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Significant redundancies exist between the Naval Construction Force, Amphibious Construction Battalion, and the Marine Corps Combat Engineer Battalion, Engineer Support Battalion, and Marine Wing Support Squadrons which necessitates a realignment of force structure and resources. This considerable duplication of capability provides the Department of the Navy a unique opportunity to realign the force structure needed for each service to carry out its required core missions and then divest of the rest. The saving generated from the divestiture of duplicate capability can then be reinvested in higher priority requirements to build the future integrated naval force.

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MASTER OF MILITARY STUDIES

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**KNOW YOUR BUSINESS: NAVAL CONSTRUCTION AND ENGINEERING  
CAPABILITY IN THE FUTURE INTEGRATED NAVAL FORCE**

SUBMITTED IN PARTIAL FULFILLMENT  
OF THE REQUIREMENTS FOR THE DEGREE OF  
MASTER OF MILITARY STUDIES

**Commander John T. Donohue, USN**

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## Executive Summary

**Title:** Know your Business: Naval Construction and Engineering Capability in the Future Integrated Naval Force

**Author:** Commander John T. Donohue, United States Navy

**Thesis:** Significant redundancies exist between the Naval Construction Force, Amphibious Construction Force, and the Marine Corps Combat Engineer Battalion, Engineer Support Battalion, and Marine Wing Support Squadrons which necessitates a realignment of capabilities, force structure, and resources to free up capital for future expeditionary construction research and development, procurement, and sustainment of the integrated naval construction force.

**Discussion:** The Navy and Marine Corps have significant expeditionary construction and engineering service capabilities dispersed throughout their organizations. Because of its dispersion, it is never looked at in the aggregate to understand its redundancies and find efficiencies to shape the force more effectively. The Department of the Navy (DoN) will fail to maximize the use of its resources to meet the challenges of Great Power Competition (GPC) if it does not take concerted steps to look at areas of service duplication such as expeditionary construction, bridging, and engineering services. Resourcing the future integrated naval construction force is further complicated by a fiscally constrained environment and a forecasted flat budget in the coming future. To determine the force size and capabilities needed by an integrated naval construction force, we need to develop it against the backdrop of the most stressful campaign the Navy and Marine Corps team may find themselves engaged. This paper reviews the history of DoN engineering capabilities, evaluates future projected operating environments, and makes a capability comparison to provide informed recommendations for necessary organizational reform.

**Conclusion:** Significant engineering capability redundancies exist between the Navy's and Marine Corps' engineering forces. However, each service has unique engineering requirements that preclude consolidating all capability under either branch. The considerable duplication of engineering capability currently present provides the DoN an opportunity to align the force structure needed to carry out the service's core missions and then divest of the remaining capability so that funds can be placed toward higher priority requirements.

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## *Preface*

Embracing change has never been a strong suit of the Department of Defense (DoD). There are interservice cultures to overcome, financial resources to protect, and doubts concerning our decisions to contend with, which can be almost paralyzing. The 2018 National Defense Strategy served as a wake-up call to DoD leadership and put each service on the path to compete against peer adversaries successfully. With limited financial resources to build and outfit a military capable of competing in an era of great power competition, a serious top-down review of how each service is organized, manned, trained, and equipped needs to take place. Redundant capabilities need to be identified and eliminated, and the buying power behind every dollar maximized. If you have been in government for any amount of time, you know this is a tall order and unlikely to happen in our bureaucracy effectively. Some organizations or people will find a way to stifle progress toward successful organizational change. I choose this topic to showcase one of many examples of duplicative capabilities within the DoD. I hope that this paper generates constructive discussion and serves as an example of how we can move forward with evaluating similar capabilities for reorganization, reduction, or divestment.

In researching this topic, I was reminded of a time as a young Lieutenant when a retired navy Captain sat me down and taught me how the Navy worked. One of the most memorable things he said to me was, “If you want to know what the Navy currently values: follow the money.” Subsequent tours as a platoon commander, operations officer, and executive officer left me dissatisfied and baffled as to why I could not get the equipment I needed to operate or to outfit units of action under my charge. My dissatisfaction with being unable to effect material readiness through procurement set me on the path of following the money. In 2018, I was rewarded with my dream job and assigned to the Chief of Naval Operation’s programming

division, “The Bullpen.” Working in the bullpen opened my eyes to the numerous duplicative efforts in the DoD and the subsequent waste of resources. Every year, I would participate in processes such as zero-based budgeting (ZBB) and program deep dives (PDD) intended to identify failing programs, programs non-core to the Navy’s mission, and misappropriated money to recapture into the Navy’s budget and put towards priority investments.

I was astonished to see the cursory effort placed toward completing a program review and further dismayed at how many recommendations were never seriously considered for action. It reminded me of the following short story and left me contemplating why the DoD was guarding so many benches:

*At a barracks in Seville was a patio. In the middle of the patio was a bench. Next to the bench, a soldier stood guard. No one knew why the bench needed guarding. They guarded it because they guarded it. Day and night, all nights and all days. And generation after generation of officers transmitted the order, and the soldiers obeyed. No one doubted, no one questioned. If as such it is done, and as such always has been done, a reason there had to be.*

*And like this, it continued until one person; I don’t know which general or colonel, wanted to see the original order. He had to forage the archives. And after much digging, he knew. Thirty-one years, two months, and four days ago, an official ordered a guard to be placed by the bench that had recently been painted so that no one happened to sit on the fresh paint.*

*–Eduardo Galeano, El Libro de los Abrazos, Trans. Nathalie Alyon*

For thirty years, soldiers guarded that bench without knowing why. How many legacy programs or capabilities is the DoD continuing to resources without looking back in time to see why we had it in the first place. We may find the requirement no longer exists, or modernity requires

something different. The DoD can not afford to guard any more benches and must take bold steps towards reform if we are to keep pace with our competitors.

In closing, I would like to thank Dr. Jonathan Phillips, Ph.D., Dean of Academics for Marine Corps University Command and Staff College, for his encouragement, support, and guidance in writing this paper. Dr. Joyce A. Donohue, Senior Health Scientist for the Environmental Protection Agency, for her assistance, perspective as a non-military professional, and editing. Finally, I would like to thank Lieutenant Colonel Patrick Manson, USMC, for his engineering expertise, guidance, and support in putting a comprehensive paper together.



## INTRODUCTION

*“You never change things by fighting the existing reality. To change something, build a new model that makes the existing model obsolete”.*

- Buckminster Fuller

The 2018 National Defense Strategy (NDS) sounded a call for a need to change how the U.S prepares to compete, deter, and win wars given the reemergence of Great Power Competition (GPC). Two of the distinct lines of effort needed to expand the competitive space directly call for “Change”: (1) Build a more lethal joint force, and (2) Reform the Department of Defense (DoD) business practices for greater performance and affordability.<sup>1</sup>

As it relates to building a more lethal force, we must consider both capability and capacity to meet the threat. More importantly, the Navy and Marine Corps must be open to abandoning historical precedence in force structure and task-organize in a more agile, scalable, reproducible, and lethal way. This reorganization will enable the DoD to implement reform actions and free up much-needed capital to invest in cutting-edge technologies.

Both the Navy’s Design for Maintaining Maritime Superiority and the Marine Corps Commandant’s Planning Guidance charted the course for how each service would implement the mandates of the National Defense strategy. Conspicuously absent from the Navy’s document is any nod towards reviewing the current force structure for relevance or reform to generate improved affordability, the second line of effort called for in the 2018 NDS. Another item of note relates to how the Navy defined its maritime domain by caging its boundaries to only the oceans, seas, waterways, and seafloor.<sup>2</sup> This definition gives a clear line of demarcation for



Figure 1: DoD Planning Guidance

where the Navy will cease to project power and transfer ground operations over to the Marine Corps as the preeminent expeditionary warfare service. The concern over the transition space between sea and land is what I believe prompted the Marine Corps Commandant, General David Berger, to state: “We must engage in a more robust discussion regarding naval expeditionary forces and capabilities that are not resident with the Marine Corps...”<sup>3</sup> By clearly defining responsibilities, both the Chief of Naval Operations and the Commandant of the Marine Corps can ensure their requisite tasks are adequately resourced and not reliant upon another service with little to no equity in maintaining the capability. The Marine Corps understands that substantial change in organization, training, and equipping is needed to meet the new desired ends.<sup>4</sup> However, this will require a shared understanding between the Navy and Marine Corps to ensure the naval force can achieve sea control or impose sea denial against any potential adversary.

The term “the frozen middle” is often used to describe a component of an organization that is difficult to understand or analyze. This lack of understanding predominantly results in the organization ignoring the issue to its detriment.<sup>5</sup> An example of such a facet would be the DoD joint engineering and construction force. Every service possesses substantial engineering and construction capabilities. However, they use unique mission essential tasks (MET) to communicate what capabilities they train too or service publications with inconsistent formats and complicated language to outline their operational capabilities. When considering both the Navy and Marine Corps as the “*integrated naval force*,” as described in planning guidance and concepts, we need to apply the appropriate level of scrutiny to determine what capabilities are required and under which branch of service they should be aligned. Only then will the DoN be able to implement meaningful reorganization to achieve greater performance and affordability.

This paper intends to provide the appropriate level of scrutiny necessary to highlight Navy and Marine Corps engineering and construction capability redundancies and recommend possible reforms the DoN can take to field a more affordable and effective engineering force. Significant engineering capability redundancies exist between the Naval Construction Force, Amphibious Construction Battalion, and the Marine Corps' Combat Engineer Battalion, Engineer Support Battalion, and Marine Wing Support Squadron. Realigning a majority of engineering and construction capabilities, force structure, and resources under the Marine Corps will ultimately help field a more agile, survivable, and lethal force. The realignment will free up capital for future investment in research and development, procurement, and sustainment of the integrated naval construction force.

To adequately examine existing Navy and Marine Corps engineering capabilities, we must review their history for precedence, analyze the projected operating environment for need, and review existing capabilities for redundancies. This, in turn, will address a small portion of the "frozen middle" and provide DoD leadership with the necessary background and information to initiate the needed reforms. It is a win-win scenario for the Department of the Navy (DoN) if it can break through each service and their requisite engineering/construction force's parochial attitudes to initiate the appropriate reforms. Engineering capability reform is a step in the right direction in designing the military force required to compete and win future conflicts.

## **HISTORY**

### **Background**

Military engineering is one of the oldest technical skillsets known within the profession of arms. The discipline's monumental achievements, along with their tactical significance, can be found dispersed throughout world history as a testimony to its importance and relevance in

warfare. Although engineering feats are not always successful in fulfilling their intended purpose, their scale, ingenuity, technical challenges, and craftsmanship can be appreciated by military officers, professional engineers, and historians alike. Starting in the 3<sup>rd</sup> century B.C., Chinese military engineers designed and began constructing the “Great Wall of China.” At the time of the Roman Empire (27BC – 476AD), military engineers constructed “Hadrian’s wall”



**Figure 2: Hadrian’s Wall**

Source: Gannet, Istock. “Admire the view from Hadrian’s Wall” *The Telegraph*.

between modern-day England and Scotland. Roman military engineers built aqueducts to deliver fresh water to population centers, constructed vast road networks to move troops and supplies expeditiously, and built siegecraft to attack enemy fortifications. 15<sup>th</sup>-century European military engineers constructed great castles to serve as military garrisons and operation centers.<sup>6</sup>

More recently, during World War I (WWI), military engineers demonstrated their indispensable ingenuity and craft by creating extensive subterranean trench networks and light railway systems to support frontline troops.<sup>7</sup> Irrefutably, military engineers are proven combat multipliers, providing construction, fortification, surveying, and demolition services to the larger combat force, making them an indispensable asset to every war effort. History tells us the value of military engineering capability; now, we need to understand its roots in the U. S. Navy (USN) and United States Marine Corps (USMC) to determine its primacy before making meaningful recommendations for its future design.

### U.S. Navy Engineers

As an inclusive profession in the U.S. Navy (USN), Naval engineering began with the establishment of the Civil Engineering Corps (CEC) on March 2, 1867, under the Bureau of Yards and Docks. These officers were professional engineers and architects whose duties

consisted of hydrography, ordnance, and overseeing the construction, repair, and maintenance of buildings, docks, and wharves on naval installations.<sup>8</sup> The Laborers and skilled artisans needed for the various construction projects were pulled from the local community. It wasn't until 1917 that the USN established the "unofficial" 12<sup>th</sup> Public Works Regiment at Naval Training Station, Great Lakes, IL, as a labor force for naval shore construction activities. CEC officers did not initially command the public works regiment. It was only from the recommendation of Rear Admiral Frederic Harris, Chief of the Bureau of Yards and Docks, to CAPT William Moffet<sup>1</sup>, Commandant of the Naval Station, that he appointed a CEC officer to oversee the regiment. This appointment set a precedent and ultimately became the marriage between the CEC and the later known "Seabees." Following WWI, the need for training and construction activities at Great Lakes ceased, and the regiment faded away into obscurity.<sup>9</sup>

During the Interwar Period (1918-1939), the Naval Construction Battalions concept was again proposed and later adopted into War Plan RAINBOW (defense of the U.S. and Western Hemisphere north of 10° latitude). However, the plan only contained the notion of a construction battalion. It gave no additional details on the required capabilities, mission, or capacity needed to support the war plan. It wasn't until October 1941 that Rear Admiral Chester Nimitz, Chief of the Bureau of Navigation, authorized the recruitment and enlistment of men from the construction trades for the first construction battalion. After the Japanese attack on Pearl Harbor, HI, on December 7, 1941, the need for a militarized engineering capability drastically changed in the DoN (U.S. Navy and Marine Corps). Civilian laborers were prohibited by international law

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<sup>1</sup> Rear Admiral (RADM) William Moffet served in the USN from 1890 to 1933. He died in an airship (USS Akron) crash on April 4, 1933. RADM Moffet is a Medal of Honor recipient and considered the father of Naval Aviation through his appointment as the first Chief of the Bureau of Aeronautics. He was considered a superb warrior, administrator, and creative officer, which prepared him to navigate government bureaucracy and win over Naval leadership support in the development naval aviation and propel the aircraft carrier forward as the centerpiece of the USN.

in war zones. In turn, on December 16, 1941, the USN established four additional construction battalions. From the establishment of the construction battalions to the end of the war, 325,000 men enlisted in Seabees. All Seabees would receive six weeks of advanced military and technical training before being shipped to their overseas assignment.<sup>10</sup> As the United States Marine Corps (USMC) was expanding, so did their need for combat engineers. To meet this growing demand, the USN transferred ~10,000 Seabees, three battalions worth of construction personnel, to the Corps for employment as combat engineers.<sup>11</sup>

Fighting alongside Marine and Army troops, Seabees helped build the five figurative roads to victory (North Atlantic, South Atlantic, North Pacific, Central Pacific, and South Pacific road). Their notable achievements consisted of the repair and expansion of airfields on Guadalcanal and Tarawa within days of capture and the removal of 12 million yards of coral and 6 million square yards of asphalt on Tinian to build a base and airfield capable of supporting B-29



**Figure 3: 112<sup>th</sup> Seabees on Tinian 1945**  
Source: Germinsky, Robert “The Fighting Seabees of World War II” *WWII Seabee Anecdotes*

Superfortress bombers. With the Marines, Navy Seabees moved across the Pacific from New Georgia to Iwo Jima, to Okinawa, and the Philippines until the road to Tokyo was complete and the war over.<sup>ii</sup> Following WWII, the U.S. military rapidly demobilized, and the Seabees with it. By 1950 there were only 2,800 Seabees left on active duty.<sup>12</sup>

Five years later, the DoN again found itself in need of engineering and construction forces to support the Korean War, and once more, the Seabees found themselves in direct support to the USMC. Seabees supported the Inchon landing by placing the pontoon causeway

<sup>ii</sup> The Seabee’s total contribution to the war effort amounted to the construction of 111 airstrips, 441 piers, fuel depots, hospitals, and housing for 1.5 million men in the Pacific campaign alone.

needed to move troops and equipment ashore. Detachments were formed and assigned to Marine Air Groups to service their airfields. They built defensive positions around bases, constructed roads, and improved port infrastructure to support USN ships. Due to the expanding nature of the Seabee's role in combat operations, the USN initiated a reorganization of the Naval Construction Force (NCF) and divided its engineering force into two distinct engineering capabilities: (1) Amphibious Construction Battalions (PHIBCBs); and (2) Naval Mobile Construction Battalions (NMCB's). The Amphibious Construction Battalions were tasked with the mission of constructing causeways, pontoon docks, and supporting personnel and equipment movement from sea to shore. The Naval Mobile Construction Battalions were tasked with building roads, bridges, tank farms, and docking facilities.<sup>13</sup>

Seabees have been employed in every conflict in which the U.S. has found itself engaged. In Vietnam, Iraq, and Afghanistan, they supported allied forces by constructing forward operating bases and protective fortifications. They built roads, airfields, and supply depots in the most austere locations and under very challenging conditions. Their employment doesn't just exist under the umbrella of warfighting. They have contributed significantly to peacetime projects such as the development and construction of Naval Support Facility Diego Garcia, the remediation of barracks and warehouses at Naval Station Rota, as well as numerous Foreign Humanitarian Assistance and Foreign Disaster Recovery (FHA/FDR) operations around the globe. Despite their relatively short existence, Navy Seabees have earned their reputation as a formidable fighting force and have certainly lived up to their motto of "We Build, We Fight."<sup>14</sup>

### U.S. Marine Corps Engineer

U.S. Marine Corps engineering expanded alongside Naval engineering during the early days of World War II (WWII). Prior to WWII, there was only a limited need for USMC engineering skillsets. The Marine Corps was a uniquely small organization whose primary

function was fighting from U.S. Navy warships and the seizure of advanced bases. As the United States' role as a world power grew, so did the Marine Corps. When the USMC was of sufficient size to deploy a brigade in the field, the necessity of an engineering capability became evident.<sup>15</sup> Between 1912 and 1913, the USMC flirted with establishing an engineering company to support the main combat force. However, due to operational needs, they ended up utilizing the unit as a rifle company. In 1921, the USMC again tried to focus and grow its engineering capability, this time at a battalion size. Less than three months later, they disbanded the battalion and reduced its size to a two company-level structure.<sup>16</sup> On April 1, 1935, as a result of Navy Department General Order 241, the USMC formally established its engineering capability at Quantico, Virginia, to fulfill its assigned mission for advance-base duty. Marine Corps engineers received training on bridge building, fortification, demolition, and rudimentary construction skillsets.<sup>17</sup>

WWII expanded the Marine Corps engineering force with the transfer of Seabees from the Navy to establish the 17<sup>th</sup>, 18<sup>th</sup>, 19<sup>th</sup>, and 20<sup>th</sup> combat engineer battalions. The Marine engineers of this war were genuine combat engineers. Much like the Pacific Area of Responsibility (AoR) challenges today, the USN and USMC grappled with the challenges levied by the tyranny of distance and the lack of territory from which to project power. As the Navy and Marine Corps advanced across the Pacific Ocean to defeat imperial Japan, Marine Corps engineers, alongside their Navy Seabee brethren, would effectively build the logistic supply lines and depots necessary to support the war effort.<sup>iii</sup> The complexity and scale of engineering



**Figure 4: USMC Eng Constructing a Road, New Britain**  
Source: The National WWII Museum

<sup>iii</sup> On Guadalcanal, Marine engineers would repair, expand, and construct defensive positions around the airbase to support allied air operations. On the island of New Britain, Marine engineers built a road capable of supporting

problems faced during the great war were something military engineers had never previously experienced, but they rose to the occasion nonetheless.<sup>18</sup>

Marine Corps engineers have been called to task in every war since.<sup>iv</sup> The indispensability of the engineer to the Marine Corps mission stands without question. At every



**Figure 5: LCPL Gartell crawls into a Vietnamese bunker**  
Source: Hemmings, Jay “The Warriors Who Infiltrated underground Tunnels in the Vietnam War” *War History Online*

opportunity, they rose to the occasion and employed their craft to meet the demands of their time. There is no question as to their utility and future within the Marine Corps, but what about the future of the NCF with the Navy? Both organizations have been fighting side by side in every conflict to date, and their exploits are

generally in support of ground operations.<sup>19</sup> One may naturally conclude that both service’s engineers serve the same purpose and should be combined to maximize combat power, the need for which is even greater in the future operating environment. The most likely reasons they have not been consolidated are:

(1) The USMC spreads its engineering capability across the MAGTF, which prevents any central point or voice of advocacy from addressing capability shortfalls or fight for resources against infantry, wing, or logistic community priorities.

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armored vehicles across a coastal swamp for U.S. tanks to move forward and engage Japanese defensive positions. On Iwo Jima, they built roads well ahead of the combat troops while under fire, they destroyed or sealed up some 5,000 caves and pillboxes, and operated distillation plants to provide potable water for troop nourishment.

<sup>iv</sup> During the Korean War, Marine Corps engineers constructed a 3.5-mile bridge to support the tactical withdrawal of tanks, trucks, and heavy equipment during the Chosin Reservoir Campaign. They created a village within 36 hours to host roughly 700 prisoners of war during a prisoner exchange with China. During Vietnam, they would build elevated roads through jungles and over rice paddies. They became the “Tunnel Rats” needed to explore, disrupt, and demolish underground hideouts and supply lines.<sup>iv</sup> During the war in Iraq and Afghanistan, Marine Corp engineers found themselves constructing combat outposts, conducting route clearance operations, using explosives to destroy culverts, buildings, or bridges.

(2) The NCF and ACB are vastly insignificant to the Navy as they are not ships, submarines, or aircraft. As such, they get very little attention when considering the design of the future naval force.

(3) Seabees have gone to great lengths to immortalize their brand and make it politically untenable to dissolve the force. Justifiably, they built a museum to honor and preserve their traditions and accomplishments. They host annual formal balls equivalent to the splendor of Navy or USMC ball, and they embroider their combat uniform with the Seabee logo to stand out and remind their fellow servicemen of who they are and what they do.



**Figure 6: Seabee Logo**  
Source: Seabee Museum online Merchandise

(4) Until now, the nature of the imposing threat did not demand significant changes in forces structure to fight and win against modern peer adversaries.

(5) A misperception exists on Seabee's capabilities beyond those of Marine Corps engineers. Seabee engineering capabilities have been historically categorized as operational level engineering services vice the Marine Corps tactical level engineering services. This misperception leads senior DoN leadership to believe there is undue risk involved when considering the divestment of the Naval Construction Force. This paper intends to demonstrate otherwise.

## PROJECTED OPERATING ENVIRONMENT

The strategic importance of the oceans and seas, as a global common, cannot be understated. It is an area owned by none and accessible to all. Some critical facts that support the strategic importance of the high seas are:<sup>20</sup>

- 90% of world commerce travels by sea
- All major trade routes intersect in the littorals
- $\frac{3}{4}$  of the world's population lives on or near the coast
- The oceans contain critical energy and mineral resources that will have increasing strategic and economic importance in the 21<sup>st</sup> century



**Figure 7: Main Maritime Shipping Routes**  
Source: Notteboom, Theo. *Port Economics, Management and Policy*. New York: Routledge 2021

Naval theorist Alfred Thayer Mahan described the sea as a vast highway where commerce travels on well-defined trade routes.<sup>21</sup> In modern-day military terminology, they are referred to as Sea Lines of Communication (SLOC). To ensure international order, the USN is assigned the mission of maintaining the freedom of the seas. However, in a time of war, the Naval Force must be capable of denying its use to the enemy while securing them for friendly use. Historian Colin Gray said it best when he stated, “Depending upon who controls the sea, water is a highway or a barrier. The continuity of the world’s seas and oceans translates into a global mobility and agility for maritime forces and merchant shipping that can have no continental parallel”.<sup>22</sup>

As stated at the beginning of this paper, the U.S. needs to change how it prepares to compete, deter, and win in an era of great power competition. A war with Russia would primarily be a continental land campaign with allied forces moving west through Europe. However, due to its geostrategic position on the globe, a war with China would resemble something like the WWII Pacific campaign where U.S. forces fought their way across the Pacific securing island footholds to establish supply points needed to maintain the pace of battle and

advanced bases from which to project combat power.<sup>v</sup> If owning strategic geography dictates how sea control is maintained in a conflict, then the USN and USMC have a significant challenge to overcome. To meet this challenge, the USMC has developed the Expeditionary Advanced Base Operations (EABO) concept to expand the Navy's ability to attain and maintain Sea Control or impose Sea Denial.<sup>23</sup> To do this, the USMC initiated significant changes in force structure and equipment, where engineering and construction capabilities need to be front and center in the reform.<sup>24</sup> Instead of fighting our way back across the Pacific, this new concept has Marines already established at advanced expeditionary bases within the weapons engagement zone.<sup>25</sup>



**Figure 8: INDOPACOM Area of Responsibility**  
Source: U.S. Indo-Pacific Command

EABO enables U.S. Forces to adapt to a peer adversary's ability to contest U.S. forward presence at legacy bases with fixed infrastructure or large targetable platforms such as an aircraft carrier (CV) or amphibious assault ship (LHA/D). Expeditionary Advanced Basing (EAB) provides a low signature dispersed forward-basing alternative to these fixed-legacy sites. It will also permit large targetable warships to remain outside the adversary's weapons engagement zone as an outside force and engage through the stand-in force located at the EAB. As the EABO Handbook states, "EABO advances, sustains, and maintains the naval and joint sensor, shooter, and sustainment capabilities of the inside force to leverage the decisive massed capabilities of the outside force with enhanced situational awareness, augmented fires, and logistical support."<sup>26</sup>

<sup>v</sup> The INDOPACIFIC Area of Responsibility (AoR) is vast. It covers nearly half the world, contains 36 different nations, and 50% of the world population.<sup>v</sup> The Pacific Ocean itself covers 30% of the world's surface, includes over 17,508 islands and fifteen archipelagic states, the largest being Indonesia, Japan, Philippines, and New Zealand.<sup>v</sup>

This concept is ultimately designed to flip the script and turn contested close and confined seas by adversary A2/AD capabilities against the adversary itself.

If the Marine Corps persists with EABO, dispersing its forces across thousands of miles of island and chokepoints would present a multitude of challenges when establishing, defending, and sustaining the key maritime terrain. However, it would expand the Navy's ability to maintain sea control within the adversaries A2/AD umbrella and deny the competitor access to markets and energy resources needed to sustain its economy.<sup>27</sup> The low signature and expeditionary nature of the Marine EAB will not be the only characteristic required for its success. The Marines occupying the EAB will need to design it for survivability and supportability. EABO dictates the need for organic engineering and construction capabilities as part of the stand-in force. In addition to traditional projects like road/bridge repair, construction of battery placements, and creating airfields, Marine Corps engineers must be well versed in deception techniques, camouflage, fortification, and signature management.<sup>28</sup> Leading back to a statement made by GEN Berger in the Commandants Planning Guidance: "Together, the Navy-Marine Corps Team must enable the joint force to partner, persist, and operate forward wherever and whenever we are called to do so."<sup>29</sup>

Getting Navy and Marine Corps engineering/construction capabilities aligned and resourced under the right service is key to fulfilling this guidance. The future integrated naval force must have the right capabilities to carry out its operational task, but they must also have the suitable capacity to support the operational requirements. Thus, we must now examine current USN and USMC engineering and construction force missions, capabilities, and cost before making meaningful reform recommendations.

## ENGINEERING CAPABILITY AND CAPACITY COMPARISON

What remains true today as it did at its inception is: “The Marine Corps shall be organized, trained, and equipped to provide...the seizure and defense of advanced naval bases...as may be essential to the prosecution of a naval campaign.”<sup>30</sup> This mission necessitates an organic engineering force to fortify existing advanced bases or construct new ones. As discussed earlier in the paper, the USN does not have a mandate for this mission, so why then does it possess such a tremendous engineering capability designed to fulfill the same mission as the Marine Corps?

To start our analysis, we must first examine all the engineering capabilities resident under the DoN. Figure 9 presents the current task organization of all engineering capabilities under the DoN and gives us a sense of its immense scale. We can now compare each element’s size, mission, and mission essential tasks to uncover capability redundancies.



**Figure 9: Department of the Navy Engineering Task Organization**

Source: Standard Navy Distribution List and MCRP 1-10.

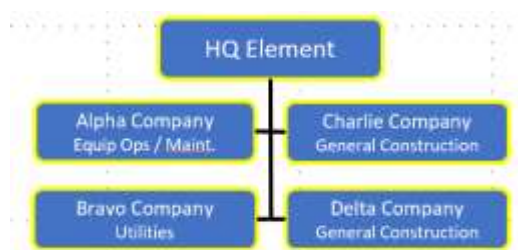
### Naval Construction Force (NCF)

The Naval Construction Force (NCF) is by far the largest of the Navy’s engineering capabilities. It consists of the following:

- Naval Construction Group (NCG)
- Naval Construction Regiment (NCR)
- Naval Mobile Construction Battalion (NMCB)
- Construction Battalion Maintenance Unit (CBMU)
- Underwater Construction Team (UCT)

Both the NCR and NCG are headquarters elements and do not provide any actual capability outside Command and Control (C2) or Title 10 responsibilities such as manning, training, and equipping the force. Thus, they will not be discussed any further in this paper but will factor into the cost of sustaining the NCF. The UCT capability is negligible and niche, so it will not be addressed as part of the larger focus on naval construction and engineering capabilities under the DoN. The two primary units capable of providing engineering services are the NMCB and CBMU.<sup>31</sup>

The centerpiece and most capable unit of the NCF is the NMCB. The mission of the NMCB is to construct advanced base facilities in support of the USN, USMC, and Joint Force Commander.<sup>32</sup> Again, the NMCB's function is the same as USMC engineering tasks. It should also be noted that the mission to seize or defend advanced naval bases is absent from the USN mission statement or any USN function directed by DoD Directive



**Figure 10: NMCB Organization**

Source: Department of the Navy. *Naval Construction Force Manual*.

5100.1. One NMCB contains ~755 personnel and the supporting equipment to provide general construction services utilizing concrete, masonry, wood, or steel as raw materials. The NMCB is task-organized into an organic HQ element and four Companies, as depicted in figure 10. Each company is dependent on the others to provide the full range of construction skillsets necessary to complete a construction project. Those construction skillsets include engineers, surveyors, builders, steelworkers, electricians, plumbers, mechanics, and equipment operators. Alpha Company maintains and operates automotive, construction, material-handling equipment for the battalion. Bravo Company oversees the installation, operation, and repair of utilities such as water, sewer, power, fuel, and communications systems. Charlie and Delta Companies are

responsible for all horizontal and vertical construction.<sup>33</sup> Engineering Mission Essential Tasks (MET) for the NMCB's are defined as:<sup>34</sup>

- Perform Civil Military Engineering Support
- Construct/Repair Forward Airfields and Landing Zones
- Perform Const. Engineer Services
- Perform Lines of Communication (LOC) Sustainment

Supplementing the NMCB is the CBMU. Despite being a separate unit, the NMCB's and CBMU's internal organization, personnel, and equipment allowances are nearly identical in capability, but the CBMU has less in terms of capacity.<sup>35</sup> The mission of the CBMU is to oversee the operation, maintenance, repair, and provide minor construction capability for shore facilities, forward operating bases, and advance bases constructed by the NMCB.<sup>36</sup> Essentially, the CMBU exists to be the stay-behind force once the NMCB moves on to the next construction project. Over the past 30 years, the Department of Defense has increasingly relied on contractor support for transportation, construction, and base support.<sup>37</sup> Arguably, the U.S. has not been involved in a total war since WWII, so the risk of using contractors for these functions was more than tenable for U.S. policymakers. As such, CBMUs have been utilized in the same capacity as the NMCB. The engineering METs assigned to the CBMU are<sup>38</sup>:

- Perform Civil Military Engineering Support
- Conduct Facilities Ops & Maint
- Perform Const. Engineer Services

The price of maintaining the NCF as a redundant engineering capability to the USMC engineering force costs the taxpayer nearly \$3.4 billion over five years, according to the FY21 Program Objective Memorandum (POM21). The annual cost of maintaining the NCF is ~\$646 million. A more in-depth look at what makes up the cost of sustaining the NCF (Table 1) shows that human resources, both active-duty (MPN) and reserve (RPN), account for a majority of the

budget (\$434M FY21 / \$2.3B FYDP). The second highest cost is with the force's Operations & Maintenance (OMN) budget (\$175M FY21 / \$932M FYDP). Programmed procurement costs (OPN) were set at (\$35M FY21 / \$173M FYDP) to facilitate the recapitalization of construction equipment beyond service life. The appropriation with the least amount of investment was Research, Development, Test, and Evaluation (RD TEN) costs at (\$2M FY21 / \$11M FYDP) to develop advanced equipment for Airfield Damage Repair (ADR) and Port Damage Repair (PDR).<sup>39</sup>

NCF Financial Data		
APP	FY21 (\$M)	FYDP (\$M)
MPN	\$383	\$2B
RPN	\$51	\$270
OPN	\$35	\$173
OMN	\$175	\$932
RD TEN	\$2	\$11
<b>Total</b>	<b>\$646</b>	<b>\$3.4B</b>

**Table 1: NCF POM21 Fiscal Breakdown**  
Source: OPNAV Program Budget Information System POM21 working table

### Amphibious Construction Battalion

The Amphibious Construction Battalion (ACB) is a second engineering and construction capability in the Navy, operationally task organized under the Navy's amphibious warfare commander. The mission of the ACB is to construct and operate port facilities in support of Combined Joint Logistic Over the Shore (CJLOTS) operations. Systems used to



**Figure 11: ACB Organization**

Source: Department of the Navy. *Naval Construction Force Manual*. NAVFAC P-315

support CJLOTS are the Improved Navy Lighterage System (INLS), Modular Elevated Causeway System (ELCAS (M)), and Amphibious Bulk Liquid transfer system (ABLTS). An ACB contains ~832 personnel and is task-organized into an organic HQ element and three companies, as depicted in Figure 11. Although designated as a construction force, 50% of the Unit of Action (UoA) is composed of fleet rates such as Boatswain mates (BM) and Enginemen (EN) for the operation of the Warring Tugs (WT) and Roll-on / Roll-off Discharge facility (RRDF). These men and women form Bravo Company and are responsible for the causeway

system placement. Alpha and Charlie Company provide the horizontal and vertical construction capabilities necessary for building the ELCAS (M) and expeditionary advance bases for the Marine landing support battalion and Naval Beach Group during amphibious operations.<sup>40</sup>

Engineering METs for the ACB are:<sup>41</sup>

- Perform Civil Military Engineering Support
- Perform Const. Engineer Services
- Construct, Maintain, and Operate Logistics Over-the-Shore

The price of maintaining the ACB engineering force costs the taxpayer nearly \$1 billion over five years, according to the FY21 Program Objective Memorandum (POM21). The annual cost of maintaining the ACB is ~\$178 million. Unlike the NCF, the preponderance of the cost of sustaining the ACB is in the OMN (\$98M FY21 / \$532M FYDP). The reason for this is that a majority of the human resources exist in RPN vice MPN. Manpower only accounts for (\$72M FY21 / \$409M FYDP) of the ACB budget. OPN costs were programmed at (\$8M FY21 / \$15M FYDP) to facilitate the recapitalization of construction equipment beyond service life. No investment in future capability development with RDTEN funding was programmed for the ACB, which should indicate where amphibious construction stands on the Navy's priority funding requirements.<sup>42</sup>

ACB Financial Data		
APP	FY21 (\$M)	FYDP (\$M)
MPN	\$53	\$308
RPN	\$19	\$101
OPN	\$8	\$15
OMN	\$98	\$532
Total	\$178	\$956

**Table 2: NCF POM21 Fiscal Breakdown**  
Source: OPNAV Program Budget  
Information System POM21 Working Table

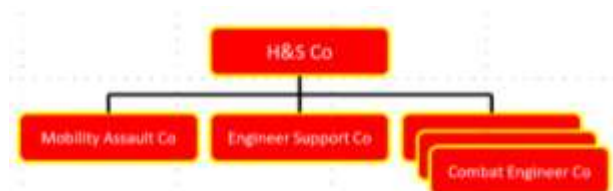
### Marine Corps Engineering Force

The Marine Corps engineering and construction force possesses many of the same capabilities as the Navy's construction force, but they are dispersed between the Marine Division (MARDIV), Marine Aircraft Wing (MAW), and the Marine Logistics Group (MLG) to support the Marine air-ground task force (MAGTF) construct.<sup>43</sup> Again, this division of capability

prohibits a central point of advocacy for engineering capability development and resources. Marine engineers provide the necessary skillsets to enable or deny freedom of maneuver throughout the battlespace (mobility/counter-mobility) and build survivable advanced-based facilities or positions (survivability/general engineering). The effective employment of Marine Corps engineers enables the commander to alter the battlespace to their advantage, scale the tempo of a battle, and improve the morale of the force by providing things like showers for frontline troops. The division of Marine Corps engineering capability and resources enables the engineering force to focus its skillsets and equipment to best support the ground combat element (GCE), aviation combat element (ACE), and combat service support element (CSSE).<sup>44</sup>

The combat engineer battalion (CEB) was initially conceived as a unique engineering capability due to its organic mobility assault company. Although not codified in doctrine yet, recent resourcing decisions in the Marine

Corps have the CEB divesting of the mobility assault company, essentially making it similar to an engineering support battalion minus bulk



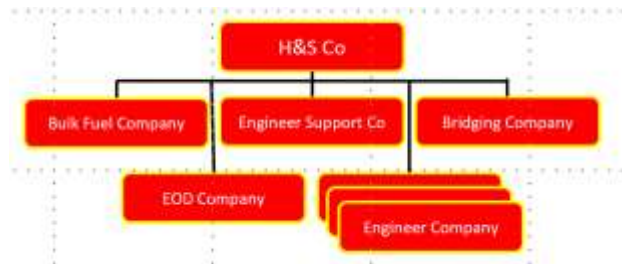
**Figure 12: Combat Engineer Battalion Organization**  
Source: MCRP 1-10.1

fuel and explosive ordnance disposal capabilities.<sup>45</sup> The mission of the CEB is to “Enhance the mobility, counter-mobility, and survivability of the Marine division through combat and limited general engineering support.”<sup>46</sup> One CEB contains ~1084 personnel and the supporting equipment to carry out its assigned operational tasks. The CEB is task-organized into an organic HQ, three combat engineer, one engineering support, and historically one mobility assault company, as depicted in Figure 12. The engineering support company provides the capability to operate and maintain automotive, construction, material-handling equipment for the battalion. The combat engineer companies provide limited utilities, horizontal, and vertical construction

capability, much like the USN's ACBs. The mobility assault company provided a mechanical and explosive breaching capability to neutralize enemy counter-mobility obstacles and break through enemy defenses.<sup>47</sup> Engineering METs for the CEB are:<sup>48</sup>

- Conduct general engineering ops
- Conduct tactical electrical supply
- Provide Engineer support to amphibious operations
- Conduct engineer reconnaissance
- Conduct counter-mobility operations

The engineering support battalion (ESB) is nearly identical to the Navy's NMCB. The difference between the ESB and an NMCB is that the USMC task-organizes its explosive ordnance disposal (EOD) capability under the ESB and designates, mans, trains, and equips a bulk fuel and bridging company where the USN includes it as a task under; performing civil-military engineering support. The ESB is



**Figure 13: Engineering Support Battalion Organization**  
Source: MCRP 1-10.1

task-organized under the MLG as part of the CSSE of the MAGTF. The ESB's mission is to "provide combat engineering and limited general engineering, bulk liquid, and utility support."<sup>49</sup> On average, one ESB contains ~1100 personnel and the supporting equipment to perform engineering and construction tasks. The ESB is organically task-organized into one HQ, bulk fuel, engineering support, bridging, EOD, and three engineer companies, as depicted in Figure 13. Beyond 2021, the USMC will no longer resource separate bridging companies and will lose the standard bridging capability. A limited nonstandard bridging capability will reside with the engineering companies along with horizontal and vertical construction.<sup>50</sup> Engineering METs for the ESB's are defined as:<sup>51</sup>

- Conduct general engineering ops
- Conduct tactical electrical supply
- Conduct engineer reconnaissance
- Conduct tactical water/hygiene service

- Conduct Horizontal/Vertical Const.
- Conduct EOD operations
- Conduct counter-mobility operations
- Conduct tactical bulk fuel storage
- Conduct mobility operations

The final component of the USMC engineering force resides with the Marine Wing Support Squadron (MWSS). The mission of the MWSS is to “provide essential air and ground support (AGS) to a designated fixed-wing and/or rotary wing component.”<sup>52</sup> with the engineering division responsible for “providing limited combat and general engineering



**Figure 14: Marine Wing Support Squadron Organization**  
Source: MCRP 1-10.1

support”<sup>53</sup> for the various components of the ACE. The engineering division of the MWSS is by far the smallest of the USMC engineering force’s engineering and construction components, with only ~160 personnel. The MWSS is organically task-organized into one HQ, one airfield operations, and one motor transportation company, as depicted in Figure 13. The MWSS engineering division’s uniqueness is its training in constructing, maintaining, and improving vertical and short takeoff and landing sites.<sup>54</sup> The USN engineering force’s equivalence would be with its airfield damage repair capability, an instance where the USN poses a much more robust capacity. Engineering Mission Essential Tasks (MET) for the MWSS engineering division are:<sup>55</sup>

- Conduct general engineering ops
- Construct/Maintain Expeditionary Airfields and Landing Zones (LZs)
- Conduct tactical bulk fuel storage

The cost of maintaining the entire Marine Corps engineering force is ~\$3.3 billion over five years. The annual cost of maintaining the USMC engineering force is ~\$616 million. Like the USN, most of the cost in sustaining the engineering force is with its manpower. Active-duty MPN and reserve RPN make up \$559M FY21 / \$3B FYDP of the budget cost. The most

noteworthy difference in maintaining a force of equivalent size to the NCF is the delta in OMN. The Marine Corps can sustain its engineering force at ~10% of the Navy's cost. The disparity in operating and maintaining the engineering forces deserve further examination. However, that investigation is outside the scope of this paper and should be done by a Navy financial analyst. Much like the Navy, the appropriation with the least amount of investment was RDTEN costs at \$4M FY21 / \$17M FYDP.<sup>56</sup>

USMC Engineering Financial Data		
APP	FY21 (\$M)	FYDP (\$M)
MPN	\$488	2.6B
RPN	\$71	\$376
OPN	\$35	\$249
OMN	\$18	\$93
RDTEN	\$4	\$17
Total	\$616	\$3.3B

**Table 3: USMC Engineering POM21 Breakdown**  
Source: OPNAV Program Budget Information System POM21 Working Table and Standard Accounting and Reporting System (STARS)

With the USN and USMC engineering force components now introduced, we can see how the engineering forces compare based on relative size, similarities in their missions, and their mission essential tasks to determine redundancies in capabilities. In addition to comparing each component's METs, it is also possible to compare the engineering skillsets in both services and use a USN list of construction capabilities as represented in the NCF and ACB required operational capability and projected operating environment (ROC/POE) instructions as an additional comparative table for analysis.

### Capability Comparison

The dispersion of resources across the DoN and the differences in language used to describe what each component does makes it challenging to analyze doctrine, organization, training, material, logistics, personnel, and facilities (DOTMLPF) issues/shortfalls. The first step in analyzing each service's engineering components is to make a side-by-side comparison of their mission essential tasks (MET) and use the MET definitions to infer where redundancies are present. Comparing the USN's and USMC's METs is a prime example of how a given service deviates from the language in a root document such as OPNAVINST 3500.38B / MCO

3500.26A “Universal Naval Task List (UNTL).” The following examples are provided to demonstrate how both the USN and USMC alter the characterization of a root task by expanding or limiting its scope beyond what is approved in core doctrine.

- Navy Tactical Task – (NTA 4.7.1 – Perform Construction Engineer Service)<sup>57</sup>
  - Tactical task expansion beyond OPNAVINST 3500.38B
    - Conduct Horizontal Construction (NTA 4.7.1.2), Conduct Horizontal Construction (NTA 4.7.1.3), Perform Bridging (NTA 4.7.1.6), Conduct Quarry Operations (NTA 4.7.2.1)<sup>58</sup>
- Marine Corps Tactical Task – (MCT 4.4.2 – Conduct Horizontal Construction)<sup>59</sup>
  - Tactical task limitation from MCO 3500.26A
    - Conduct limited Horizontal Construction (MCT 4.4.1.1)<sup>60</sup>

Table 4 below provides a side-by-side comparison for each services engineering component. To give a fair comparison, only the approved tactical task from the UNTL instruction was used to populate the table for evaluation. An “**X**” denotes an explicitly assigned MET. An “**\***” indicates a task equivalency inference identified by examining doctrines and instructions that refer to activities that are comparable to the mission essential task listed in Table 4. Appendix 1 provides the tactical task descriptions that accompany the METs used in Table 4.

An evaluation of Table 4 shows us that each engineering component provides civil engineering capabilities to include engineer reconnaissance, utilities (water/electrical), horizontal/vertical construction, lines-of-communication (LOC) sustainment. The construction and repair of forward airfields reside only with the NCF, ESB, and MWSS engineering divisions. ACB’s distinct contribution to the DoN engineering force is constructing, maintaining, and operating logistics over-the-shore facilities.

<u>Mission Essential Task</u>	<u>NCF</u>	<u>ACB</u>	<u>CEB</u>	<u>ESB</u>	<u>MWSS</u>
Perform Civil Military Engineering	X	X	*	*	*
Perform Construction Engineer Services	X	X	*	*	*
Conduct General Engineering Operations	*	*	X	X	X
Provide engineer support to amphibious operations	*	*	X	X	
Construct, Maint., and Operate Logistics Over-the-Shore		X			
Construct/Repair Exp. Airfields and Landing Zones	*			*	X
Perform Lines of Communication (LOC) sustainment	X	*	*	*	*
Conduct Engineer Reconnaissance	*	*	X	X	*
Conduct Horizontal/Vertical Construction	*	*	*	X	*
Conduct Tactical Water/Hygiene Services	*	*	*	X	*
Conduct Tactical Electrical Supply	*	*	X	X	*
Conduct Tactical Bulk Fuel Storage	*	*		X	X
Conduct Mobility Operations			*	X	
Conduct Counter-Mobility Operations			X	X	

**Table 4: Mission Essential Task Comparison Table**

Source: Defense Readiness Reporting System – Navy and Marine Corps Training Information Management System

The next challenge is determining if the USN and USMC job fields align and highlight any disparity in skillsets that would prevent an engineering component from fulfilling an inferred assigned tactical task. Figure 15 provides a side-by-side comparison of each service’s engineering occupational specialties. From the figure, it is evident that most skillsets are represented in both the USN and USMC. With the Marine Corps divesting of the CEB mobility assault company, the ABV operator no longer contributes to the comparison. The disparity resides with the USMC combat engineer and the Navy’s construction electricians and utilitiesman. They are the only occupational fields separating the two engineering capabilities.

Engineer Job Fields	
USN	USMC
Builder	= Basic Engineer
Construction Electrician	= Basic Engineer
Construction Mechanic	= Engineer Equipment Mechanic
Engineering Aide	= Engineer Assistant
Equipment Operator	= Engineer Equipment operator
Siteworker	= Metal Worker
Utilitiesman	= Basic Engineer
No equivalent	= Combat Engineer
No equivalent	= Assault Breacher Vehicle Operator
Utilitiesman subspecialty	= Bulk Fuel Specialist

**Figure 15: Engineer Occupational Specialties Comparison Table**

Source: NAVPERS 18068F & MCO P1200.16

The Navy puts more education and training into developing builders, construction electricians, and utilitiesman to construct, repair, and operate engineering systems such as water, electrical, sewage, HVAC, and communications systems. The USMC provides limited capability in building these systems with their basic engineers. As for the officer corps, the Navy requires its CEC officers to be licensed professional engineers. The USMC does not share this requirement.<sup>6162</sup>

A final comparison for the USN and USMC applies to operational requirements. The Navy publishes a Required Operational Capabilities and Projected Operating Environment (ROC/POE) instruction for every capability it possesses. All ROC/POEs instructions are exceptionally robust and include a unit's ability to conduct missions under specific warfare areas such as amphibious warfare, C4ISR, force health protection, and mobility, to name a few. For this evaluation, I will only compare construction capabilities since they are why the engineering force exists. Since the USMC does not publish a ROC/POE instruction, the Marine Corps' engineering operations doctrine and MET descriptions will be used to determine if the USMC possesses the equivalent Navy operational requirement. After evaluating the table presented in Appendix 2, we can safely state that 63% of the operational capabilities are shared between the NCF, ACB, and USMC engineering forces. The most significant disparity between the operational capabilities is due to equipment shortfalls for tasks such as:<sup>63</sup>

- Well Drilling
- Asphalt batch plant
- Rock crushing
- Concrete batch plant
- Quarrying
- Pile driving

Even for the NCF and ACB, most of the equipment required to complete these tasks is not readily available to the battalions. The equipment must be augmented from a special nonstandard table of allowance equipment set. Once in possession of the equipment, the unit can

still only provide a limited capability to the operational commander.<sup>64</sup> The operational capability similarity would increase to ~80% if the same equipment were available to the USMC ESB.

With an in-depth analysis of capabilities complete, the final question becomes: How much capability needs to remain with each service so that both have enough capacity to sustain the fight before the reserve force can be mobilized, and the totality of the joint force is brought to bear? This question will be difficult to adequately address since no one knows the context of the next war. What the DoD should avoid is to design and resource the force to support military-operations-other-than-war (MOOTW)<sup>65</sup>. The focus needs to remain on resourcing to a level adequate to conduct major combat operations. MOOTW such as disaster relief, civic action, and overseas military construction is excellent for international relations but not essential when designing a hard power premier military force. The U.S. military's involvement in MOOTW should be for proficiency training opportunities. The U.S. will never have enough capacity to support all MOOTW projects.

Designing the future integrated naval engineering force needs to be on structuring a scalable force with the right core competencies to carry out the projected operational tasks. In addition, the DoN needs to identify capability gaps for future concepts like EABO to invest in future engineering capabilities and material solutions that will enable the U.S. to maintain a competitive edge in mobility, counter-mobility, survivability, general engineering, and amphibious operations. As such, the DoN should consider the following recommendations to implement reform and ultimately field a more agile, scalable, reproducible, and lethal engineering force to address these issues.

## RECOMMENDATIONS

The following recommendations are provided for consideration by USN and USMC leadership to design the future DoN engineering force appropriately and the cost savings associated with doing so. The recommendations are not presented as a prioritized list. The recommendations involving a budgetary action are laid out so that each service can translate the actions into load sheets for input into the program budget information system (PBIS) or for the Office of the Secretary of Defense, Cost Assessment and Program Evaluation division to translate the recommendations into a program decision memorandum for the DoN to action.

### Recommendation to the DoN

1. Rewrite OPNAVINST 3500.38B “Universal Naval Task List (UNTL)” to include tactical tasks beyond what is already listed, if required. Eliminate division of tactical tasks between the Navy (NTA) and Marine Corps (MCT). Standardize tasks into a single list. Coordinate with both the Army and Air Force for consistency in language.

### Recommendations to the USN

1. Divest of the Naval Construction Force and reinvest the savings in shipbuilding to accelerate closing the gap in attaining a 355-ship count. Total savings: \$581M FY21 / \$3.3B FYDP.
2. Transfer one NMCBs worth of personnel (~755 sailors) and equipment to the USMC to reconstitute the 3<sup>rd</sup> Marine Expeditionary Force Pioneer Battalion (3<sup>rd</sup> MARDIV CEB). Transfer four company’s worth of engineering personnel (~405 AD / ~115 RC) to the USMC MWSS to field a more robust airfield damage repair capability between the three active duty and one reserve MAWs. Resources transferred to USMC: \$65M FY21 / \$116M FYDP.<sup>vi</sup>
3. Reinvest savings to procure Light Amphibious Warship inventory requirement and other high-priority investments directed by the CNO planning guidance (CNOG).

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<sup>vi</sup> The transfer of personnel from the USN to USMC includes the officer programmed authorizations of three Navy Civil Engineering Corps Flag Officers for the Marine Engineering Groups.

4. Expand Amphibious Construction Battalions essential tasks to include conducting port damage repair as this should not be left to the Marine Corps to undertake.
5. Realign Under-water Construction Teams under Amphibious Construction Battalions.
6. If not already resident with the U.S. Army engineering force or the Army Corps of Engineers, align well drilling, concrete/asphalt batch plant operations, quarrying, and rock crushing requirements with the appropriate organization.

### Recommendations to the USMC

1. Establish a flag-led Marine Engineering Group (MEG) directly subordinate to the Marine Expeditionary Force Commander with Navy CEC officer programmed authorizations (OPA). Consolidate respective CEB, ESB, and MWSS engineering companies under the MEG.<sup>vii</sup>
2. Eliminate Marine Occupational Specialty (MOS) 1300 “Basic Engineer.” Establish three additional MOSs comparable to the Navy’s builder, construction electrician, and utilitiesman. Developing skilled tradesmen will provide a more effective engineering capability to the USMC.
3. Require all USMC Engineering Officers to be licensed professional engineers equivalent to USN CEC officers.
4. Task Organize the ESB’s bulk fuel company under the Combat Logistics Regiment’s Supply battalion.

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<sup>vii</sup> Taking a page out of history and recognizing the success the Navy had with consolidating naval aviation under the Bureau of Aeronautics, the can USMC can implement the same concept with their engineering force by placing it under a marine engineering group (MEG). RADM William Moffet revolutionized naval aviation as the first Chief of BUAER. The Marine Corp can revolutionize expeditionary engineering under a flag led MEG.

Additionally, the MEG will provide the USMC the ability to mass engineering forces and capability to support large scale operations or large engineering projects.

## CONCLUSION

Significant capability redundancies exist between the USN and USMC engineering force costing both services resources, which could be better used to develop and field high- and low-tech capabilities needed for future wars. Additionally, the division of engineering manpower, capability, and resources across the DoN enterprise prevents synergy of effort in forming a more agile, scalable, and lethal engineering force. It results in a lack of advocacy for future capability development, as denoted by the lack of research and development funding placed towards engineering advancements.<sup>66</sup> Reviewing the history of the Navy's and Marine Corps' engineering force and analyzing their METs, occupational fields, and operational requirements demonstrates that the naval engineering force has been employed in a similar manner as the USMC engineering force since its inception and that the DoN is sustaining comparable capabilities in its two branches of service. However, a complete divestiture of either one of the two engineering forces is not warranted. There are unique engineering operational requirements in both services, which preclude fully consolidating the engineering force under one service branch. For example, the Navy must retain the ACB to support amphibious and CJLOTS operations, and the UCT is still required to support underwater construction activities.

The USMC is the Navy's preeminent expeditionary warfare component, and as such, carries the fight ashore where engineering capabilities are primarily required. As such, the preponderance of the DoN engineering capability needs to reside with the Marine Corps and not the Navy. The Commandant of the Marine Corps, General David Berger, opened the door for topics such as this to be discussed and explored so that senior military leaders can make informed decisions while implementing meaningful organizational reform. Although this paper solely focused on DoN engineering capability, we must not forget the U.S. Air Force and U.S. Army engineering force or the Army Corps of Engineers in the joint arena. The fear of not

having an organic capability and needing it drives each service to fund all these redundant essential services. We must continue to work as a joint force and share our resources so that savings can be realigned to grow capability and capacity where shortfalls genuinely exist.

This paper is an example of what should be occurring throughout the joint force. We may find that more capability reduction is warranted once the USAF and USA engineering force is brought in for additional capability and capacity evaluation. Future topics should include the relevance of the entire naval expeditionary combat command (NECC) alongside the USMC or the utility of bringing back the USMC landing support battalion (LSB) when an identical capability resides with the Navy's beach master units. The title of this paper begins with "*Know your business.*"<sup>viii</sup> Let the USMC be in the business of expeditionary warfare on land with all the proper resources to accomplish their mission. The USN's business is with gaining, maintaining, or denying sea control on the oceans, seas, waterways, and seafloor. As such, the USN needs to get out of the business of expeditionary warfare on land and transfer or divest of all capabilities in this arena to reinvest in what is explicitly required for the Navy's mission. The DoD has a lot of self-reflection to do. It will take officers and civilians with incredible strength of character and drive to do the analysis, cut through the bureaucracy, and break through the antagonist who will inevitably want to blindly guard their benches.<sup>ix</sup> **GOD BLESS AMERICA!**

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<sup>viii</sup> The statement, "Know your business" was taken from an address on leadership by Major C. Bach, U.S. Army given in 1917. The full title of his speech is "Know your men, Know your business, Know Yourself." The speech on leadership gained such attention, it was entered into the congressional record as Congressional Document 289. Although the assertion to "Know your business" was directed to individuals, the notion applies to organizations as well. An organization without focus and understanding of what it exists to do will fail to provide adequate service and synergize its efforts. Its leadership will fail to agree on what is important and resources will inevitably be spread too thin to accomplish anything of value.

<sup>ix</sup> See short story in preface.

## APPENDIX 1: Mission Essential Task Definitions<sup>67</sup>

<u>Task #</u>	<u>Task</u>	<u>Description</u>
NTA 4.7	Perform Civil Military Engineering Support	To repair and construct facilities and lines of communication and to provide water, utilities, and other related infrastructure
NTA 4.7.1	Perform Construction Engineering Service	To construct or renovate temporary and/or permanent facilities (well drilling, water purification, and distribution systems, pipeline installation). This task includes constructing marshaling, distribution, and water purification and storage facilities. Task also includes constructing pipelines, constructing/renovating fixed facilities, drilling wells for water, and dismantling fortifications
NTA 4.7.4	Conduct Port Operations	To organize and supervise port operations to support the build-up of forces shore. This will include port loading, port safety, ships scheduling, establishing navigation aids/vessels traffic systems, and dredging for safe navigation
NTA 4.7.5	Perform Lines of Communication (LOC) Sustainment	To maintain land, water, and air routes that connect an operating military force with one or more bases of operations and along which supplies and reinforcements move. Tasks include constructing/maintaining roads, highways, over-the-shore facilities, ports, railroad facilities, and repairing/expanding existing airfield facilities. Task also includes raising and removing grounded or sunken vessels and providing towing services for ships with propulsion system casualties or non-self propelled craft
MCT 4.4	Conduct general engineering operations	To conduct general engineering operations, repairing and construction of facilities, and to provide water, utilities, and other related infrastructure. To review OPLANs, combat and civil engineer support plans and approve MARFOR engineer plans. Coordinate base development, advance base functional components (ABFC), and manage the wartime construction program. Plan and support bulk liquid (fuel and water) construction and operations requirements. Oversee the expeditionary airfield (EAF) plans and operations. Source and allocate EAF material and support. Dismantle fortifications and to construct and maintain facilities and communications networks that give physical structure to the lines of communication. Assemble and erect predesigned structures. Construct expeditionary Combat Service Support facilities and cantonment areas. This activity includes the following: building/maintaining forward staging bases, sectoring rear area, sustaining LOC, supporting construction, and acquiring or producing construction material
MCT 4.4.1	Conduct Engineer Reconnaissance	To conduct engineer reconnaissance, or collecting data that provides engineers within a MAGTF, information on terrain, hydrographics, meteorological, and infrastructure (e.g., built-up areas, transportation networks, utilities, existing natural or manmade obstacles) necessary to support the commanders with their planning for ongoing or future operations. Engineer reconnaissance is vital to successful MAGTF operations and reconnaissance missions relate not only to the engineer mobility mission but also to the countermobility, survivability, and general engineer missions.
MCT 4.4.2	Conduct Horizontal/Vertical Construction	To conduct and perform expedient soil stabilization, drainage system installation, and surveying operations as necessary to conduct expeditionary horizontal construction. Horizontal construction is required to shape the terrain to meet the operational requirements of the MAGTF and includes MSR construction and/or maintenance; expeditionary airfields; site preparation for structures or construction of base camps, command posts, and maintenance facilities for use by the

<u>Task #</u>	<u>Task</u>	<u>Description</u>
		MAGTF. Planning considerations for vertical construction include (total requirement for each type of facility): beddown; maintenance; command centers; hospitals; bunkers; EPW compounds; existing structures and facilities; amount of new construction required; Host Nation Class IV availability; Unit Class IV stocks; and, number of engineer units available. To increase the capacity of all LOC(s) to include airfields, road networks, staging areas, supply bases, and ports of debarkation in operational areas to accommodate the throughput necessary to support the joint forces and multinational forces campaign, major operations, and routine support requirements. To acquire, maintain, and allocate to subordinate organizations battlespace (ground areas, air space) to conduct operations and provide logistics services.
MCT 4.4.2.1	Construct/Maintain Expeditionary Airfields and Landing Zones	Construct expeditionary airfields (EAFs), forward operating bases (FOBs), landing zones (LZs), and vertical/short takeoff and landing (V/STOL) pads to include sub-base prep and matting installation. Construct and install facilities such as fuel farms and revetments. Perform rapid runway repair and base recovery after attack.
MCT 4.4.7	Conduct Tactical Water and/or Hygiene Service	To receive, purify, store and distribute water as necessary to support operations in all environments. Water support may be provided to U.S. Forces, other nation armed forces or civilians as directed. Provide showers, laundry, trash removal, waste disposal and refrigeration as necessary. Manage field sanitation measures and equipment.
MCT 4.4.8	Conduct Tactical Bulk Fuel Storage	To conduct storage operations for tactical bulk fuel systems. The Marine Corps has developed a family of tactical fuel systems (TFS) designed and configured specifically to support a unique mission using similar components. These TFS have specific storage requirements and are: Amphibious Assault Fuel System; Tactical Airfield Fuel Dispensing System; Helicopter Expedient Refueling System; Expedient Refueling System; and, SIXCON.
MCT 4.4.9	Conduct Tactical Electrical Supply	To conduct tactical electrical supply operations and provide electric power generation and distribution to military units through a mobile generation and tactical distribution grid system.
MCT 1.4	Conduct Mobility Operations	To conduct operations which maintain the freedom of movement for personnel and equipment in the battlespace without delays due to terrain or barriers, obstacles, and mines.
MCT 1.5	Conduct Counter-Mobility Operations	To delay, disrupt, and destroy the enemy's offensive movement in order to destroy its forces directly or indirectly by enhancing the effectiveness of friendly weapon systems.

## APPENDIX 2: Required Operational Capabilities Comparison Table

ROC	ROC#	ROC Definition	NMCB	ACB	USMC
<b>CON</b>		<b>CONSTRUCTION (CON)</b>			
	<b>CON 1</b>	<b>PERFORM TACTICAL CON</b>			
	CON 1.1	Perform vertical CON including prefabricated buildings, bunkers, and towers.	X	X	*
	CON 1.2	Perform horizontal construction including unpaved roads, airstrips, mat runways, and helicopter landing areas.	X		*
	CON 1.3	Construct utilities including power generation and water purification systems.	X	X	*
	CON 1.4	Construct beach improvements, beach exits, helipads, minor roads, and camps.	X	X	*
	CON 1.5	Perform limited construction above water that is directly associated with underwater construction tasks.	X	O	*
	<b>CON 2</b>	<b>PERFORM BASE CONSTRUCTION.</b>			
	CON 2.1	Perform vertical construction including prefabricated buildings, masonry and concrete buildings, and steel and concrete bridging.	X	O	*
	CON 2.2	Perform horizontal construction including asphalt roads, asphalt, and concrete runways and paved storage, staging, and parking areas.	X		*
	CON 2.3	Construct utilities including central base power plant, sewage and water systems, water purification and desalination systems, and wire communication systems.	X		*
	CON 2.4	Perform vertical construction of own expeditionary camp facilities under all climate conditions.	X	X	*
	<b>CON 3</b>	<b>PERFORM CONSTRUCTION ENGINEERING.</b>			
	CON 3.1	Conduct surveying and drafting operations.	X	X	*
	CON 3.2	Conduct material testing.	X		
	CON 3.3	Perform planning and estimating.	X	X	*
	CON 3.4	Perform design for local expedient projects.	X	X	*
	<b>CON 4</b>	<b>PERFORM SPECIALIZED CONSTRUCTION.</b>			
	CON 4.1	Conduct well drilling operations.	X		
	CON 4.3	Conduct concrete batch plant operations.	X		
	CON 4.4	Conduct asphalt batch plant operations.	X		
	CON 4.5	Conduct quarry operations.	X		
	CON 4.6	Conduct rock crusher operations.	X		
	CON 4.7	Conduct Seabee team operations.	X	O	*
	CON 4.12	Conduct pile driving operations.	X	X	
	CON 4.13	Perform pier and wharf construction.	X	X	*
	CON 4.14	Provide rapid response to inspect and repair fleet inshore and undersea facilities and systems.	X		
	CON 4.24	Construct and maintain facilities necessary for care of refugees.	X	X	*
	<b>CON 5</b>	<b>PERFORM CONSTRUCTION LOGISTIC SUPPORT IN THE ASSIGNED AO.</b>			
	CON 5.1	Maintain custody and inventory control over special NCF auxiliary equipment and coordinate the issue and operation of these items.	X	O	*
	CON 5.3	Operate and maintain long-haul transportation equipment in support of NCF units.	X	O	*
	CON 5.5	Perform inventory management of construction and advanced base functional components materials.	X	X	*
	CON 5.6	Provide and operate a limited ADP service.	X	X	*
	CON 5.7	Provide planning, engineering, and design services as required.	X	X	*
	<b>CON 6</b>	<b>PERFORM WAR DAMAGE REPAIR AND RAPID RUNWAY REPAIR OPERATIONS.</b>			
	CON 6.1	Perform repairs to utilities including central base camp power, sewage, and water systems	X	X	*
	CON 6.2	Perform repairs to petroleum, oil, and lubricants distribution systems.	X		*
	CON 6.4	Perform rapid runway repair.	X	X	*

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