (MEF) staff. The three MEFs are the largest, most capable form of a Marine Air-Ground Task Force (MAGTF). Each MEF has been authorized a billet for a Navy Civil Engineer Corps (CEC) Lieutenant as the NCF Liaison Officer.

The NCF (or Seabees) have supported the Marine Corps with a wide range of advanced-base construction from the origin of the Seabees during World War II through the Persian Gulf War. Discussion of this support role and the organizational/command relationships between the NCF and the Marine Corps is provided.

Discussion of the benefits and costs expected to be realized from these billets will lead to a proposed job design. This design of responsibilities attempts to optimize results from the billets. Job characteristics for work motivation for the officers assigned are also considered.

TABLE OF CONTENTS

I. INTRODUCTION

A. GENERAL

This thesis analyzes the benefits and costs to be incurred by the establishment of Naval Construction Force Liaison Officer (NCFLO) billets on each of the three Commanding General, Marine Expeditionary Force (MEF) staffs. These billets are being established with the primary intent of both improving the coordination and increasing the frequency of joint operations between the Marine Corps and the Naval Construction Force, also known as the Seabees. Placing the new positions on the MEF staffs enables the officers assigned to work directly for the customer (the MEF Engineer) while maintaining liaison with the NCF units supporting the MEF. The purpose of the cost/benefit analysis is not only to identify the costs and benefits that will accrue from the new billets, but also to lead to an appropriate design of job responsibilities to optimize results from the billets. Job satisfaction, motivation, and career development for the officers assigned are also considered. By January 1993 all three MEFs (I MEF at Camp Pendleton, CA; II MEF at Camp Lejeune, NC; and III MEF at Okinawa, Japan) are scheduled to have their respective NCFLO billets filled.

B. METHODOLOGY

Research data were assembled from four general categories:

1. Navy and Marine Corps publications, instructions and documents
2. Reports and correspondence
3. Interviews and written comments
4. A reference book on the subject of work redesign

Category 1 data were used chiefly to provide the background for the thesis and the nature of organizational relationships between the NCF and the Marine Air-Ground Task Force (MAGTF). Category 2 data were used extensively in researching the NCF support of the I MEF MAGTF in the Persian Gulf War. These data were also essential in determining benefits from the billets and recommending job responsibilities and procedures.

Extensive use of category 3 data was essential to the identification of costs and benefits of the billet and the creation of a job design. Comments from Navy Civil Engineer Corps (CEC) officers and Marine Corps personnel from the three MEFs and NCF staffs and from those who held key NCF positions during the Persian Gulf War were important in determining job responsibilities and any training requirements for the officers assigned to the billets. These comments were obtained either through telephone conversations or during two thesis travel trips. During the period 22-28 July, 1992 the author (along with seven other active and reserve CEC officers) served as an augment to the I MEF and Joint Task

Force staffs at the exercise MEFEX II at Marine Corps Air-Ground Combat Center (MCAGCC), Twentynine Palms, CA. The second site visit was during the period 22-25 September 1992 to the I MEF Command Element Headquarters at Camp Pendleton, CA. These two site visits were invaluable in gathering data for this thesis.

Category 4 data were used to evaluate the billets using five characteristics which have been published as keys to enhancing work motivation. This information lends a theoretical approach to this otherwise mainly practical thesis.

C. SCOPE AND LIMITATIONS

As described earlier, there are new NCFLO billets established at each of the three MEFs. Though the research and recommendations of this thesis should apply to a great extent to all three positions, the focus is on the billet at I MEF at Camp Pendleton, CA. It is expected that there will be some unique features of each of the three positions which will not be addressed in this thesis.

Another limitation of this thesis is the fact that much of the cost and benefit information could not be quantified or accurately estimated in monetary terms. Many of the costs are indeterminable, including travel costs based upon the number, type and locations of exercises and other operations in which the NCFLO participates. The benefits are largely qualitative,

such as an improved level of performance, an increased amount of participation in exercises, etc.

Much of the correspondence which led to the manning of the three NCFLO billets also discussed a closely related initiative to establish a new Navy Civil Engineer Corps (CEC) Lieutenant Commander billet at the Marine Corps Combat Development Command (MCCDC). This thesis does not address this action.

D. ORGANIZATION OF THESIS

The following chapter (II) describes the history of the NCF support role, the organizational structure and various units of the NCF, the command relationships between the NCF and the United States Marine Corps (USMC), the Terms of Reference (TOR), the specific NCF involvement in operation Desert Shield/Storm, and the duties of the immediate supervisor of the NCFLO, the MEF/MAGTF Engineer. The description of each of these areas is provided to explain the nature of NCF/Marine Corps relations, which will provide the basis for the NCFLO position.

Chapter III describes job responsibilities and benefits expected to be achieved with the establishment of the billets. The benefits from both primary and secondary/collateral duties are specifically addressed and summarized.

Costs are addressed in Chapter IV. A discussion of the Manpower Allowance implications is provided. Costs for which specific dollar values could be assigned are quantified, and

those which were intangible are simply listed. Initial (one-time) and recurring costs are summarized at the end of the chapter.

Chapter V presents an analysis of the responsibilities of the billets using a framework of five characteristics for work motivation.

Chapter VI concludes by presenting a logical follow-up from the cost/benefit analysis with a job responsibilities design. The design estimates the allocation of the officers' time at each specific area of duty. The chapter also provides a cost/benefit summary and recommendations for additional research.

II. BACKGROUND

A. HISTORY

The naval construction force (NCF) was established in 1942 to meet the critical need during World War II for builders organized, trained and equipped to both build and defend themselves. The need was for a force that could provide construction capability to continue development of bases all over the Pacific and also to support amphibious operations in the Pacific Theater. Rear Admiral Ben Moreell, Chief of the Bureau of Yards and Docks, obtained authority to recruit men from the construction industry to serve in the NCF, and for officers of the Navy's Civil Engineer Corps (CEC) to command these NCF units.

The NCF (or Seabees) expanded quickly in World War II and reached a strength of about 325,000 by the end of the war. They built over 400 advanced bases, and in the Pacific alone they built 111 major airstrips, 441 piers, hospitals for 70,000 patients, tanks for storing 100 million gallons of fuel and housing for 1.5 million men. [Ref. 7]

After World War II, the Seabees supported Marines in Korea and Vietnam. A large portion of the NCF was placed into the reserves after Vietnam.

Since Vietnam the NCF has continued to train and maintain readiness to carry out the following primary support roles: [Ref. 8]

1. Responsive military advanced base construction.
2. Military construction in support of MAGTF operations.
3. Defensive operations against enemy attacks on personnel, convoys, camps and construction sites.
4. Amphibious assault and ship-to-shore support.
5. Battle damage repair.
6. Disaster control and disaster recovery operations.
7. Humanitarian/civic action work.
8. Peacetime construction projects at military bases worldwide.

Recent NCF contributions in the areas of disaster recovery and humanitarian assistance in the wakes of Hurricane Andrew in Florida and Typhoon Omar in Guam were significant. Assistance in Florida was provided by two tailored Naval Mobile Construction Battalion (NMCB) Air Detachments[1], a detachment from Amphibious Construction Battalion Two, three Construction Battalion Units (CBUs), and approximately 150 reserve NMCB personnel recalled for active duty training. As part of the Joint Task Force Andrew, established to direct all military assistance in south Florida, the NCF's efforts were mainly directed at recovery efforts in the local community, including infrastructure in the Homestead area. Two CBUs also

[1]A description of each of the NCF units and their missions is provided in the next section.

provided assistance to the Naval Security Group Activity (NAVSECGRUACT) in Homestead, Florida. In Guam, Seabees from the on-site Battalion, two additional Air Detachments, Construction Battalion Maintenance Unit 302 and Seabees from various shore activities provided assistance by clearing roads, augmenting Public Works' utility crews, transporting potable water and setting up generators for emergency power. [Ref. 14]

B. NAVAL CONSTRUCTION FORCE ORGANIZATIONAL STRUCTURE

1. Naval Construction Brigade (NCB)

On 10 April, 1992, the Chief of Naval Operations (CNO) approved the integration of active and reserve Seabee units into single operating commands in each of the Atlantic and Pacific fleets, reporting directly to the fleet Commander-in-Chiefs (CINCs). Prior to this action, the Commander, Construction Battalions, Pacific Fleet (COMCBPAC) and Commander, Construction Battalions Atlantic Fleet (COMCBLANT) were the headquarters units exercising peacetime command and administrative control of assigned NCF units. Now, COMCBLANT is replaced by the 2nd Naval Construction Brigade (NCB), with its subordinate 20th (active, training) & 22nd (deployable) Naval Construction Regiments (NCRs); and COMCBPAC is replaced by the 3rd NCB, with the 31st (active, training) & 30th (deployable) NCRs. The 2nd NCB will be commanded by a reserve CEC Rear Admiral, while the 3rd NCB will continue (as when COMCBPAC) to be commanded by an active CEC Rear Admiral who

also serves as commander of the Pacific Division, Naval Facilities Engineering Command. Both brigades will integrate active and reserve personnel into the headquarters' staff for normal peacetime management and for contingency operation. [Ref 13]

The NCB's provide policy guidance in such areas as administration, contingency planning and readiness, provide military and technical training, unit employment and scheduling, tasking, and equipment and logistic support. The NCB's provide command, administrative, and operational control of the subordinate NCRs.

2. Naval Construction Regiment (NCR)

The mission of the NCR is to develop construction plans, assign projects to battalions, military and technical training for NCF units, and direct distribution of equipment and materials to battalions. Normally, regiments are used to coordinate the efforts of two or more NMCBs assigned to a specific area or mission.

Under the new NCF organization, there are three types of regiments. The two active regiments (20th and 31st) are responsible for training, homeport and deployed material support. The two deployable, or shadow regiments (22nd and 30th), filled with NCB and active regiment personnel, would be the first regiments to deploy in a contingency. The reserve/line regiments are the third type, and would be the next regiments to deploy (after the 22nd and 30th).

3. Naval Construction Force Support Unit (NCFSU)

The NCFSU is an integral part of an NCR, providing logistical and engineering support to the NCR and other units (such as NMCBs) subordinate to the NCR. Engineering support capability includes designing, planning & estimating (P & E), quality control, and materials testing. The NCFSU also operates and maintains auxiliary construction and transportation equipment and performs specialized repair and overhaul of equipment as needed.

This support provided by the NCFSU is very important, since it augments NCR capability with components not organic to the NMCBs. These components include operations and maintenance of rock crushers, asphalt and concrete batch plants, large paving machines, additional long haul transportation assets, and other specialized equipment. [Ref. 7]

4. Naval Mobile Construction Battalion (NMCB)

The NMCBs (there are presently eight active battalions) are the backbone of the NCF. In wartime, each NMCB is made up of about 726 men and 230 pieces of construction equipment. The NMCB's mission is construction, but it also maintains machine guns, mortars, and individual small arms to provide defensive firepower. The NMCB is capable of splitting into smaller units or fielding task-organized units up to a company level. Each NMCB is also capable of providing a tailored air detachment of

approximately 89 men with a task-organized air-mobile equipment allowance to meet the needs of the mission.

5. Air Detachment (Air Det)

The Air Det can be deployed from the NMCB within 48 hours to provide both horizontal and vertical construction support. It is important to recognize that the Air Det can be reinforced or otherwise tailored to provide flexibility to meet a wide range of requirements and construction tasking. The Air Det is self-sufficient for 30 days with the exception of material in classes I (subsistence), III (fuel), and V (ammunition). These items are limited to a 5 day supply.

6. Special Naval Construction Force Units

The following units are not normally assigned under the operational control of the MAGTF commander, but display the additional diversity of NCF capabilities. [Ref. 7]

a. Amphibious Construction Battalion (PHIBCB)

The mission of the PHIBCBs is to provide ship-to-shore transport of fuel, materials, equipment and water in support of the Amphibious Ready Group for MEF and MEB-sized operations and Maritime Prepositioning Force operations. This mission includes the assembly and installation of floating and elevated causeways and the operation of self-propelled barges and warping tugs for transfer of materials. The Battalion also provides camp support, perimeter defense, and construction support for these operations.

b. Underwater Construction Team (UCT)

The UCT provides a wide range of underwater facilities support including construction, maintenance, repair and inspection.

c. Construction Battalion Maintenance Unit (CBMU)

The CBMU provides maintenance support to an advance base before or after construction has been completed. It also provides some defensive capability and decreases the need for civilian maintenance and construction personnel in a combat zone.

d. Seabee Team/Civic Action (CAT) Team

This NCF unit is normally a 13-man unit that provides construction and construction training support to counterinsurgency, civic action, and rural development operations. These teams are usually drawn from active NCF units, especially NMCBs.

e. Construction Battalion Unit (CBU)

The CBU is an NCF unit within the Shore Establishment. They provide a peacetime construction force for major shore activity commanders. The CBU is organized similar to the NMCB but is not self-sustaining. In a contingency or wartime situation, CBUs are designed to be assimilated into an NMCB or to construct and maintain the Navy fleet hospitals.

C. USMC/NCF COMMAND RELATIONSHIPS

1. USMC Forces

The USMC provides to the American people a force which is naval in character, useful for conventional operations in the air and ashore, and able to operate with the U.S. fleets around the world. It is a force that is expeditionary in nature, being able to operate in foreign lands without U.S. bases or facilities. It is useful for a wide range of conflicts in addition to major wars.[Ref. 1]

For organizational purposes, the USMC can be divided into two broad categories, the operating forces and the supporting establishment. The supporting establishment includes Headquarters Marine Corps; individual bases, posts and stations; training activities and formal schools; the Marine Corps recruiting force; Marine Corps logistics bases; Marine Corps Combat Development Command (MCCDC); and Marine Corps Systems Command.

Seventy percent of all Marines serving on active duty are assigned to the operating forces, which include the Fleet Marine Forces, Marine Corps Security Forces at naval installations and in shipboard detachments, and the Marine Security Guard Battalion. The largest number, by far, of operating force Marines are members of the two Fleet Marine Forces. Those two forces are Fleet Marine Force, Pacific

(FMFPAC) and Atlantic (FMFLANT). The I and III MEFs fall under FMFPAC while the II MEF is under the command of FMFLANT.

2. The Marine Air-Ground Task Force (MAGTF)

The MAGTF is the basic building block of the Marine Corps combat operations. All MAGTF's, whatever their size, have the same basic structure: a Command Element (CE), a Ground Combat Element (GCE), an Aviation Combat Element (ACE), and a Combat Service Support Element (CSSE) to support the entire MAGTF. The basic MAGTF can then be tailored to the specific mission assignment. The MAGTF, then, melds the air and ground force elements with the combat service support element under the command element (which controls the other three). When required, the MAGTF is augmented by the NCF.[2] NCF forces provide direct support to the organization to which assigned, normally the MAGTF commander. This command relationship is displayed graphically in Figure 1. The MAGTF commander may sometimes elect to delegate command of the NCF forces directly to one of his subordinate commanders, such as the ACE, CSSE, or (least likely) the GCE commander. This

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[2]It is important to recognize that NCF units enhance the MAGTF effort with complementary, not duplicative support. NCF units are made up of highly skilled specialists, capable of executing engineering projects (generally combat service support tasks) of a more sophisticated and permanent nature than normally accomplished by USMC engineer units. On the other hand, the NCF is a credible defensive organization, but does not possess the offensive combat capabilities of USMC engineer units. [Ref. 7]

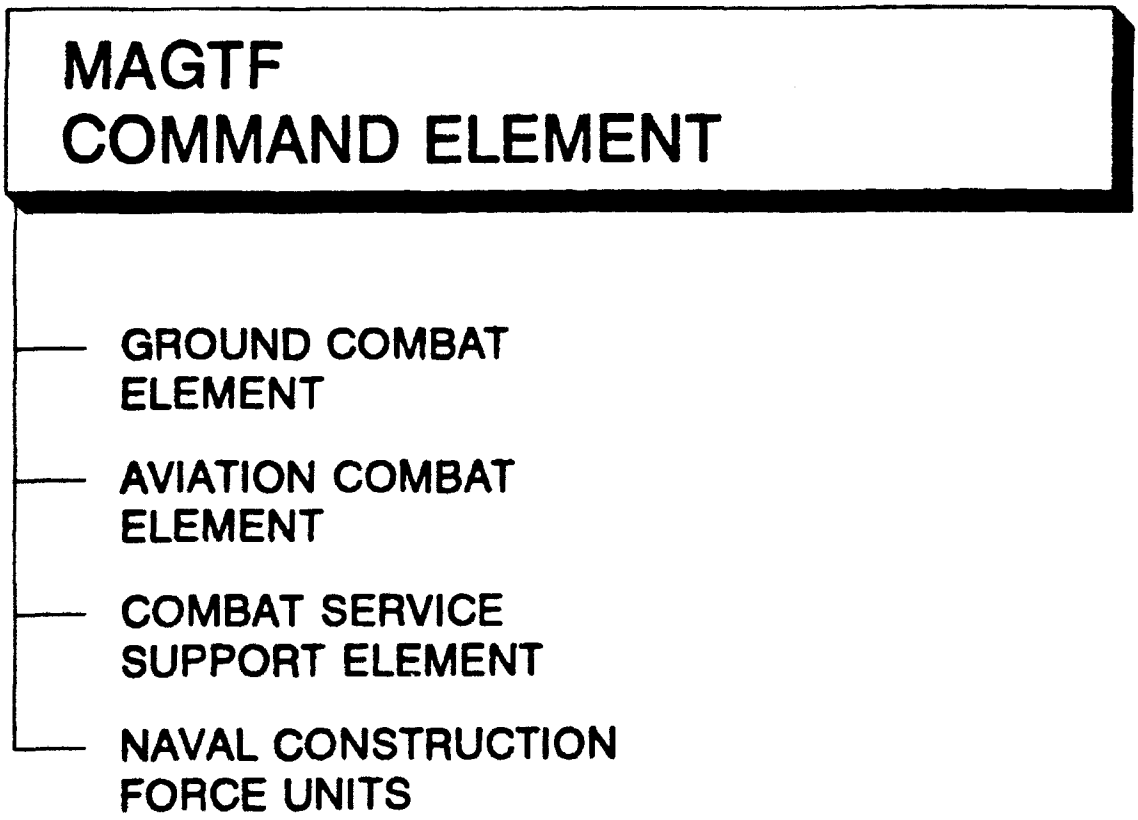

Figure 1: Marine Air-Ground Task Force (MAGTF) with NCF Augmentation [Ref. 8]

decision should be based upon the priority of the NCF's effort and the type, quantity, and customer(s) of the specific tasks assigned [Ref. 8].

A MAGTF is established in one of three configurations based on the size of force needed for the situation -- a Marine Expeditionary Force (MEF), a Marine Expeditionary Brigade (MEB), or a Marine Expeditionary Unit (MEU).

a. The MEF

The MEF is the largest and most capable MAGTF, made up of about 48,000 Marines and 2,600 Navy personnel under the Command Element (CE), the Marine Division (GCE), the Marine Aircraft Wing (ACE), and the Force Service Support Group (CSSE). The Naval Construction Forces actually assigned to support the MEF would be task-organized. However, the NCF organization planned to be assigned to support an entire MEF would be a Naval Construction Regiment (NCR) composed of the Regimental headquarters, three battalions (NMCBs), and a Naval Construction Force Support Unit (NCFSU).

b. The MEB

The MEB is made up of about 15,000 Marines and Navy personnel under the Command Element, the Regimental Landing Team (GCE), the Marine Aircraft Group (ACE), and the Brigade Service Support Group (CSSE). The MEB is the forward echelon of a MEF and can remain forward deployed for an extended period of time. The NCF unit assigned to support a MEB is an NMCB.

c. The MEU

The MEU is made up of about 2200 Marines and Navy personnel under the Command Element, the Battalion Landing Team (GCE), the Squadron (ACE), and the MEU Service Support Group (CSSE). The NCF unit assigned to support a MEU is a task-organized (approximately 100 man) Air Detachment from an NMCB. [Ref. 1]

D. THE TERMS OF REFERENCE (TOR)

1. Background

The TOR formally establishes a doctrinal relationship between the Marine Corps and the U.S. Navy governing the employment of NCF units to achieve their full potential in support of MAGTF operations. The TOR agreement was first signed on 15 June 1987 and distributed as an attachment to CNO memo ser 44R/7U394375 of 29 June 1987. A TOR update was signed on 21 June 1988 to report progress and reaffirm commitment for continued progress toward the goals of the original document. [Ref. 16]

2. Action

The TOR provides high-level policy guidance for NCF and USMC representatives to utilize to address issues such as planning, command relationships, exercise and training requirements, logistic/supply support, lift requirements, etc.

At the start of any operation where Seabees will support the USMC, the NCF units must shift OPCON[3] to the MAGTF Commander. This policy was noted [Ref. 2] as a recommended revision to the Terms of Reference (TOR) resulting from confusion about command relationships between the NCF, the Navy and the Marine Corps at the start of operation Desert Shield. The recommendation also stated that the NCF should work closely with the Marine Corps to instill the fact that the NCF is an integral part of the MAGTF. The NCF units should then be included on distribution for all correspondence, policies, etc. that relate to general MAGTF business.

E. OPERATION DESERT SHIELD/STORM

1. Introduction

Thousands of Seabees were deployed to the recent Persian Gulf War (Operation Desert Shield/Storm). The majority of these personnel were members of Naval Mobile Construction Battalions (NMCBs) or Amphibious Construction Battalions (PHIBCBs). The NMCBs were primarily deployed in direct support of the I MEF MAGTF. At this time, a Naval Construction Regiment (initially COMCBPAC FOXTROT DELTA {forward deployed} later renamed as the Third NCR) was

[3]OPCON, or Operational Control, is a command relationship whereby the gaining commander (in this case, the MAGTF) receives complete authoritative direction over the assigned units (NCF) for operational matters and has responsibility for all matters except logistics, administration, discipline, internal organization, and training.

established to coordinate the construction tasking and support of the NMCB units. This regiment fell under the direct operational control of the I MEF MAGTF Commanding General. Also, a Navy CEC Lieutenant was temporarily assigned to the I MEF staff as liaison between the MAGTF and the NCF units and Regiment. His responsibilities included coordinating NCF tasking with the MEF Engineer and to ensure the MAGTF understood NCF missions, capabilities and limitations.

2. NCF Liaison Officer (NCFLO) Billet

A CEC officer billet at each of the three standing MEF Command Elements, and one at the Marine Corps Combat Development Command (MCCDC) had long been identified as valid requirements, but the positions had never been filled in peacetime. Through a series of correspondence from MEFs, FMFPAC and MCCDC, the Marine Corps had nearly reached the point of filling the billets even before Desert Storm occurred. The positive outcome of the arrangement to have the CEC officer on the I MEF Command Element staff during Operation Desert Shield/Storm appears to have been additional justification for permanently manning the three billets at the MEFs.

3. Specific NCF Support

To illustrate the type of support the NCF provided the USMC during operation Desert Shield/Storm, the following list of accomplishments is provided: [Ref. 2]

1. 6.0 million square feet of aircraft parking
2. Ammunition Supply Points (ASP's) totalling over 9.9 million square yards to contain over $2.0 billion of ordnance
3. Tent camps for 37,500 people
4. 4,865 structures including strongback tents, Southwest Asia (SWA) huts, K-span and sprung buildings
5. Galleys to feed 100,000 troops
6. Maintenance of 250 miles of unimproved Main Supply Routes (MSRs)
7. Two C-130 airstrips

Among other NCF accomplishments which were not necessarily in direct support of the I MEF MAGTF, an element of Amphibious Construction Battalion (PHIBCB) One off-loaded USMC equipment and supplies from Military Prepositioned Force ships and two Construction Battalions Units's (CBUs) were integrated into Fleet Hospital Five to erect and maintain the 500 bed facility [Ref. 11]. Additionally, the NCF played an important role in the Operation Provide Comfort in northern Iraq. Assistance provided there included creating shelter and other services, runway repair and fresh water for Kurdish refugees [Ref. 12].

F. THE MEF/MAGTF ENGINEER

1. Introduction

Before discussing the specific responsibilities and benefits expected to be achieved from the NCF Liaison Officer (NCFLO), a description of the more wide ranging

responsibilities of his supervisor, the MEF Engineer, is germane.

An engineer officer often serves within the Command Element of the MAGTF as a special staff officer to the MAGTF commander. If the Command Element of the MAGTF does not have an assigned engineer officer, the senior Marine engineer (from one of the other three elements) normally assumes this as a collateral duty. This is more likely to occur with smaller MAGTFs, when assignment of a full-time engineer officer may not be practicable. The highest level of MAGTF engineer officer is the MEF Engineer. The discussion below is written primarily from the perspective of the MEF Engineer, but also applies to the special staff engineer officer of other size MAGTF's.

The primary operational responsibility of the MEF/MAGTF Engineer is to list, prioritize and assign engineer tasks to various engineering units to support the MAGTF. This engineering and construction support may be needed during peacetime operations at the bases where MEF units are assigned, or at remote locations before or during exercises or actual contingency situations, and may be provided by Marine Corps Engineer units[4], the NCF, other U.S. or allied force engineer assets, and/or host nation support. Figure 2

[4]Each of the MAGTF Commander's three subordinate elements (the Air Combat Element, the Ground Combat Element and the Combat Service Support Element) have organic engineer units to support itself (and/or other elements if determined necessary by the Command Element).

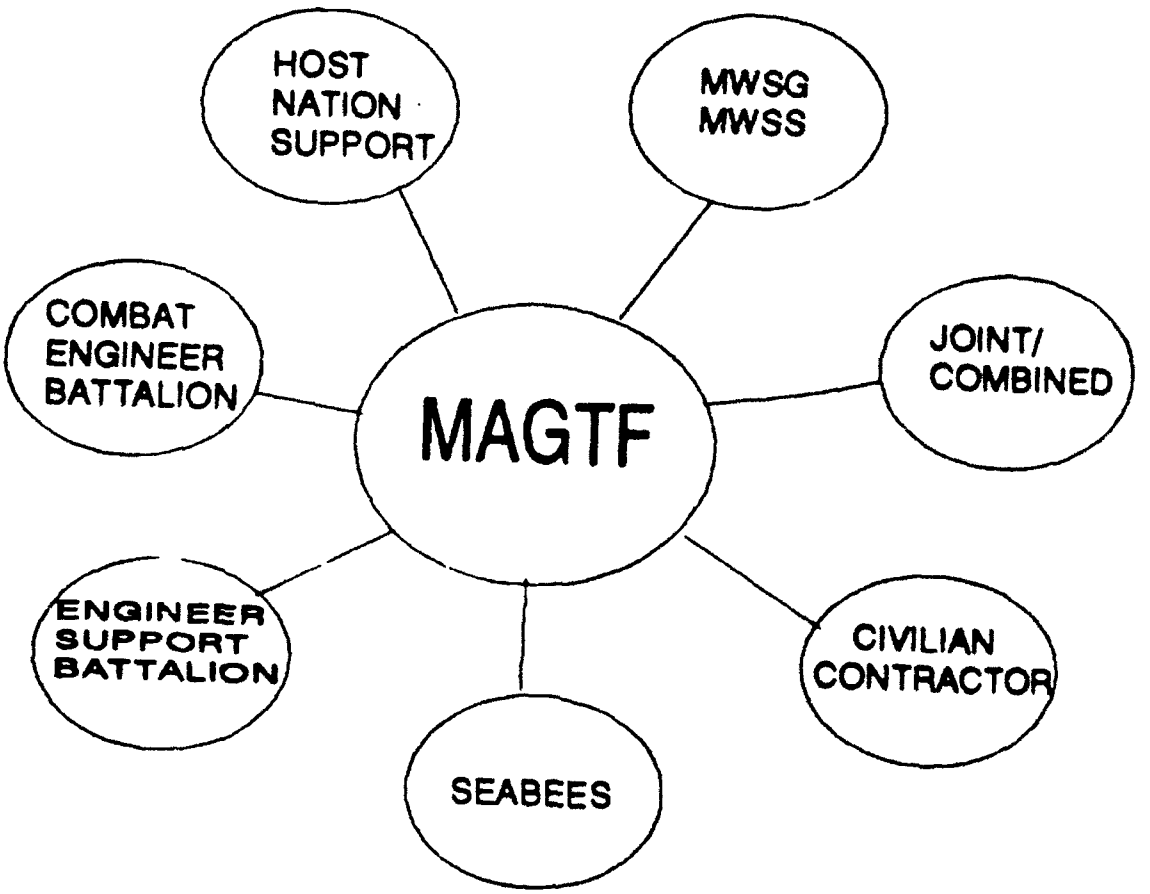

Figure 2: Primary MAGTF Engineer Assets [Ref. 7]

displays the Engineer assets available to the MEF Engineer [Ref. 7]. Joint or combined engineer assets may also be available to the MAGTF engineer.

The MEF Engineer may also be responsible for various types of staff/planning work, especially involving subjects related to the four categories of engineer support described in the next section.

2. MAGTF Engineer Tasks

The engineer tasks that these different engineer assets must complete may vary widely, from close combat support to general engineering. The areas of engineer effort fall into the four major categories described below: [Ref. 7]

a. Mobility

Mobility enables military forces to move while retaining the ability to carry out their mission. Engineers assist the MAGTF commander by improving the ability of forces to move over rough terrain or obstacles. Specific support may be in the form of countermine operations, gap crossing, bridge construction, constructing and maintaining roads and aviation landing sites, and reconnaissance.

b. Countermobility

Countermobility is the placement of obstacles or mines, in conjunction with the terrain, to delay, disrupt or destroy the enemy.

c. Survivability

Survivability tasks involve improving the degree to which a system can avoid or endure a hostile environment without losing the ability to carry out its mission.

d. General Engineering

General engineering tasks involve both horizontal and vertical combat service support construction projects, whereas the previous three categories are combat support projects. General Engineering involves considerably higher standards of planning, preparation, design and construction than the other three categories. Utilities and bulk fuel and water support also fall under this category. Most of these tasks are performed in the rear area and contribute to the force's sustainability.

e. Summary

Appendix B provides a helpful list of engineer tasks in each of these four major categories, along with the capabilities of various engineer units (Combat Engineer Battalion, Engineer Support Battalion, Marine Wing Support Squadron Engineers, the NCF and Civilian Forces) to carry out the tasks.

3. I MEF Engineer Office

The I MEF Engineer (presently a Major but normally a Lieutenant Colonel) and his staff (Chief Warrant Officer (CWO4), Master Sergeant, Gunnery Sergeant, Lance Corporal) carry out the responsibilities listed above.

The I MEF Engineer reports directly to the Assistant Chief of Staff, G-4 (a Colonel).

III. RESPONSIBILITIES AND EXPECTED BENEFITS

A. INTRODUCTION

1. What is a Liaison Officer?

Liaison is the contact maintained between units to ensure understanding and unity or integration of purpose and action. It is critical to the success of any military operation. The designation of a liaison officer is a commonly used technique for maintaining this close contact. Use of an individual of the proper rank and experience conserves manpower and guarantees contact.

2. Preliminary Job Description

In the process of validating and justifying the need for manning the Naval Construction Force Liaison Officer (NCFLO) billets, the USMC has already provided a foundation for job responsibilities for the new positions. Several pieces of correspondence [Refs. 3,4,5, and 6], originating from the individual MEFs, Fleet Marine Force, Pacific (FMFPAC), and the Marine Corps Combat Development Command (MCCDC), have identified the need at each MEF for an assigned liaison with the Navy and civilian communities on civil engineering matters as well as for effective use of NCF units in support of MAGTF operations. The following responsibilities were specifically identified in the correspondence:

a. Assist in operational planning, exercises, and construction projects in MEF areas of operation

b. Assist in preparation of Civil Engineering Support Plans

c. Coordinate and plan input to Military Construction[5] (MILCON) program and other facilities improvements for USMC bases/stations

d. Coordinate and plan Expeditionary Facilities requirements

e. Coordinate Engineer troop training projects with NCF, MEF Command Element, USMC bases/stations and MEF Engineer units

f. Integrate NCF into MEF Operating Plans

g. Coordinate construction projects with Reserve NCF units

h. Represent MEF's on contingency real estate and energy conservation issues[5]

After considering each of the above (projected) preliminary job assignments by the research methodology described earlier, a more accurate projection of the actual job responsibilities can be developed. This description of duties and the approximate effort to be expended in each will be outlined in the concluding chapter.

B. PRIMARY DUTIES

1. NCF Support of MEF Operations

a. Introduction

The primary responsibility for the NCF Liaison officer should be to plan, coordinate and track the execution

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[5]Present plans indicate that the I MEF NCFLO will have little or no responsibility for these issues.

of NCF support of MEF operations under the direction of the MEF Engineer. The Terms of Reference (TOR) update requires that the USMC and NCF plan and exercise jointly at every opportunity [Ref. 16]. Both active and reserve NCF units have often participated in Joint Chiefs of Staff (JCS) and fleet exercises.

b. NCFLO Qualifications

To carry out this primary responsibility, the NCFLO should be familiar with the organization and capabilities of NCF units. Appendix B should be helpful in augmenting the experience of the NCFLO in this area. The NCFLO should be able to obtain preliminary estimates of material requirements and project durations and also be accustomed to working with NCF representatives on project support and status. The NCFLO should have some experience with, or obtain guidance on using the Advanced Base Functional Component[6] (ABFC) system. The NCFLO should also be familiar with the NCF Tables of Allowance[7] (TOA). It has been

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[6]The ABFC planning system is used by Navy and USMC forces in operational planning for the establishment or improvement of advanced bases and facilities in support of forces.

[7]The purpose of the TOA is to identify and quantify the basic personnel, material, and equipment for the performance of the unit's mission(s) in contingency/wartime/disaster recovery operations. The TOA is designed to sustain construction operations for 90 days, except for fuel and subsistence, which are limited to 15 days support. Class IV support (construction materials) are not addressed by the TOA. Ammunition is limited to a 3 day contingency provision allowance.

recommended that a CEC Lieutenant Commander that has had a prior tour as an NMCB Operations Officer would be the appropriate assignment for the positions. An officer of this rank and experience would bring the benefits of more effectiveness to the NCFLO positions. However, at this time the positions have been designated as Lieutenant billets. To ensure at least minimal familiarity with these references and concepts, NCFLO's should have had a prior tour as a junior officer in a Naval Mobile Construction Battalion (NMCB).

c. Background

NCF support of MEF operations may be in the form of actual or simulated construction in MEF exercises, such as Field Training Exercises (FTXs) or Command Post Exercises (CPXs). NCF participation in these exercises provides valuable training for both the NCF and USMC representatives involved, exposing them to NCF support of operations in a MAGTF configuration and improving the readiness for actual wartime construction requirements. The tempo and scope of these exercises will improve confidence for all those participating. Maximum benefits could be achieved by tasking Seabees with real construction projects in all MEF exercises. However, Navy-Marine Corps funding will probably never allow the luxury of transporting NCF units to every exercise. Though all NCF units regularly conduct field exercises to improve combat and contingency construction readiness, the training is normally located near the NCF unit's homeport or

permanent duty station to minimize troop transportation costs. Even if adequate funding did exist, remote field exercises would still be somewhat limited due to the already taxing battalion homeport and deployment schedule.

d. Action

NCF and USMC personnel must attempt to gain as much experience as possible from the actual troop training exercises that can be funded and arranged, and they should augment that experience with exercises which simulate the utilization of actual NCF troops performing construction projects for the MAGTF. This chapter emphasizes that the primary function of the NCFLO is to coordinate with Naval Construction Brigade (NCB), Regiment (NCR), Battalion (NMCB) and other NCF unit representatives to arrange and carry out NCF involvement in MEF exercises whenever possible. Coordination between the MEF and tne NCF should first be carried out by the NCFLO and NCB representatives, until an NCR is assigned for the operation. The support potentially provided by the NCF and an NCFLO should be considered as an available and valuable asset by smaller MAGTF (such as MEB or MEU) commanders also.

To support the MAGTF, the NCF needs a representative in-theater as early as possible [Ref 2, pp. 52]. The NCFLO can function in this capacity, providing information helpful to NCF units that will later enter the theater (concerning construction project tasking, host nation

support of projects, climatic and other working and support conditions).

Despite the funding and schedule problems mentioned earlier, many NMCB Air Detachments and some full NMCBs and PHIBCBs should be able to participate in various exercises in support of one of the three MEFs. An example of this is the yearly NMCB Air Detachment embarkation in support of the USMC in the "Team Spirit" exercise in Korea. Another is the recent PHIBCB Two involvement in the joint service operation Ocean Venture '92. PHIBCB Two's contributions in the joint Maritime Prepositioning Force/Logistics Over-the-Shore exercise included erecting and maintain a 650-man camp; providing road construction, beach preparations and pier installations; and conducting ship-to-shore movements [Ref. 13]. Other exercises were specifically mentioned in the TOR [Ref. 16].

Because these type of occasions may be relatively limited, all three NCF Liaison officers should attempt to participate as much as possible in the planning, coordination and execution of them and, at a minimum, be informed of all related correspondence (including After-Action/Lessons Learned reports). Maximum use should be made of Command Post Exercises and the existing field exercises in which the NCF participates and those the NCF itself conducts.

e. Benefits

The benefits expected to be achieved from these Primary duties are as follows:

1. More NCF Involvement in MAGTF Operations. The NCFLO is in an ideal position to actively promote and assist the involvement of the NCF in MEF/MAGTF operations, to include training exercises and construction at Marine Corps bases. The officer's position and ability to arrange, plan and coordinate this involvement should allow some NCF participation that was previously considered not practicable just because of the administrative and coordinating work necessary.

2. Improved NCF Involvement in MAGTF Operations. The planning and coordination of NCF support should be improved with the MEF having an 'in-house' NCF representative. The NCF Liaison Officer (NCFLO) link between the NCF and USMC should allow better coordination and understanding of command relationships, capabilities planning, embarkation, construction project tasking, material and supply support, communications and reporting. Just having another CEC officer experienced in these matters would be valuable for the NCF in any combat exercise or true contingency, and having the officer located on the MEF Engineer's staff should place the experience in an optimum position. Regular NCF and NCFLO participation in exercises will familiarize NCF and USMC

representatives with procedures and responsibilities, increasing readiness for actual contingencies.

3. Relieved Burden on MEF Engineer and NCF Staffs. In the past, MAGTF/NCF operations were coordinated by the MEF Engineer and his staff, working with NCF personnel primarily from COMCBLANT or COMCBPAC (now the 2nd and 3rd Naval Construction Brigades), and to some extent the Regiments and other NCF units. Though the arrangement seems to have been successful to a large degree in the past, most likely due to great effort by MAGTF and NCF personnel, this arrangement is problematic in several respects.

a. The supported unit (the MEF) is not normally located near the NCF units supporting it. This makes timely and regular communications and coordination between the two extremely difficult. This difficulty can degrade the quality of NCF support, decrease the amount of NCF support, and/or consume an inordinate amount of MEF and NCF personnel's time for communication and coordination.

b. The MEF Engineer s staff has little or no experience with NCF missions, capabilities and limitations. Therefore, the link between the customer (the MEF) and the supporting organization (the NCF) is simultaneously long-distance and tenuous due to the 'language barrier' between the two parties.

The addition of the NCFLO provides the benefits of easing the burden on the MEF and NCF staffs.

2. NCF/MEF Plans

The NCFLO's can also contribute to MAGTF/NCF coordination by preparation of plans clarifying and detailing

the broad guidelines of the Terms of Reference, Civil Engineering Support Plans[8] and other employment plans.

One example of an employment plan that has been identified as a potential task for the NCFLOs is the Time-Phased Force Deployment Data (TPFDD), or Time-Phased Force Deployment List (TPFDL). This system identifies units' transportation needs and required dates to support their missions. The NCFLOs could collect, process and coordinate TPFDD data for supporting NCF forces assigned to the MAGTF in accordance with established plans. An official placement of and maintenance procedures for NCF lift requirements into all MAGTF TPFDL arrangements have not been established. This is a significant problem and was a "lessons learned" item from the Persian Gulf War, because the NCF units' arrivals in theater for Operation Desert Shield were delayed, since they were not included in the TPFDL. One solution that has been recommended for investigation by the NCFLO is to deploy a task organized NCF unit early in the movement to immediately construct the MEF (or whatever type of MAGTF is being supported) Command Element headquarters camp and begin the most pressing initial construction projects in support of the

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[8]The Civil Engineering Support Plan (CESP) addresses resources, manpower and material to expand or improve facilities and support. The CESP is normally written at the Fleet or theater level, but within the MAGTF its implementation may become the responsibility of NCF units [Ref. 7]. It can be initiated during the assault phase by MAGTF engineers and continued by the NCF and civilian construction forces as the combat ends or moves onward.

MAGTF. This and all additional NCF units planned to support the MEF should be worked into the MEF's TPFDL. Also to be investigated is the possibility that there could be standard designs and arrangements for MAGTF Command Element Field Facilities, to be constructed by USMC Engineers or the NCF. The camp could possibly be a new standard design, prepared by the Naval Facilities Engineering Command (NAVFAC), with the flexibility to accommodate special features of the terrain, material availability, host nation support and other factors that may force the standard design to be altered in the field.

Another planning topic that the I MEF NCFLO may be directed to act upon involves the Headquarters, U. S. Central Command (USCENTCOM) Regulation Number 415-1 of 20 June 1992. This directive defined responsibilities for Military Construction and Engineering in the USCENTCOM area of responsibility (AOR). The I MEF Engineer office may act on the requirements of this regulation, especially involving the establishment of Regional Contingency Construction Management (RCCM) Teams. The other MEFs may have similar responsibilities in their AOR.

The benefit to be achieved with this duty is that additional problems can be resolved and plans formulated or improved without an additional workload on existing MEF or NCF personnel.

3. NCF/MEF Action Officer

The NCF Liaison officer can act as the action officer for a wide variety of other NCF/MAGTF issues as deemed necessary by the MEF Engineer or higher authority. A good example of this is the possibility of the NCFLOs being assigned to assist on resolution or coordination of the various NCF problem areas or "lessons learned" from different NCF and MEF operations. Reference 2 provided a number of problem areas across many aspects of NCF and NCF/MEF operations that were noted after the Persian Gulf War. These and other problem areas could be addressed by the NCFLOs with the approval of the MEF Engineer and under the direction of and in cooperation with the Naval Construction Brigades, Regiments, NAVFAC Headquarters, the Civil Engineer Support Office (CESO), and other NCF representatives.

Another action item for the NCFLOs may include providing NCF representation at MEF quarterly logistics conferences, possibly involving followon correspondence with NCF, NAVFAC, or Civil Engineering Support Office (CESO) representatives. For I MEF, the 31st NCR, R30 officer is currently performing this function.

The benefit to be achieved with these duties is once again the capability of resolution of more problems and of taking on additional NCF/MAGTF interface operations without an additional workload on NCF and MEF personnel.

4. NCF -- Permanent Construction Support

The MEF may also request NCF units to conduct more permanent-type construction at existing bases, possibly not involved with a combat training exercise. This type of work, if within the continental U.S., will normally be accomplished by Reserve NCF personnel on active duty training. The NCFLO should coordinate the request for such work with the NCB and, after approval, coordinate construction project material and administrative support to the NCF unit.

Again, the addition of the officer in the NCFLO position should provide the benefits of more frequent and effective involvement of the NCF in these projects without additional burden on NCF and MEF personnel.

C. *SECONDARY/COLLATERAL DUTIES*

1. Introduction

The majority of the NCFLO's time should be allocated to NCF-related work. The officers ordered into the billets will be selected based on their NCF background and should, therefore, achieve the greatest benefits to the MEF and NCF by being used in that capacity. Still, as a MEF asset, the NCFLO can expect to be tasked with some duties which are not directly related to the NCF. Some of these secondary, or collateral, duties are outlined below.

2. Naval Facilities Engineering Command (NAVFAC) Issues

The NCFLO may sometimes be expected to investigate, provide information, or take action on NAVFAC subjects such as

Public Works and Resident Officer in Charge of Construction (ROICC) issues involving bases or facilities used by the MEF. These duties may be referred to by NAVFAC representatives as staff civil engineer duties. Public Works Centers/Departments operate and maintain the facilities, utilities and transportation systems on Navy and Marine Corps bases, while the ROICC office manages contractor construction projects on Navy and Marine Corps bases. In addition to having a prior tour in an NMCB, most NCFLOs will have had Public Works and ROICC experience, making them well qualified to address these problems.

The MEF can benefit from the NCFLO addressing these base-related problems with the appropriate NAVFAC representatives. With the NCFLO obtaining information and taking action on issues such as contractor construction, facilities designs, Public Works maintenance of bases, master plans, utilities, energy and real estate, issues should be able to be resolved efficiently because of his background and experience in networking with the appropriate NAVFAC offices. The addition of the NCFLO as a point of contact for some of these issues should also benefit the local Public Works organization.

3. MEF/USMC Issues

The NCFLO may become the action officer on issues which bear no direct relation to the NCF or NAVFAC. This includes work involving Marine Corps engineer units and other

MEF Engineer responsibilities. Examples of issues of this type that the NCFLOs may become involved with include the Joint Engineering Support Plan, engineering intelligence and reconnaissance (for example, terrain studies), technical training of engineer and non-engineer units, and engineer equipment topics. Though the officer will most likely have little or no prior experience in this area, he should be able to consult various personnel within and outside of the MEF to gain the knowledge needed. It is expected that the NCFLO will continuously progress in familiarization with USMC operations and procedures, becoming increasingly more capable of performing this collateral duty. Even so, it is recommended that no more than 10% of the NCFLOs time be allocated to work that is not NCF or NAVFAC related (not including duties mentioned in section 4 below).

The benefit of this capability is simply that the MEF gains another staff/action officer. The officer admittedly will have little initial related experience or subject knowledge, but the benefits from this collateral duty will increase as the officer gains experience with the job. Also, the NCFLO obtains the benefit of knowledge and experience with the Marine Corps that he would not have otherwise gained. Again it is recommended that the NCFLO be used sparingly in this role.

4. Military Administrative Duties

These duties consist of periodic inspections, regularly scheduled physical fitness and other military training and administrative duties conducted during working hours. To a large extent, these are duties that would be required of an officer in any assignment.

D. SUMMARY OF BENEFITS

This section summarizes the benefits expected to be derived from each of the primary and collateral duties described above. None of the expected benefits could be quantified or estimated in monetary terms. The summary is organized by dividing the expected benefits into four categories:

1. Expected benefits for the MEF.
2. Expected benefits for the NCF.
3. Expected benefits for others.

1. Expected benefits for the MEF

It is expected that the establishment of the NCFLO position with the job responsibilities described in sections B and C above should provide the MEF with the following benefits:

a. More frequent and more effective NCF support of MEF operations without an additional workload on MEF personnel.

b. With respect to MEF/NCF plans, additional problems should be able to be resolved and additional plans formulated, reviewed, put into effect and improved without additional workload on MEF personnel.

c. Provides a designated representative knowledgeable in NCF matters to act on NCF/MEF coordination issues deemed necessary by the MEF Engineer.

d. Capability to arrange more frequent and improved coordination of NCF construction projects on MEF bases without additional workload on MEF personnel.

e. More efficient resolution of NAVFAC (Public Works and ROICC) issues without additional workload on MEF personnel.

f. An additional staff officer to act on MEF and specifically MEF Engineer issues.

2. Expected benefits for the NCF

It is expected that the establishment of the NCFLO position with the job responsibilities listed in sections B and C above should provide the NCF with the following benefits:

a. Allow more frequent and more effective participation of the NCF in MEF operations without additional workload on personnel from Brigades, Regiments, and other NCF units.

b. With respect to MEF/NCF plans, additional problems should be able to be resolved and additional plans formulated, reviewed, put into effect and improved without additional workload on NCF personnel.

c. Provides a designated representative on the MEF Engineer's staff who is knowledgeable in NCF matters to act on NCF/MEF coordination issues deemed necessary by the NCF (with concurrence of the MEF Engineer).

d. Capability to arrange more frequent and improved coordination of NCF construction projects on MEF bases without additional workload on NCF staff personnel.

e. Provides training for three more CEC officers in joint Marine Corps/NCF operations, in addition to those (Brigade, Regiment, NMCB, etc) already experiencing it. This training provides additional officers qualified for future NCF tours.

3. Expected benefits for Others

a. Base NAVFAC offices (Public Works, ROICC) should receive some benefit from having a CEC officer representative on the MEF Engineer staff.

IV. COSTS

A. MANPOWER/BILLET COST DISCUSSION

Compensation for the three Naval Construction Force Liaison Officer (NCFLO) billets was obtained through the realignment of existing U.S. Naval Officer billets stationed with the Marine Corps. This increase in billets also resulted in an increase of three in end-strength for the Navy Civil Engineer Corps [Ref. 10]. Therefore, the Marine Corps did not lose any billets in establishing these, and the Navy (Civil Engineer Corps) gained three.

A widely accepted method of costing military billets is using the Composite Military Rate (CMR). The CMR is determined by averaging the pay for all personnel within a paygrade, including basic, incentive, and special pay; allowances and expenses (quarters, subsistence, separation, overseas pay, uniform, bonuses and life insurance benefits). The calculation does not include retirement, support such as medical and commissary privileges, welfare and recreation, training or Permanent Change of Station travel. The 1991 CMR for a Navy Lieutenant (O-3) is $67,045, while the three other services are all at least $2,700 less. The other three services average $63,950. [Ref. 15]

The Navy figure is higher due to the larger percentage of O-3s earning special pays (such as sea, submarine, flight,

professional) than the other services. Even the other three services' average of $63,950 includes many officers drawing special pays and allowances not received by the NCFLOs. Since the NCFLO will generally not receive these special pays or allowances, a round figure of $60,000 is an appropriate estimation of the pay and allowances cost for each NCFLO billet.

B. DESCRIPTION OF OTHER COSTS

1. Introduction

The itemized costs described below include those which could readily be assigned an actual dollar-value, those which are immaterial enough that they could be neglected, and those which are variable depending upon circumstances. A summary of the costs is provided in section C.

2. Utility Green Uniform Issue

The 31st Naval Construction Regiment (NCR) issued the I MEF NCFLO a complete issue of Utility Greens to include shirts, trousers, boots, socks, hardhat, coat, belt buckle and soft covers, for a total unit cost of $335. The II MEF NCFLO is wearing the USMC field uniform. Since he was required to purchase these uniforms with his own personal funds, there will be no cost to any unit for his uniforms. The field uniform for the III MEF NCFLO has not yet been determined. NCFLOs coming to the billet directly from a prior tour in an NMCB or other NCF unit should obtain a new issue of greens before detaching.

3. References

To function effectively in the MEF Engineer's office, the NCFLO will require copies of several current NCF manuals and instructions. Examples include the NMCB and other NCF units' Tables of Allowance, Advanced Base Functional Component (ABFC) guide (NAVFAC P-437), various other NAVFAC P-manuals and other references. A few of these references may already be located in the individual MEF Engineer offices. Each NCFLO should be able to obtain those references needed from the cognizant office at no cost to the MEF. Most of the necessary manuals are available from the Civil Engineer Support Office (CESO) in Port Hueneme, CA. The incremental cost to the cognizant office providing these manuals and instructions is estimated as follows:

a. NAVFAC P-437----------$160
b. Tables of Allowance----------200
c. NAVFAC P-Manuals----------100
c. Other----------300
Total----------$760

4. Field (782) Gear

The MEF should provide all necessary field gear for the NCFLO. For the purposes of this thesis, it is assumed that a single initial issue of the gear will last indefinitely. This gear is very durable and requires little maintenance; therefore this is a realistic assumption. The total unit cost determined for the gear is $1,025.

5. Administrative Costs

The additional usage of office and field consummables and depreciation on existing furniture and equipment caused by the addition of the NCFLO billet is relatively insignificant and is therefore ignored.

6. Training/Indoctrination Costs

NAVFAC Headquarters is investigating the possibility of funding an initial indoctrination trip for the NCFLOs and their direct supervisors (each MEF Engineer) to the Construction Battalion Center (CBC), Port Hueneme, CA. The I MEF NCFLO will undoubtedly incur some minor Temporary Additional Duty (TAD) costs for coordination of issues and/or indoctrination and training at the nearby CBC Port Hueneme. Transportation, lodging and per diem costs for a potential three day indoctrination course are estimated below:

a.	I MEF NCFLO-Travel	$ 80	(privately owned car)
	Lodging (BOQ)	24	($8 X 3 nights)
	Per Diem	102	($34 X 3 days)
	Total	$206	
b.	I MEF Engineer (travelling with NCFLO)		
	Travel	$ 0	
	Lodging	24	
	Per Diem	102	
	Total	$ 126	
c.	II MEF NCFLO/MEF Engineer (per person)		
	Travel	$ 348	
	Lodging	32	
	Rental Car	120	
	Per Diem	136	
	Total	$ 636	(per person)

d. III MEF NCFLO/MEF Engineer (per person)

Travel	$1210	
Lodging	40	
Rental Car	150	
Per Diem	170	
Total	$1570	(per person)

These costs would be reduced considerably if combined with Permanent Change of Station (PCS) or other travel already necessary for other reasons. Effort should definitely be made to provide any necessary training or indoctrination for the III MEF NCFLO before he departs for his duty station in Okinawa.

No other significant specific initial training cost requirements for the NCFLO have been identified. However, the officers assigned may find that there are vital areas that they are not familiar with (such as NCF capabilities, references, procedures or organizations). If this occurs, the officer should individually take action to gain the familiarity necessary by contacting the cognizant authority on the subject and arranging for self-study or training. This training may result in some travel costs for the MEF or NAVFAC Headquarters.

7. Travel/Transportation Costs

The NCFLO will often travel to MEF operations via government means already transporting MEF personnel. Thus, the incremental costs for travel/transportation for these operations would be negligible and are ignored here.

The NCFLO will also sometimes travel individually or in a small group to NCF-related operations when the MEF

Command Element is not also going as a unit. In these cases there will be a considerable incremental cost. This is also the case when the NCFLO travels to sites in advance of exercises or other types of operations to plan for engineer or other support. The number of and cost of each of these trips is unknown and cannot be quantified at this time. These costs should be funded on a case-by-case basis by the operation or unit conducting the event for which the NCFLO is travelling.

C. SUMMARY OF COSTS

The following is a summary of the costs (described in more detail in sections A and B above) that are expected to be experienced because of the establishment of the NCFLO positions. The costs are grouped into three categories: one-time, periodic, and variable costs. These three types of costs are estimated below, with the organizations tentatively responsible for funding provided in parentheses.

1. One-Time (initial) Costs

These costs are those which are expected to be experienced only once, upon initial manning of each MEF's NCFLO position.

a. References----------$ 760 (CESO)
b. Field (782) Gear----------1025 (MEF)
c. Indoctrination/Training: (per person)
   1. I MEF----------206 (NAVFAC/MEF)
   2. II MEF----------636 (NAVFAC/MEF)
   3. III MEF----------1570 (NAVFAC/MEF)

2. Periodic Costs

a. Composite Pay Rate--------$60,000 per year (U.S. Navy)
b. Utility Green Uniform--------$335 per 2 to 3 year tour (NCR or NMCB)

3. Variable Costs

The variable costs are those that are based upon the number and expense of activities in which the NCFLO participates. Included in this category is NCFLO travel for exercises and other reasons. These costs would be primarily funded by the MEF. At this time, no cost can be estimated for this category.

V. JOB CHARACTERISTICS FOR WORK MOTIVATION

A. INTRODUCTION

One objective of this thesis is to design NCFLO job responsibilities to maximize benefits. However, simply maximizing benefits from a person in a particular job can cause negative side effects. This can occur, for example, if duties are assigned which provide benefits for the organization but do not provide job motivation for the individual. This chapter focuses upon job motivation determined by the quality or type of work assigned to the NCFLO.

The quality of the workload is determined by the level of appropriately challenging, meaningful and satisfying responsibilities, and also the opportunities for learning and growth which develop officers for future positions and keep them competitive for promotion. Some examples of negative effects which could occur due to inappropriate quality or types of job responsibilities include deterioration of performance and difficulty in attracting top performers as replacements for the positions.

Reference 9 discussed five core job characteristics that contribute to enhancing work motivation. The characteristics motivate through the experienced meaningfulness and responsibilities of the work and knowledge of the results of

a person's effort. The five characteristics are skill variety, task identity, task significance, autonomy, and job feedback.

1. Skill Variety

This characteristic is the level to which duties require a variety of different actions and, therefore, different skills. The wide range of primary and collateral duties expected for the NCFLO, involving both long and short-range planning, along with day-to-day duties should result in more than adequate skill variety. The mix between responsibilities involving the NCF, NAVFAC, Marine Corps Engineer and other Marine Corps subjects also contributes greatly to skill variety. The unique environment for the NCFLO, working with and for the Marine Corps, will also inherently demand skill variety.

2. Task Identity

The degree to which duties require responsibility for an entire, identifiable item of work, is task identity. As the primary point of contact for the MEF on all NCF and NAVFAC topics, the billet should feature excellent task identity.

3. Task Significance

This characteristic is the perceived relative importance of the work. The responsibilities as projected in this thesis compare favorably with those typically assigned to a Navy Civil Engineer Corps (CEC) Lieutenant. The task significance is expected to be high, unless excessive

collateral duties such as minor Public Works/facility maintenance responsibilities are assigned.

4. Autonomy

Autonomy is the degree of freedom and independence experienced in the manner of carrying out the duties of the position. This characteristic will depend greatly upon the specific tasks assigned, the direction of the MEF Engineer and, to some extent, the guidance of senior NCF staff personnel. The fact that the NCFLO is the only CEC officer at the MEF should enhance autonomy. It is anticipated that autonomy will be adequate.

5. Job Feedback

This characteristic concerns the level, clarity, and timeliness of the knowledge of the outcome of one's work. With most of the NCFLOs' projected duties, as with most engineer work in general, the results are relatively visible. It should become apparent whether operations and projects were well planned, executed, or coordinated. Staff work that is approved, put into effect and operates well will automatically provide feedback. Job feedback for these billets is therefore considered to be high.

B. PERSONAL FACTORS

There are many factors that affect how people respond to their work. In addition to the five core job characteristics, reference 9 also describes three characteristics that people

have that are important to responding well to highly motivating jobs.

Assuming that the core job characteristics from part A above indicate that the NCFLO positions will be highly motivating jobs, the following personal factors for the officers assigned are important:

1. **Knowledge and Skill**

For a highly motivating job, positive feelings result from good performance, and negative feelings from poor performance. Feelings are less impacted by performance in lower motivating positions. Therefore, for highly motivating jobs, people with the appropriate knowledge and skills to perform well will experience satisfaction. Since the highly motivating job 'matters' to the individual, if he lacks the knowledge or skills to perform well, unhappiness and frustration will result.

For this reason, training and experience of the NCFLOs is important. Some senior CEC officers have suggested that the NCFLO positions be filled with CEC Lieutenant Commanders who have had a prior tour as an NMCB Operations Officer. This suggests that an officer with the Operations Officer knowledge, skill and seniority would be more capable of carrying out the duties expected of the NCFLO. If this is the case, the Lieutenant NCFLO may become frustrated if performance suffers due to the lack of the knowledge, skill, or credibility of the Lieutenant Commander. Since the

billets are presently being filled with Lieutenants, the officers assigned should (at a minimum) have had a prior junior officer tour in an NMCB and become as familiar as possible with NCF operations. The experience gained by being assigned as an Air Det Officer-in-Charge in an NMCB would be the ideal background for an NCFLO.

2. Growth Needs

Jobs that are highly motivating have opportunities for self-direction, learning, and personal growth and accomplishment. Some people have stronger growth needs than others, and those with stronger growth needs will be more eager to use these opportunities. People with low growth needs may not recognize the opportunities, not value them, or feel threatened by them. Officers being considered for the NCFLO positions should have high growth needs.

3. Satisfaction with Work Context

This personal characteristic involves factors such as pay, work environment, job security, co-workers, and supervisors. People who are satisfied with these factors will respond more favorably to motivating jobs. It is expected that the work context for the NCFLO positions will be excellent.

C. SUMMARY

Some specific responsibilities of the NCFLO will likely be high on some of the five core job characteristics and low on others. It is anticipated that <u>as a whole</u>, the

responsibilities of the billets will provide excellent job motivation. It is also expected that the work context or work environment for the NCFLO will be excellent.

It is expected that the CEC Lieutenants considered for NCFLO positions will respond favorably to the duties of the position if they have the adequate personal characteristics of knowledge, skills, and growth needs. A preferably senior CEC Lieutenant who will be competitive for promotion, with a prior tour as an officer in an NMCB, along with some indoctrination or turnover from a predecessor and self-study of NCF operations should have the needed personal traits. Conversely, additional benefits could be achieved by assigning CEC Lieutenant Commanders to the positions.

VI. CONCLUSION

A. RECOMMENDED JOB RESPONSIBILITIES DESIGN

The NCF Liaison Officer should be assigned the primary and secondary/collateral duties described in Chapter III above. The responsibilities will continue to change through time, will differ in cycles depending on operations occurring at each MEF, and will differ somewhat from one MEF to another. Nevertheless, an approximate mix of the effort expected to be dedicated to each duty can be recommended. This recommendation is made based on the author's personal experiences in carrying out this research and in prior tours, assessment of the references listed herein and input from numerous NCF and USMC personnel. Based on these, to maximize benefits from the position (while considering job motivation) it is recommended that the NCFLO's time should be allocated approximately as follows:

DUTY	APPROXIMATE % OF EFFORT
1. NCF/MEF Issues-Exercises, operations, training, etc	35%
2. NCF/MEF Issues-Long term, plans, etc	35%
3. NCF/MEF Issues-Construction at USMC bases	5%
4. NAVFAC/PWD/ROICC issues for MEF Facilities and bases	5%
5. Action on MEF & MEF Engineer Issues (non-NCF, non-NAVFAC)	10%
6. Military Admin (physical & other training, inspections, etc)	10%
TOTAL	100%

B. COST/BENEFIT SUMMARY

The total costs expected to be experienced due to the new billets, including the one-time and periodic costs, plus the variable costs which could not be estimated at this time are described in Chapter IV. Range estimates for these costs are summarized below in the three categories of initial (one-time), annualized (periodic costs expressed as yearly figures), and variable costs.

1. Initial costs range from $1991 to $3355, depending upon initial indoctrination costs, references and field gear.

2. Annualized costs range from $60,000 to $60,170 per year, depending primarily upon officers' years of service and uniform requirements.

3. Variable costs are indeterminable since they are dependent upon the number and expense of activities and operations in which the NCFLO is involved.

The benefits expected to be experienced due to the new billets are described in Chapter III. A summary of them is provided below:

1. More frequent involvement and improved NCF coordination and performance in MAGTF operations.

2. Additional NCF/MEF plans, problems, issues, etc. that can be formulated, reviewed, and/or resolved.

3. More frequent involvement and improved coordination and performance of NCF construction on MEF bases and stations.

4. More efficient resolution of NAVFAC (Public Works/ROICC/etc.) issues for MEF.

5. An additional staff officer at the MEF to act upon MEF and, in particular, MEF Engineer topics.

These benefits are expected to occur without any additional burden on NCF or MEF staffs or NAVFAC representatives.

The author's personal assessment of the comparison of costs and benefits is that the initial and annualized costs are not substantial and should be worth the projected benefits.

The variable costs for involvement in certain exercises or operations may sometimes be significant. Yet, NCFLO involvement in these exercises and operations was the primary reason for establishing the billets. For this reason, these costs should be funded whenever possible, and decided on a case-by-case basis at the appropriate approval level.

C. RECOMMENDATIONS FOR ADDITIONAL RESEARCH

A follow-on study that would be of value would be to focus on each of the three NCFLO billets individually, after the positions have been filled for three years or more. A cost/benefit analysis and job design similar to this one could then be prepared more accurately.

Someone may also want to prepare a cost/benefit analysis and job design for the Marine Corps Combat Development Command (MCCDC) billet discussed in Chapter I. This study would involve the initiative to establish a new Navy Civil Engineer Corps (CEC) Lieutenant Commander billet at MCCDC. This billet would be closely integrated with the three NCFLO billets.

APPENDIX A

LIST OF ACRONYMS

ABFC------Advance Base Functional Components
ACE-------Aircraft Combat Element
AOR-------Area of Responsibility
BOQ-------Bachelor Officer Quarters
CBC-------Construction Battalion Center
CE--------Command Element
CEC-------Civil Engineer Corps
CESO------Civil Engineer Support Office
CPX-------Command Post Exercise
CSSE------Combat Service Support Element
FMFLANT---Fleet Marine Force, Atlantic
FMFPAC----Fleet Marine Force, Pacific
FTX-------Field Training Exercise
GCE-------Ground Combat Element
I MEF-----First Marine Expeditionary Force
II MEF----Second Marine Expeditionary Force
III MEF---Third Marine Expeditionary Force
JCS-------Joint Chiefs of Staff
MAGTF-----Marine Air-Ground Task Force
MAW-------Marine Aircraft Wing
MCAGCC----Marine Corps Air-Ground Combat Center
MCCDC-----Marine Corps Combat Development Command
MEB-------Marine Expeditionary Brigade
MEF-------Marine Expeditionary Force
MEU-------Marine Expeditionary Unit
MILCON----Military Construction
MSR-------Main Supply Route
MWSG------Marine Wing Support Group
MWSS------Marine Wing Support Squadron
NAVFAC----Naval Facilities Engineering Command
NCB-------Naval Construction Brigade
NCF-------Naval Construction Force
NCFLO-----Naval Construction Force Liaison Officer
NCFSU-----Naval Construction Force Support Unit
NMCB------Naval Mobile Construction Battalion
P&E-------Planning and Estimating
PCS-------Permanent Change of Station
PHIBCB----Amphibious Construction Battalion
RCCM------Regional Contingency Construction Management
SWA huts--Southwest Asia Huts
TAD-------Temporary Additional Duty
THIRD NCR-Third Naval Construction Regiment
TPFDD-----Time Phased Force Deployment Data

TPFDL-----Time Phased Force Deployment List
TOA-------Table of Allowance
TOR-------Terms of Reference
USCENTCOM-United States Central Command
USMC------United States Marine Corps

APPENDIX B

[Ref. 7]

ENGINEER TASKS, CAPABILITIES, AND SOURCES OF SUPPORT

	CBT ENGR BN	ENGR SPT BN	MWSS ENGR OPSDIV	NAVAL CONST FORCES	CIV FORCES
MOBILITY TASKS (COMBAT SUPPORT)					
Conduct Engineer Reconnaissance	PM	PM	PL	NL	NN
Breach Obstacles	PH	SM	NL	NL	NL
Construct Pioneer Roads	PH	SH	SL	SH	NL
Assault Bridging	PL	SL	NN	NN	NN
Clear Mines	PH	SH	SL	NN	NN
Clear Helicopter Landing Sites	PM	PH	SL	SH	NL
Improve Beaches	PH	SH	NN	NM	NN
Employ Specialized Demolitions	PH	SH	NL	NL	NN
Provide Technical Engineer Advice	PH	NH	PH	NN	NN
Fight as Infantry	SM	NL	NN	NL	NN
COUNTERMOBILITY TASKS (COMBAT SUPPORT)					
Conduct Engineer Reconnaissance	PM	PM	PL	NL	NN
Place Mines	PH	SH	SL	NN	NN
Plan/Install Obstacles and Barriers	PH	SH	SL	NM	NN
Employ Specialized Demolitions	PH	SH	NL	NL	NN
Provide Technical Engineer Advice	PH	SH	PH	NN	NN
Fight as Infantry	SM	NL	NN	NL	NN
SURVIVABILITY TASKS (COMBAT SUPPORT)					
Construct Field Fortifications	PH	PH	PM	SH	NL
Employ Specialized Demolitions	PH	PH	NL	NL	NN
Provide Technical Engineer Advice	PH	PH	PH	NL	NN
GENERAL ENGINEERING TASKS (COMBAT SERVICE SUPPORT)					
a. General Engineering					
Conduct Engineer Reconnaissance	SM	PM	PL	PM	PM

	CBT ENGR BN	ENGR SPT BN	MWSS ENGR OPSDIV	NAVAL CONST FORCES	CIV FORCES
Surveying and Drafting	SL	PM	PL	PH	NL
Plan Construction, Repair, and Maintenance of Camps	SL	PH	PM	PH	SL
Improve Beaches	SL	PH	NL	PH	NN
Construct Standard and Nonstandard Bridges	SL	PH	NN	PH	NL
Improve Unpaved Roads, Airstrips and Marshalling Areas	SL	PH	SL	PH	NM
Perform Rapid Runway Repair	NN	SM	PM	SM	NL
Repair/Improve Bare Base Existing Airfields	NN	PH	PM	SM	NH
Build Expedient Airfields (matting)	NN	PH	SL	PH	NN
Plan and Estimate Projects	PM	PH	PM	PH	PM
Materials Testing (engineering properties)	SL	PM	PL	PH	PH
Soil Stabilization	SL	PH	PL	PH	NM
Construct Aircraft Revetment/Dispersal Sites	NL	SH	PM	SH	NL
Repair Airfield Damage	NL	PH	PM	PH	SM
Engineering Design (deliberate)	NL	PH	SL	PH	SM
Perform Pile Driving Operations	NN	PM	SL	PH	SM
Repair War Damage	NL	NM	NL	SH	PM
Drill Wells	NN	NN	NN	PH	SM
Construct Semi-permanent Camps	NL	PH	SL	PH	SM
Erect Pre-engineered Structures	NL	PH	PL	PH	SM
Construct Hard Surfaced Storage/Staging/ Marshalling Areas	NN	NN	NN	PH	SL
Perform Vertical Construction (including concrete)	NL	PM	PL	PH	SM
Asphalt Roads	NN	NN	NN	PH	SM
Operate Base Central Power Plants	NN	NN	NN	PM	SM
Perform Base Maintenance	NL	SM	SL	SH	SM
Concrete Production Operations	NN	NL	NL	PH	SM
Asphalt Production Operations	NN	NN	NN	PH	SM
Perform Quarry Operations	NL	SM	NL	PH	SM
Perform Rock Crusher Operations	NN	SM	NN	PH	SM
Construct Logistical Support Bases	NL	PH	NL	PH	SM
Construct Airbases	NN	PH	NN	PH	PM
Construct and Repair Port/ Waterfront Structures	NL	NM	NL	PH	PM
Employ Specialized Demolitions	NH	PH	NL	PH	NN
Conduct Nonexplosive Demolition and Obstacle/Debris Removal	NL	PH	NL	PH	PH
Provide Technical Engineer Advice	NL	PH	PM	PH	PH
Fight as Infantry	NM	SL	NN	SM	NN
b. Utilities Support					
Provide Tactical Water/Hygiene Services	SL	PH	PM	NN	NL
Provide Tactical Electrical Supply	SL	PH	PM	NN	NN
Develop Sewage and Water Systems	NN	NL	NL	PM	PM
c. Tactical Bulk Fuel Storage & Dispensing	NN	PH	PM	NN	SL

Task Priority and Capability Code:

First Letter:	P-Primary Task and Responsibility S-Secondary Task N-Not a Task
Second Letter:	H-Heavy Capability M-Medium Capability L-Light Capability N-No Capability

NOTE: The capabilities of civilian forces, host nation, U.S., or other sources of engineer efforts vary greatly; precise capability clarification is impossible. Tasks showing a civilian mission or capability imply that this task may be appropriate. Civilian forces don't have, and are not assigned, missions as such. Entries for them indicate that they should be considered as a resource for mission accomplishment.

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