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14. ABSTRACT
This project focuses on logistics and supply chain management operations in support of the procurement of construction material in the Naval Construction Forces to approach opportunities to improve efficiency and competitiveness. Using Lean Concept, we analyze the process and identify different types of waist in order to optimize the support outcome. As a result the report brings seven recommendations to be implemented such as (1) centralize the design, (2) add the Planning and Estimate into the Readiness Program (3) Extend the Supply Chain Network (4) Create a program owner (5) Reduce time between NMCB Turnover in the Pacific (6) Create an inventory system and allocate one common data-base and (7) Mapping FMEA and Operation Risk. These recommendations have the potential to bring the project cycle from 16 to 25 months down to 10 to 14 months. As well this creates a more suitable enterprise for sustainability and more an independent process.

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Naval Construction Forces , Pacific, Lean Concept, Optimization, Process, Design, Projects, Supply Chain

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Implementation of Strategic Lean-to the Naval Construction Forces in order to improve the Supply Chain in Class IV material

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MSE697- Capstone Project

Professor Shereazad Jimmy Gandhi, PhD

Due date: July 20th, 2019

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Introduction

Brief History

A brief historical contextual is provided on the Seabees and Civil Engineer Corps to provide the reader with a sympathetic of the historical implication and need for these important units in the United States Navy.

Seabees

Before World War II, the United States Navy utilized civilian workers to execute their construction in war zones, and this was considered adequate practice. However, before the entry of the United States into World War II, international law changed. The law established it illegal for any civilian labor force to fight enemy attacks. If the civilians battled enemy attacks, they could be tried as guerrillas in the international courts with a sentence of implementation.

As a consequence of the new international requirements, Rear Admiral Ben Moreell, Chief of the Navy's Bureau of Yards and Docks, requested that the Secretary of the Navy permit him to arrange a military construction power in December of 1941. He intended this new force to be covered of active-duty military personnel who can accomplish large-scale construction as well as being trained in arms and capable of protecting themselves. In January of 1942, he gets the endorsement to start drafting men from the construction skills for his construction force. This was the birth of the Navy Construction Battalions, more commonly referred to as the Navy Seabees.

During that early period, the ability to fight was significant; these early recruits were chosen more for their construction skill than for their physical condition and military experience because of the large-scale projects that were required during World War II. More than 325,000 men aided with the Seabees in World War II, fighting and building on six continents and hundreds of islands. In the Pacific, they built 111 major airstrips, 441 piers, bridges, roads, tanks for the storage of 100 Million gals of fuel, hospitals for 700,000 patients, and housing for 1.5 million men. (Oliver, 2017)

The Seabees have been a portion of every major battle since World War II, and have recurrently well-known their capability to construct camps, aircraft aprons, runways, bridges, and anything else that they may be called upon to construct during the time of war. In peacetime, the Seabees

uphold their construction skills and war readiness by deploying overseas and executing construction on Depart of Defenses and Stated lo23cation and bases around the world.

Civil Engineering Corp

In the initial years of the United States Navy, civilian engineers were selected to achieve the planning, construction, and conservation for all naval bases. In 1842, the Navy formed the Bureau of Yards and Docks, which became the branch accountable for build and maintenance of all naval facilities. In the beginning, only civilian engineers were allocated to oversee it. However, on March 2, 1867, Congress passed an act authorizing that Navy civil engineer positions could be held by commissioned naval officers (Naval Appropriation Act of 1868, 1867). These branches would be commissioned by the President of the United States, with the agreement of the Senate. This was like the other commissioned officers in the Department of Defense, excluding that the civil engineer officers were not considered line officers, and therefore could not be enabled assumed commanding troops. This congressional act marked the birth of the Navy Civil Engineer Corps.

When Admiral Ben Moreell created the Seabees in 1942, there were units of enlisted personnel, and the Navy mandated them to be supervised by officers. Meanwhile, the Civil Engineer Corps were not line officers; the Navy confronted a problem over what commission officer would lead the Seabees. Admiral Moreell maintained his persistence and was able to persuade Navy leadership that the Civil Engineer Corps was the finest options, and in March of 1942, the Secretary of the Navy approved the Civil Engineer Corps to command the Seabee's.

The Bureau of Yards and Docks has been replaced by Naval Facilities Engineering Command (NAVFAC), which consists of both military and civilian engineers working side by side. The Navy Civil Engineer Corps is comprised of approximately 1000 active-duty officer personnel accountable for managing the Seabees as well as managing public works and overseeing construction contracts on Navy and Marine Corps installations all around the world. (Stasik, 2004)

Project Focus Area

This paper focuses on logistics and supply chain management operations in support of the procurement of construction material in order to approach opportunities to improve efficiency and competitiveness. The improvement and recommendation of this paper will be based on Lean Concept. This concept was born after World War II, Toyota created a new innovated way for manufacturing operation "Lean," of course, with the focus on manufacturing. Across the years, the industries of manufacturing and services have been very successful in the implementation of this system. This system is focused on the elimination of waste across any process and standardize it. These wastes are recognized as (1) unnecessary transportation, (2) excess inventory, (3) unnecessary motion of people, (4) waiting, (5) over-production, (6) over-processing and (7) defects which require effort and cost for corrections. The first step will be to understand the value from the customer's point of view, second mapping the value stream, and third improvement of the flow. Moreover, this recommendation is going to be synchronized with the aggregate process of all stakeholders to create a suitable implementation.

Contingent on the scope of recommendations provided in this project, the implementation steps can take many years for the Navy to achieve, because of the developments and limits of the federal government. Therefore, this paper will focus on a comprehensive study of the previous, current system, as well as recommendations for adopting lean advantages. This project will deliver to the leadership with the information they need to determine the future of the supply chain for the construction material.

Project approach and scope

The Department of Defense documents, Construction Battalion "lessons learned," and meetings with personnel involved in various phases of the Naval Construction Force supply chain were used to develop the detailed examination of the past and current construction material process as well as the development of recommendations provided in this project.

The Naval Construction Forces are operating worldwide with homeports at the East Coast on Gulfport, Mississippi and the West Coast on Port Hueneme, California. They reach more than 25 Details to support construction operations in South America, Europe, Africa, and the whole Pacific. In this project, we are going to restrain the space to the Pacific Region. As well as the Pacific Region, the current operation is supporting around 17 different geographic territories in

order to shield a specific stream value to analyze and implement lean, and we are going to select the Construction Readiness Program reducing the geographic scope to only eight locations. This program is dedicated only to support the different branches in the Department of Defense with construction while the Seabees hold Construction Readiness during peacetime. This is one of the most important programs, employee around 80% of the resources of a deployed Battalion in the Pacific. In continuation, we are going to describe in detail the major components of the operations as well as key personnel.

Overview of the Naval Construction Forces

Naval Construction Group

The Naval Construction Group is an Echelon IV command reporting to Navy Expeditionary Combat Command (NECC), serves as administrative Immediate Superior in Command (ISIC) for Active and Reserve Naval Construction Forces (NCF). They prepare the Fleet Naval Construction Force (NCF) units to conduct expeditionary and deliberate construction in support of Combatant Commanders and warfighter requirements. This is done through combat and construction training, equipment and maintenance training, and logistical and mobilization support of our subordinate units. As I mentioned before, this project will be focused on the Pacific Region, making Port Hueneme, California as homeport. The Naval Construction Group One (NCG1) is the group assigned to the west. The NCF has three active Battalion on this side of the USA. They have a preparation of 12 months on homeport under the NCG1 to obtaining all the readiness and requirements to deploy for six months under the Naval Construction Regiment 30th in order to support the Department of Defense in the Pacific Region. This process is enabled two Battalions on homeport getting ready while one is deployed.

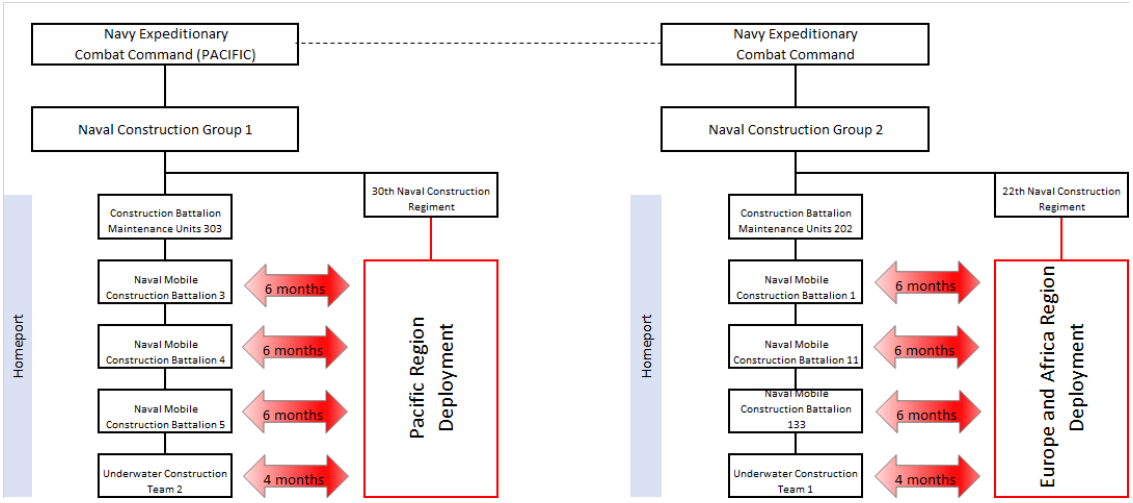


Figure 1 NCF Chain of Command

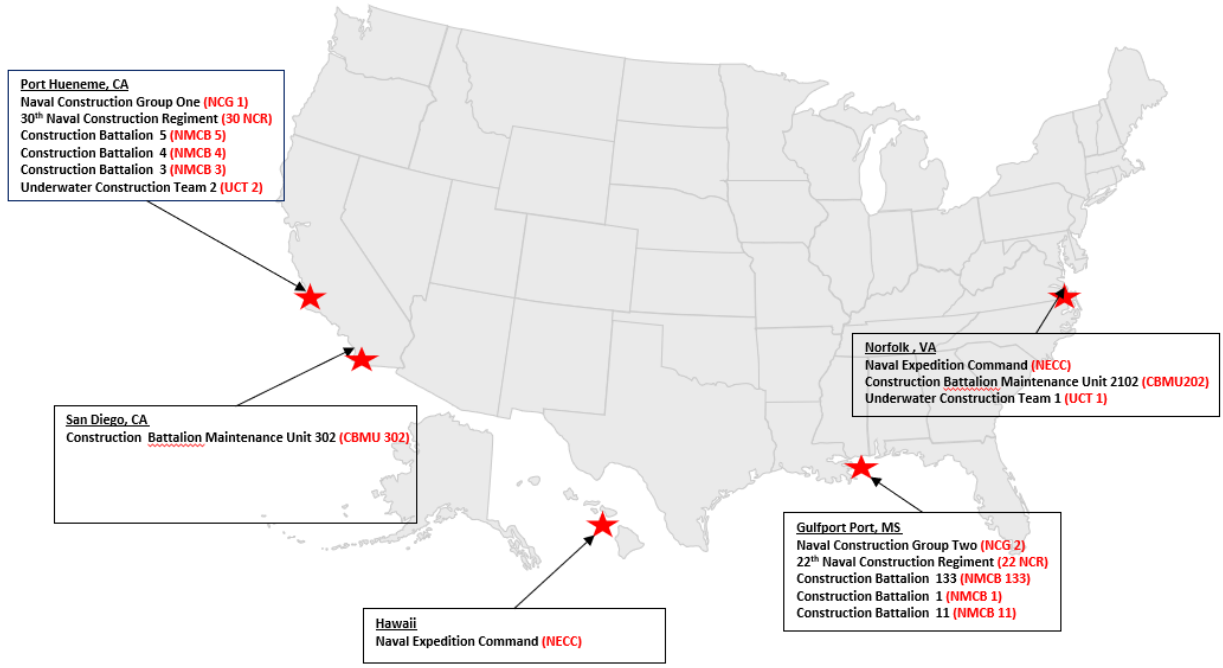


Figure 2 NCF Key Locations

30th Naval Construction Regiment

Thirtieth Naval Construction Regiment Seabees are an essential part of the Naval Construction Force and provide valuable construction support to Navy and Marine Corps units. The Naval Mobile Construction Battalions (NMCB) Three, Four and Five are the substance of the active Pacific Naval Construction Force, under the direct command of the Thirtieth Naval Construction Regiment (30NCR). Each Battalion has about 600 personnel between officers and enlisted. Their component includes Civil Engineer Corps officers, other staff officers, enlisted craftsmen from every construction trade and various fleet support ratings. The 30NCR is the Direct Supervisor of the Battalion while they deploy to the Pacific Region for six months. (Public Navy, 2018)

30NCR units maintain a high state of readiness to support operational plans. 30NCR also conducts activities that support regional partnerships with allied and partner nations throughout the Pacific region and provide an advanced base and general engineering and construction in support of U.S. Navy, U.S. Marine Corps, and when directed, Joint Task Forces, other services, and agencies.

Naval Mobile Construction Battalion

The Naval Mobile Construction Battalions (NMCB's) are very important and visible units of the Naval Construction Force. The Construction Battalions can deploy fast, within 48 hours, and perform construction in peace and wartime. They also maintain arms and are skilled to fight as well as performing construction. The Regiments are the supervisors, while the Construction Battalions are the executors or deploy. These units consist of approximately 600 personnel in peacetime and absorb a reserve augment, which makes them approximately 800 personnel in wartime. The Construction Battalion is a self-sustaining unit that consists of all major construction trades, medical, dental, legal, messing, administrative, and supply personnel. (COMFIRSTNCD, 2001)

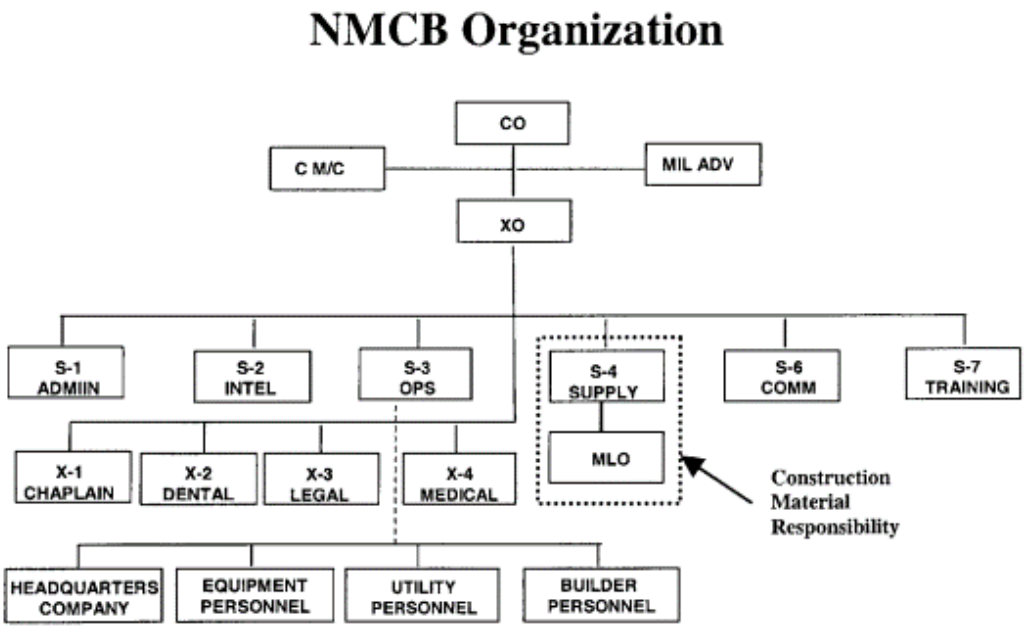


Figure 3 Battalion Basic Organization (Source: COMFIRSTNCD, 2001)

In the Supply Department, there is a sub-organization called Material Liaison Officer (MLO). This organization is accountable for working with the various construction projects and providing the construction material requirements for each one. After material requirements are well-defined, the MLO then synchronizes with the Regiment to arrange for ordering, shipping, and receipt of all

construction material. On a typical deployment, a Construction Battalion typically has over twenty-five projects that co-occur on their deployment cycle. Therefore, it is contributory that the project material processes as smooth as possible. (Public_Navy_Lab, 2017)

Other Units

The other units recognized in the organizational chart provided as figure 1 are specialty units, such as the Construction Battalion Units Maintenance (CBUM's) and Underwater Construction Teams (UCT's) that have detailed taskings and therefore, they have exclusive, unit-specific material requirements that do not directly apply to the study in this paper.

The CBUM's do not deploy in peacetime, and in wartime, they deploy exactly to build field hospitals. The field hospitals are ready kits that have most of the materials required to set up them in the field, and consequently, construction material support is not a major issue for the CBUM's. As well, in peacetime, the personnel in the CBUM maintain their skills by performing construction projects on the base that they are stationed.

The Underwater Construction Teams (UCT) are small diving teams, and they also deploy for detailed tasking in which their tasking is specialized, so they do not require or experience the same construction material challenges that the Construction Battalion.

Seabees Readiness and preparation for construction operations

It is essential to point out the training and level of skill that current active duty Seabees possessed. After the creation of Seabees on WWII, the rules for recruiting Seabees have transformed, and the Navy only gains its Seabee personnel from Selective Service, this is the old-style boot camp process. Therefore, the typical age has dropped significantly, and the personnel starting in the Seabees do not stay side by side of construction expertise that the original Seabees had. Consequently, training programs had to be established. After a normal deployment of six months, the Construction Battalion arrives back to the respected homeport for 12 months to be training and preparation for the next deployment. Below we can see figure 4 as the basic concept of this preparation/training.

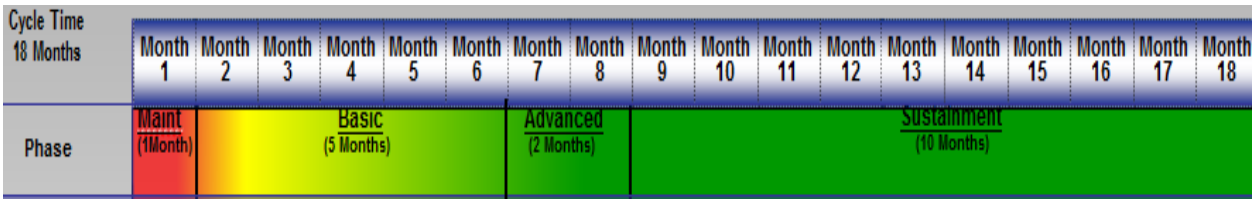


Figure 4 Cycle of training for the NMCB (Source: (Abare, 2018))

The NCF has two Naval Construction Training Centers (NCTC's) that train men and women the basics of being a carpenter, equipment operator, electrician, plumber, engineering technician, equipment mechanic, or steelworker.

Nevertheless, after learning the basics, there is an important requirement for on the real occupation training in order to fully comprehend the trade, same as an apprentice or journeyman in the civilian construction trades. Therefore, it usually takes some years, for a young Seabee to become skillful in their occupation. This training does influence the construction material supply chain and will be covered in this paper.

Seabees Construction

In the standard peacetime deployment, the West NCF deploy to Okinawa (Japan). From there they deploy at least 15 detachments that break off from the main body and travel to other bases around the Pacific Region to do construction throughout the deployment. The scope of projects determines the extent of these detachments at the location. Also, the detachments are equipped with the necessary construction skills required to complete the work at the location successfully. The detachments are usually headed and ran by a CEC officer.

Imagine a large construction company with a head office in Japan, and at least ten satellite offices spread out around the world. As a result, they are supporting all these units with materials and equipment carriages a challenge. The NCF currently has a process in place for supporting Construction Battalions with their construction material, but the process has ineptitudes.

Scope and example of projects

Example 1

NMCB THREE Detail Diego Garcia will construct a 36ft x 205ft x 7in concrete pad with a 10in thickened edge. The pad will be used as a storage area for the Pacific Air Force, Detachment-Diego Garcia War Reserve Material (WRM). This pad will allow PACAF to have improved accountability of its WRM as well as the WRM’s staging for rapid deployment.

Figure 5 36ft x 205ft x 7in concrete pad construction (Source: Project Report from the 30th NCR)

Example 2

NMCB THREE Detail San Clemente will construct a 30’ X 60’ pre-engineered building to include electrical, utilities and interior finishes. This project will provide permanent office spaces for the Seabee Detail deployed to San Clemente Island. Seabees support NALF SCI with construction and engineering tasking, which in turn enables Third Fleet to achieve training initiatives and MCO readiness.

Northeast view

Current Interior View

UT1 Zimmerman prepares copper pipe for soldering

CE3 McGowen works on HVAC electrical disconnect

UTCN Lopez checks for leaks when conducting pressure test

Initially difficult to pull wire with the fishtape on hand, CE3 McGowen borrowed a stiffer tape from NAVFAC to pull wire

Figure 6 30’ X 60’ pre-engineered building construction (Source: Project Report from the 30th NCR)

Example 3

NMCB THREE Detail Guam will construct a 50’x56’ concrete storage facility with two personnel doors on the north and south walls, two roll-up doors on the west wall, and six windows. A 13.8 KW pole transformer will be replaced, interior and exterior lighting, main distribution panel, and service disconnect installed. The project provides a hardened vehicle storage facility in Guam.

Figure 7 50'x56' concrete storage facility construction (Source: Project Report from the 30th NCR)

Example 4

NMCB THREE Detail will demolish existing school building and replace with a one-room classroom building in accordance with ROICC Thailand design and construction standards that include concrete slab, CMU block walls, steel truss roof with hat channel purlins and corrugated

steel roof sheeting. A tree limb located above the school building; endangering the building the roof will be removed. The building will be patched with stucco, painted with high-quality paint, and will have a brass dedication sign. The goal is to improve the health and safety of roughly 1246 students currently attending school at this location. While building the school Det. Will improve construction skills, enhancing phase two readiness.

Figure 8 School Building Renovation (Source: Project Report from the 30th NCR)

Material and logistic

An overview of the DoD classes of supply is essential because it will give a better understanding of the complex of the Supply Chain. The US Army classified the supply is a ten-class arrangement that allows the Seabee table of allowance material to be divided into more specific classifications. This section will define the various classes of material and explain why Seabee construction material creates such a challenge.

CLASS	CLASSES OF SUPPLY DESCRIPTION
Class I	Subsistence (food)
Class II	Clothing, individual equipment, tent's, organizational tool sets and kits, hand tools, unclassified maps, administrative and housekeeping supplies, and equipment.
Class III	Petroleum, Oil, and Lubricants (POL) (package and bulk): Petroleum, fuels, lubricants, hydraulic and insulating oils, preservatives, liquids and gases, bulk chemical products, coolants, deicer and antifreeze compounds, components, and additives of petroleum and chemical products, and coal.
Class IV	**Construction materials, including installed equipment and all fortification and barrier materials**
Class V	Ammunition of all types, bombs, explosives, mines, fuses, detonators, pyrotechnics, missiles, rockets, propellants, and associated items
Class VI	Personal demand items (such as health and hygiene products, soaps and toothpaste, writing material, snack food, beverages, cigarettes, batteries, alcohol, and cameras—nonmilitary sales items)
Class VII	Major end items such as launchers, tanks, mobile machine shops, and vehicles.
Class VIII	Medical material (equipment and consumables) including repair parts peculiar to medical equipment. (Class VIIIa – Medical consumable supplies not including blood & blood products; Class VIIIb – Blood & blood components (whole blood, platelets, plasma, packed red cells, etc.).

Class IX	Repair parts and components to include kits, assemblies, and subassemblies (repairable or non-repairable) required for maintenance support of all equipment.
Class X	Material to support nonmilitary programs such as agriculture and economic development (not included in Classes I through IX).

(US Army, 1996)

Supply class IV items are distinct as construction materials and will be the focus of this project. The reason to provide this table is to provide a comprehended appraisal of the complex in any Navy unit related to the management of the supply chain. This classification orders do not have to do with priorities or importance. Let us keep in mind, the main mission of the Construction Battalion is the BUILD. This principle is the motivation to create a subcomponent in the Construction Battalion Supply Department just to deal with this type of material called Material Liaison Offices.

The Naval Construction Project at the Regiment level is the management between 80 to 100 projects in any year. The budget is a combination of several components such as (1) Raw Material (2) Tool and Equipment (3) Deployment Transportation (4) Labor, (5) Design, (6) Sustainment on Deployment and (7) Sustainment on Homeport Dependents. For this project, we are going only to approach the cost of Raw Material (1) or construction material. The class IV of material is budgeted around 12 Million dollars each year for construction in the Pacific in the execution of the Construction Battalions. The budget is a shared account of multiplex customer and stakeholder with construction requires in the Pacific.

The types of construction material inventory in the Construction Battalion

On the construction enterprises, inventory control is key to the success of the project. As well the inventory control is the real challenge, one project can have so many milestones, and sometimes one single project can have more than 600 different elements or raw material. In other cases, the raw material order will be shared between two or more projects in different locations and for different customers. However, the Completion Cost Value must be accurate, and tracking the item with the cost must be precise and documented.

Type of material on the NCF

Order Material

In the process of Planning and Estimating the project, the crew team will create a bill of Material. This Bill of material is a result of the recollection of the list of material required for Construction Activities or milestone identified by the crew team. Each bill of material is unique and tailored in accordance to the experience by the crew and the construction methodology they are using and the integration of quality and safety priorities by the command. This document will separate the requirement in 30, 60, 90, 120+ days as well as identify any long lead items, and this procedure also helps us to keep a record of the inventory. This will help the supply department to prioritize the efforts in the procurement of construction material.

Stock Material

After ordering the material, the shipment will arrive at the Construction Battalion warehouses. After arrival, the Material Liaison Department will check and document material shipment to ensure accountability between the order and the (delivered material) physical account. As well they need to validate the quality of the product; after validation, the inventory is moved to the warehouse or other storage buildings.

Work in Process Material

Once the material has been drawn from the warehouse and transferred from the Supply Department (Material Liaison Branch) to the project team, the classification of the material change to Work-in-Process and the cost associated to this inventory pass to be part of the final cost of the construction. The accountabilities belong to Project Management and are used to increase work in a place called WIP. The WIP is one of the most important of the critical performance measurements on construction in order to ensure proper management of the project. The cost associated with this inventory is no longer an estimation; the Construction Battalion has a real cost and invoice associated. This makes it very important for the proper management of the inventory, any discrepancies for this point on will increase the cost of the construction and have the possibilities of increasing the cost beyond the budget constraint.

Support Material

All support material is reusable in any other project. For example, sandbags, wood for concrete placement, and other reusable materials. They are usually confused with consumables, but for easy management, however, that is not the right category. Proper project management will hold

accountability for the leftovers of this material in order to be returned in the warehouse and reused in another project. This is a cost-effective process.

Consumables Material

The consumable material is like the support material; however, they are intended not to be reused in another project, and they do not contribute directly to the construction. For example, the safety elements in the initial of any project like safety type. Another example will be environmental controls where these elements are not used for construction. However, these materials are required by law and must be part of the project.

Finish Facility

After completion of any project, In the final cleanup, we are ready for the project turnover with the customer. The new facility is ready for occupancy, and all capital Improvement related to the scope of work is completed. The facility with all equipment's includes real estate is considered a Finished Facility and the final cost must synchronize as:

Order Material= Work in Process + Consumables + Warranty = Finished Facility.

Warranty Operation Material

After the completion of the project, the Construction Battalion will provide a safety stock of material for warranty or operational purposes. This is very traditional in any construction company, and they usually are incorporated in the contract. For an example of this type there will be some small stock of inventory of tiles or carpet.

Describing the NMCB Supply Chain

Key Positions

It is precise that in the Naval Construction Forces Supply Chain they are a large number of staffs working in paralleled to complete any project on this section we are going to mention the primary staff related to the process. (COMFIRSTNCD, 2001) (NAVFAC, 2019)

Customer

On the Department of Defense, we have many different entities; the Pacific region is not the exception. The Seabees as a Navy component we always prioritize the Navy family as the 1st customer. However, on the Pacific Region and only in the Construction Readiness program the customer is any Department of Defense component in need for construction support on Japan, Diego Garcia and any other location in support of the Seventh Fleet Area of Operation.

Public Works or any Installation Chief of Engineering

Public Work Officer

The Public Works in any Navy or Marine Corps Base are the Subject Matter Experts on Facility or Construction Engineering. They have strategic resources to manage and support the facility installation appointed to them. He or She is responsible for maintaining the current facility, plan, and execute any construction is the support of the responsible installation; this is called Capital Improvements. As well they are responsible to provide Base operation support via contracts and in-house employees such as transportation, supply chain, security, cafeteria and any other requirement in the supply department needed in lieu to accomplish the mission. Outside of the Navy this position has different names but must like it they have the same description, to generalizer, we call them the chief of engineering.

Requirement Branch

On any federal installation, we always have a department or division to support and represent the facility investment. They are responsible for the development of requirements for maintenance, repair, and recapitalization. They are the field staff to help the customer to induct the project with the correct requirement justification and most important record the scope of the project in synchronization with the customer.

Planners

As we all know, any new construction will require planning to synchronizer and prioritize future projects. This department belongs to the Public Work Officer or Chief of Engineering and works

to ensure proper documentation and funding appropriation are set for any new project in their facility. They are responsible for developing the Engineering Scope of Work to be transferred to the design team for design development. As well they are responsible for routing all local authorization and any environmental approval needed before the project began.

Design Department

In the Navy and Marine Corp Departments, we have a setup design team to support the installation with design and any other engineering support required. This design team is a component for all the different types of engineering disciplines, and they work in synchronization to develop the design and specification for any new projects. As well we have some other design capabilities outside of the installation to support the huge demand for this requirement.

Regiment

We discussed on the Overview Section; however, we want to emphasize they are the ultimate authority in the delivery of the construction.

Project Development

In the Regiment, we have a department dedicated to supporting the project induction enables and coordinating with all the stakeholder to ensure proper flow in the process. As well they track the development of requirement, development of design, material procurement, funding, and project completion, including warranty.

Construction Readiness Officer

This is the Officer appointed by the Regiment to manage the Construction Readiness Program. He or she is responsible for managing all stakeholder expectation and synchronized the resources across all the stakeholders. As well, this position is responsible for the project flow and the quality of them across the Pacific Region.

Construction Battalion

They are the last element responsible for the execution of the construction. They possess the labor and skill trade to execute the construction. On each deployment, they need to accomplish between 10 to 15 projects, and they deliver this task creating “details” to ensure better accountability and manager of resources.

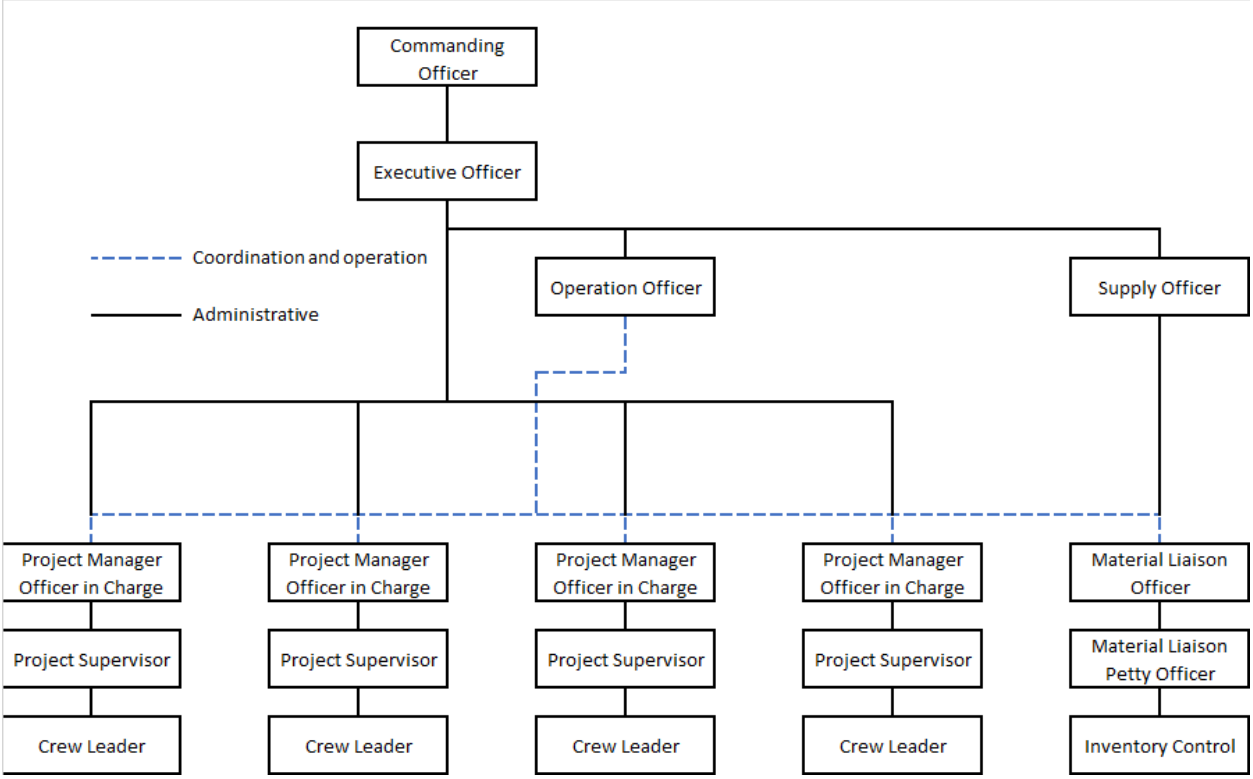


Figure 9 NMCB Key personnel interaction

Supply Officer

The Supply Officer is a Naval officer from the Supply Corp attached to the Construction Battalion responsible for all the supply chain in support of the Battalion mission Accomplished. On average, the officer allocated has at least ten years of experience in the Navy enterprise.

Moreover, it is considered as a Senior Officer around the Battalion Wardroom. His expertise will help with the procurement of material without crossing any federal or local law constraints. As we mention before they are not only responsible for the Class IV (Construction material) they need to manage the entire table of an allowance included all the different categories with an estimation of $65 Million.

Project Manager

The project manager must like it call Officer in Charge (OIC) they are responsible for the execution of one project, sometimes up to three projects. They are Junior Civil Engineering Officers, and they are par with a Navy Chief Petty Officer called Enlisted Liaison. Together they are the leader of the Detail or Company. They are responsible for overseeing the project for Planning and Estimation until the completion. They focus the synchronization of tasking with the

resources as well all report needed to ensure proper execution and management of Regiment and Battalion leadership expectation.

Project Supervisor

The role of Project Supervisor is extremely important in the project execution. The Project Supervisor is an estimator who meticulously identifies equipment and labor resources required to complete a project. He devises a workable construction plan as well is responsible for developing a two-week plan taking in consideration inventory and all other resources. The project supervisor is a skilled technician who develops and implement safety plans. This leader is a visionary who coordinates people and equipment to execute the daily construction efforts. Lastly, this job is a conscientious shepherd of government funds who protect and adequately uses the equipment, tools, and material.

Project Crew Leader

The Crew Leaders is the field supervisor. On the civilian enterprise, we call him field management, and they are constrained to a specific location. These leaders are responsible for manages the execution with a range of one-week planning. The crew leader is responsible for project inventory control on site. They are responsible for daily execution and in the quality of the execution. Most traditionally we can observe a petty officer second class been appointed to this position. This position is the execution voice for the project supervisor and responsible for optimizing production with the resources delegated.

Material Liaison Officer (MLO)

The Material Liaison Officer is a Civil Engineering Officer must like its Junior Officer. This Officer work under the Supply Officer but having a background in engineering will help to translate the construction requirement to a supply requirement and viscera. The MLO is responsible for Procuring, receiving, storing, issuing, shipping, transferring, and accounting for all construction project material across the extension of the Pacific. The Material Liaison Officer is responsible as well as maintaining related inventory and financial records and files. This is possible by preparing correspondence and reports relating to construction material. As well his duties require the initiating surveys on damaged items, and replacing or repairing them, interacting with contractors following DOD Directives Standards of Conduct and compiling and submitting the Estimate at Completion (EAC) report. In summary, his responsibilities are the management of material conditions, requirements, excesses, overruns, project material funding.

Material Liaison Petty Officer

The Material Liaison Petty Officer most likely is enlisted with ten years' experience and has been a project supervisor before. They are the point of contact day by day with the project supervisor, and together they prioritized the construction material. The key part of this position is the communication between these two positions (the Project Supervisor and the Material Liaison Petty Officer). This Petty Officer is responsible for the daily inventory control management and the synchronization of the material delivery in according with the two-weeks schedule by the project. As well, this position is responsible for the construction tool and other support equipment needed to complete the project.

Inventory Control or Warehouseman

Junior enlisted is responsible for organizing the warehouse and tracking all material received in the warehouse and all material delivery from the warehouse. These staff of enlisted is a combination of Seabees with some construction skill in order to identified construction material and nomenclature and the Logistic Support skills to balance and manage the warehouse according to general instruction.

Description of the process according to Navy Instruction

On this section, my goal is to show the flow diagram of the current process in according to the Navy instruction and provide a stream value based on this flow. As well this diagram is very old and requires some new edition. In the 30th NCR, this process has been improved independently of the instruction the process provide a better flow and reduced the cycle time very significant. This comparison will help the leadership to releases a new version.

Flow Diagram (COMFIRSTNCD, 2001)

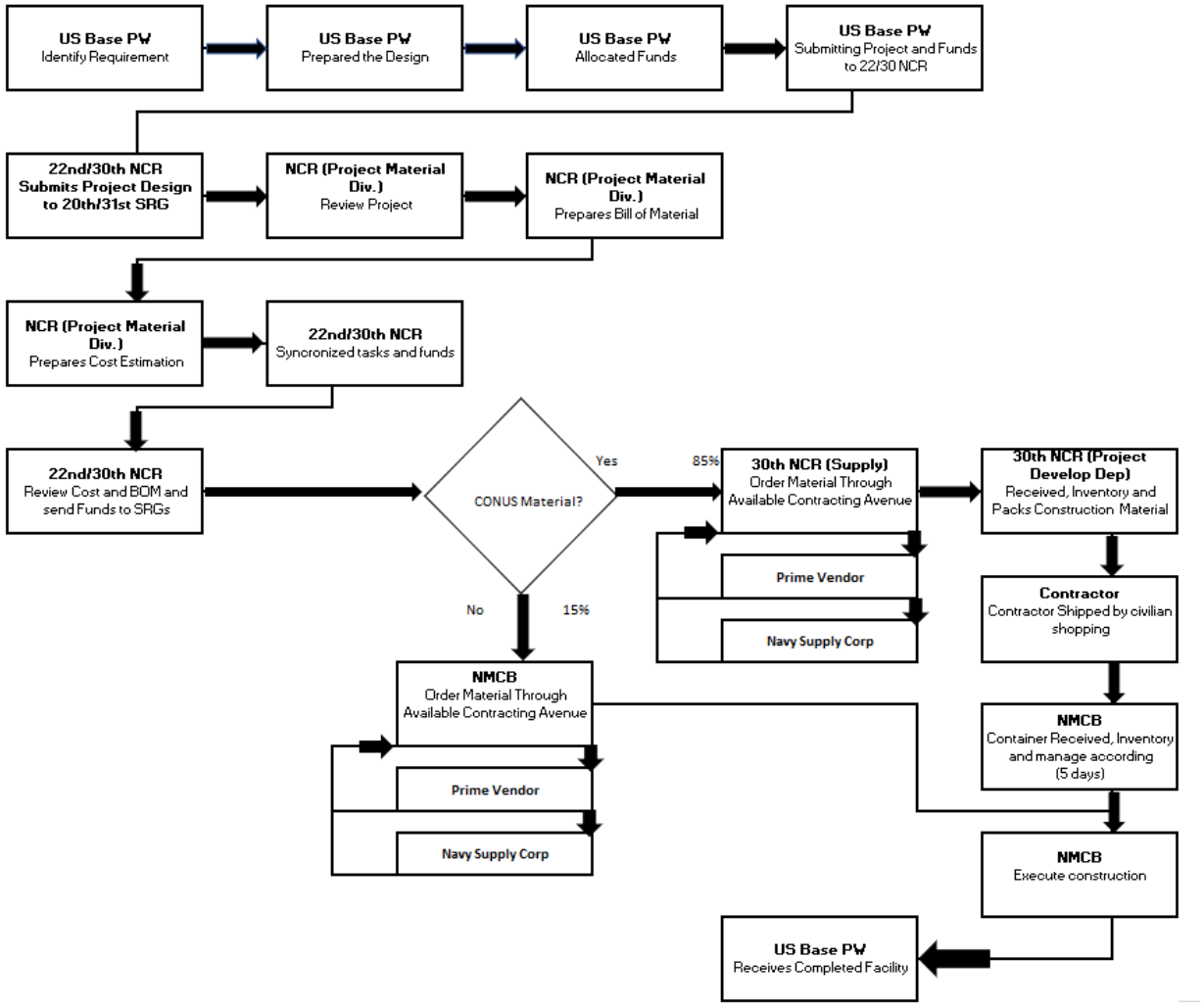


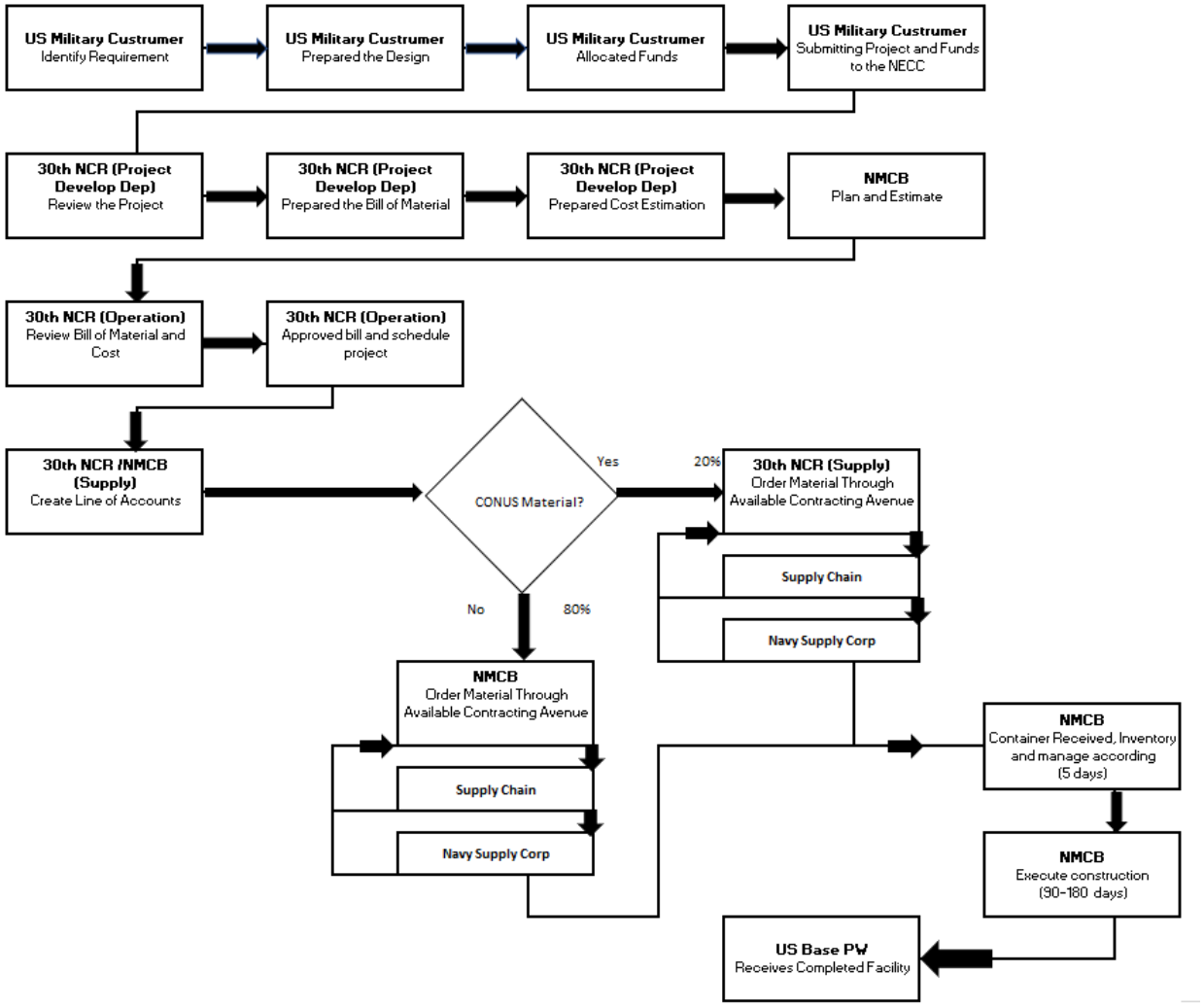
Figure 10 3.1. Flow Diagram (COMFIRSTNCD, 2001)

Summary Description of the Flow in according with COMFIRTSNCD, 2001

This instruction is very old and was developed by the first naval construction division. This Command is no longer in operation and was replaced by the Navy Expeditionary Combat Command. As well other units like Seabee Readiness Group (SRG) were replaced by Naval Construction Group after the completion of the war in Afghanistan and Iraq. These changes are making a huge difference in the current process flow; however, there isn't a single instruction in the Naval Construction Forces to address these changes in the Department of Defense. In order to complete this project, we are constraining the area of assessment to the Pacific Area and based in the GEMBA Walk we are changing the process flow to reflect a more accurate version in order to incorporate lean and other operation concepts in order to optimize the process.

GEMBA Walk on the Pacific Region and a better description of the current process beside Instruction

On 18 April 2019. I had the opportunity to meet with leaders of the 30th Naval Construction Regiment, located in Port Hueneme, CA. This command is responsible for Construction Operation in the Naval Construction Forces in the Pacific. The objective of the meeting is to understand the current process and observe how the steps and the synchronization between the steps are implemented up to the delivery of any project. Based on this, we tailored the flow chart as follows.



(Jolan, 2019)

Flow Description

Identification of requirements

The first step in any construction is the identification and summary of the requirements. This step is crucial for the development of the project. It is here where we convert the customer's needs in the engineering language. This step belongs to the US Military installation staff, and they are responsible for collecting and managing the requirements for each new project to ensure operation suitability while the installation follows all regulation and constraining for that particular location. Here the Installation Chief needs the support for each department in the installation organization such as Planners, Requirements, and Engineering mentioned in the key personnel section.

Prepared for design and allocation of funding

This is the first step in the engineering world in order to start the execution of a project. In this step, the engineering staff will get the scope of work from the customer and integrate into a complete design and specification for construction. The design varies between 30 days and up to six months, depending on the workload and the importance of this project for the installation and the mission. Some installations have their design team; others require to outsource this effort. The Installation Chief of Engineering needs to work with his resources to accomplish not only the NCF design but all the requirements at that location. The NCF cannot provide or develop designs (not in-house capability), and the dependency is unavoidable. As well under this instruction, the Installation is responsible for allocating and providing the funds for each project while they are requesting the NCF support for any project. The US Navy had fenced a threshold to support the continued employment of the Seabees. However, this threshold only supports Navy Installation, such as life and operation support. There are many other customers in the DoD with other requirements, and they all have a different constraint on allocating and spend on funds. The installation or entity will be transferring these funds to the NECC in order to convert the funds to any streamline required to execute construction operations. One example of this is allocation on Enclosure 1. The Regiment does not have the authority to hold a Line of Account (Cash Stream) so all funds must go to the highest echelon like NECC. They hold the money until the procurement of the material is required and serve as an audit to ensure proper management of funds on each project.

Project review and scheduling

After the project has been inducted, and the design is completed, the Regiment will do a review and allocate the resources to complete the project. Like mentioned before each Battalion has some extend capability, so the Regiment needs to work with the units scheduled to enable time for preparation and material procurement. This section was improved in the Pacific Region in order to incorporate more time for the unit's preparation and incorporate other resources. In this step of the flow chart, the regiment will deliver the first draft of the bill of material including only long lead items and some other common material none related to the technical process of the construction. As well the Regiment will develop a Cost Estimate more comprehended in order to request funds from NECC down to the selected unit of execution.

Planning and Estimate

This is the meat of the process; any variation and mistake on this step can result in mission failure. The Battalion selected for this project will create a Project Team to start, plan, and estimate a project. They will complete the task so they can elaborate on the Construction Activity Sheet (CAS) with enough details to feed the presented diagram, resources level, and a 100% bill of material. This will be compared with the Regiment initial Bill of Material to ensure proper planning for the unit. This planning and Estimated are happing at homeport and are part of deployment preparations. Each project can be executed in many different ways, and each way will require a different bill of material. This process can take from 14 days up to 60 days, depending on the complexity of the project or the knowledge the project team has about planning. The lack of knowledge has been a weakness to the NCF for years after the Iraq War.

Project Package Review and approved for funding

This part of the process has been changed many times, but here we are going to hold the description in according to the instruction and traditional process. After the project team completed the planning and estimation for a particular project. The outcome of the effort is called the project package. This is a detailed plan on how the team is proposing to execute the construction for the project, including the technical aspect and the logistic support. The package will include how and when the team will use the resources such as enlisted personnel, equipment, material, tools, and others.

After the Planning and Estimates are completed the Battalion via the Project Develop department will request approval from the Regiment to concur and deliver the funds for material procurement.

This will create a few lines of account to stream funds in order to pay vendors on the delivery of material and services in supporting the project. Some projects can have up to ten different accounts.

United State Material Procurement

The Regiment obtains and manages the funds for construction materials from Port Hueneme. They have some avenues to procure these construction materials requirements. First, by using the Prime Vendor contractor; this is the authorized vendor from the US Navy to deliver supplies to the Navy in all the categories mentioned before. They have a matrix of subcontractors to provide the final product. They are the most efficient avenue to procure material in support of the Seabees required inventory. The only downside of this avenue is the limitation of delivery overseas.

A second option is the use of Task Order with the local Contracting Offices. This process will take at least 120 days to be accomplished. The process will involve a request for a proposal to a worldwide vendor, time for Request for information, time to prepare a proposal, time to review the proposal, time to award the selected proposal, and finally time for delivery. Moreover, if the delivery is wrong and if there was a government mistake, we are looking at another 30-day delay. However, this is good for a significant element like the procurement of a Pre-Engineering Building or something similar.

In the next section, I will explain how we expand this constraint and the challenge to overcome after expanding the supply chain outside of the US.

Construction Material Receipt, Packaging, and Shipping

Due to the constraining in the Prime Vendor to deliver overseas, we have to contract a private company to enable this delivery. The Prime Vendor will delivery all of the material to Port Hueneme, CA, and the regiment will be inspecting and accepting the inventory at this location. After accepting the inventory, the Regiment has to store all of the inventory in containers, and a third logistic company will take it for delivery. This phase is very controversial in accountability and has been a failure point in the process for years. In the new current VSM version for the Pacific, we are able to resolve this constraint. However, there are still several people who believe the old process is more efficient.

Construction Battalion Receipt of Materials

After the container has been shipped, the vendor/contractor provides a timeline of delivery. This timeline is not reliable, or consistent; it delays for different reasons; like change in route or weather

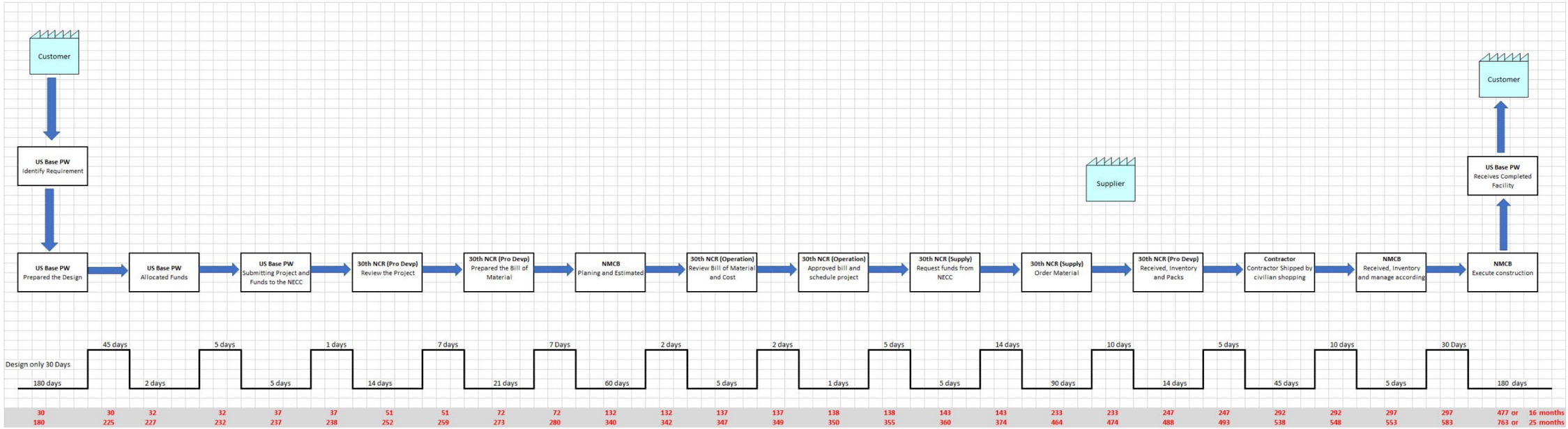
situations. After arrival to the final destination and passing all customer requirements, the port will be communicated with the Construction Battalion for inspection and accepting the inventory. As well the MLO offices are responsible for updating the Regiment.

The Seabees do not have the technology to track and monitor all inventory. The MLO offices are responsible for inspecting the inventory, confirming the quantity and storage in the warehouse in appropriated order.

Local Supply Chain

Local material procurement is based on the Government Credit Card (GCT). Each unit has a GTC to execute small procurement or to obtain the requirement stream cash flow to complete the mission. In the construction world, the GTC is allowed to be used only in the emergency approach. The Federal Government has the requirement to provide suitable competition to enable better prices. The GTC is only limited to $2,000 and to be used no more than one time for each project. This constraint was able to be managed, but I will explain more in the current VSM section. (DLA, 2005)

Current Pacific VSM



Assessment of the current Pacific VSM

In this section, the outcome is to provide an assessment to the Value Stream Map, let us keep in mind the assessment is based on the Supply Chain and not in the Construction Operation. However, the contrition operation will be the lead to drive the behavior of the supply chain. In the assessment, we can observe the Owner of the Step or evolution; sometimes, that position does not do directly responsible; however, he holds the accountability of the outcome. As well we have the time to take for each step, in the services industry is hard to have a standard time like in the manufacture; this is why we used the average time for each step. The operation risks mention in this section is the most common threat for the construction operation you can observe in each step. Moreover, for last, we have the yield for each step-in order to have an idea and how smooth is the step or how hard and inconsistent some steps can be. The Yield was grade base on interviewing Subject matter Experts at the NCF and how they assess the each step on the process.

#	Step	Assessment
1	**US Base PW** Identify Requirement	**Owner:** Installation Chief of Engineering **Time:** Between 5-10 days * in the VMS they are incorporated in the design **Operation Risk:** **(1)** If one of the requirements is missing the project can be completed but not suitable for occupancies and operation. **(2)** The missing requirement can delay the design. **Yield:** 90%
2	**US Base PW** Prepared the Design	**Owner:** Installation Chief of Engineering **Time:** Between 10 -180 days **Operation Risk:** **(1)** Poor physical assessment creating more risk on the construction phase. **(2)** Miss requirements for that particular country or installation. **(3)** Can be a delay to the point where the project is no longer needed. **Yield:** 50%
3	**US Base PW** Allocated Funds	**Owner:** Installation Chief of Engineering **Time:** From the moment the design is completed, most of the time, sitting in the shell on average 45 days until another department takes for funding. The allocation of funding normally takes two days. **Operation Risk:** **(1)** Funds expiration are too close to the start of the project. **(2)** Do not follow the appropriation requirement by Congress. **Yield:** 99%

4	**US Base PW** Submitting Project and Funds to the NECC	**Owner:** Installation Chief of Engineering **Time**: From the moment the funds have identified the need to be the route for approval on average five days, until start the processes where normally takes five days. **Operation Risk:** **(1)** Send the wrong funding document stream. **(2)** Send to the wrong person or the wrong amount **(3)** Lack of knowledge from the installation and how to submit the project. **Yield: 99%**
5	**30th NCR (Pro Devp)** Review the Project	**Owner**: Regiment **Time**: On average 14 days **Operation Risk:** **(1)** Approval without balancing the schedule and resources **(2)** Miss critical point of the design and requirements **Yield: 70%**
6	**30th NCR (Pro Devp)** Prepared the Bill of Material	**Owner:** Regiment **Time**: On average 21 days **Operation Risk:** **(1)** Unsuitable Initial Cost Estimate **(2)** Unsuitable Initial Bill of Material **(3)** Lack of staff to perform a good review **Yield: 50%**
7	**NMCB** Planning and Estimated	**Owner:** NMCB **Time**: Between 30-60 days **Operation Risk:** **(1)** Late delivery of the project package **(2)** Poor Bill of Material and Resources level **(3)** Lack of knowledge to produce a Project Package **Yield: 90%**
8	**30th NCR (Operation)** Review Bill of Material and Cost	**Owner:** Regiment **Time**: On average five days **Operation Risk:** **(1)** Approval project closest to the Congregational Threshold without gap for rework **Yield: 99%**
9	**30th NCR (Operation)** Approved bill and schedule project	**Owner:** Regiment **Time**: On average one days **Operation Risk:** **(1)** Poor resources level between a unit of execution **Yield: 80%**

10	**30th NCR (Supply)** Request funds from NECC	**Owner:** Regiment **Time**: On average five days **Operation Risk:** **(1)** The poor description of the bill of material **(2)** Wrong funding document submission **(3)** Wrong line of account created **Yield: 99%**
11	**30th NCR (Supply)** Order Material	**Owner:** Regiment/ NMCB **Time**: On average, 90 days; however, this step can be a night mirror and take up to 180 days. **Operation Risk:** **(1)** The poor description of the bill of material **(2)** Delay on Request for Information from the vendor **(3)** Order wrong requirement according to the design and specification **(4)** Wrong avenue of acquisition to obtain some material **(5)** Order beyond approval for safety stoke **(6)** Wrong out of funding **(7)** Delays in the material due to customization **Yield: 50%**
12	**30th NCR (Pro Devp)** Received, Inventory, and Packs	**Owner**: Regiment **Time**: On average 14 days **Operation Risk:** **(1)** Misplace inventory **(2)** Delay Inventory due to lack of staff to perform **Yield: 85%**
13	**Contractor** Shipped by civilian	**Owner:** Regiment **Time**: On average 45 days **Operation Risk:** **(1)** Misplace inventory **(2)** Delay Inventory due to Q hold on Ships **Yield: 95%**
14	**NMCB** Received, Inventory and manage according	**Owner:** NMCB **Time**: On average five days **Operation Risk:** **(1)** Misplace inventory **Yield: 90%**
15	**NMCB** Execute construction	**Owner:** NMCB **Time**: On average 180 days **Operation Risk:** **(1)** Misplace inventory **(2)** Quality Issues **(3)** Changes in the project scope due to unforeseen condition **Yield: 70%**

16	**US Base PW** Receives Completed Facility	**Owner:** Installation Chief of Engineering **Time:** N/A **Operation Risk:** **(1)** Miscommunication on the requirement **(2)** Quality Issues **Yield: 99%**

On this VSM, we can observe 16 steps in a line process to provide the ultimate construction product. On this chain, we have three main owners such as the Chief of Installation, most like the PWD (reference on the key personnel section), the Regiment and the Construction Battalion. This can be a challenge in the synchronization of efforts and resources. Each owner has different agendas and specific constraining on resources. The relationship between the Battalion and Regiment can be easy straight-out by the direction of the Regiment as a superior command. However, the Installation Chief of Engineering does not have the same relationship with the regiment, making it almost like an external operation. On top of this, we have the time difference variance from 8 to 15 hours, depending on the country on the subject. To keep in the same observation, step 2 is the development of the design, and the Installation Chief of engineering has the lead on this evolution. This will include a mix of designers between US Engineering and Host Nation Engineering, creating a suitable mix to address the requirement for the specific installation. At the same time, this is an advantage that it is becoming a disadvantage in the overall process. Imagine receiving designs from more than 12 different geographic locations with their version of Standard Drawing; this is part of the reason this step has a 50% yield. Other reasons are the lack of communication, lack of design knowledge, and conversion form local requirements to US requirements.

The next step with a low rate of yield is the Review of the project. In many cases, the Regiment staff is not aware of the design after completion creating a bank of question greater than normal and delaying the process of the review and must critical missing important requirement on the construction delivery. This is construction services and almost 100% of the time each construction will have issues related to budget and schedule pushing the agenda to the right and creating uncertainty on the resources level, this is why the yield is under 70%. The Regiment does not have enough staff to perform a suitable design review and initial bill of material. It is on this step where we can miss a long lead item pushing this project to a completed second cycle

(six months) as well part of this evolution is to create an initial Cost Estimated in order to start the programming of funds and provide a warning to each vendor.

The next step, Planning, and Estimated are in conjunction with the Project Review. Even when the yield is on 90%, the Construction Battalions had a large gap in knowledge and expertise in this evolution. The reason why the yield is good is due to the hard quality inspection by the leadership on the Battalion and the leadership on the Regiment. The largest issues of construction quality have a root cause on the Planning and Estimation phases. The yield is high, but it is just because it is related to the Supply Chain, and we change the yield rate base on delivery or construction skill the yield will drop down to 20%. Almost every project presented to the Regiment fails in the first intent of approval.

The next step with low yield is stepped 11th the order of material. This is an evolution between the Regiment, and the Battalion Deployed and the Battalion getting ready for deployment. These many entities in the communication channel created a lot of confusion and miscommunication between the vendor and the project teams. The communication starts with the request for a quote, and how good is the description in the request. Following with answer question from the vendor in order to narrow the requirements and provide a suitable quote. As well we can run the change to submit the request on the wrong acquisition avenue or platformer. The supply chain changes a lot, and the NCF does not have an instruction to follow so is more up to the discretion of the Material Liaison Officer deployed, while the requirements are to fulfill the needs for the Material Liaison Officer getting ready for deploy.

Steps 12th, 13th, 14^{th,} and 15th have a common operation risk “Misplace Inventory” the lowest yield along is 70% on step 15th, however, if you calculate the yield across these four steps you are looking for almost 50% yield. The NCF does not have an electronic system for tracking inventory.

Constraining

Market

The NCF can provide services to any command or branch under the Department of Defense. The US Navy and Marine Corp is the first customer, and most likely, it is the most common one to request support from the NCF. Outside of the Navy, we have to compete with other units like Red Horses in the US Air Forces. Our market is limit to tasks under the one-million-dollar threshold and only under the present of the Navy Installation Command. Sometimes we have some exceptions, but this is normally our market region. To have this in perspective in the Pacific region, only 25% have Navy Installation support, meaning our market is limited to the geographic location due to berthing support and others. (Bichard, 2019)

Resource

Our Battalions are structured with 560 personnel between skill construction traits and support elements. This holds the capability to a specific number of projects the battalion can take in a deployment cycle of six months. (Abare, 2018)

The battalion configuration is:

Equipment Operator and Maintenance Mechanics	120 enlisted
Builders and Steelworkers	140 enlisted
Utilityman and Electrician	110 enlisted
Support Element	110 enlisted
Leadership	80 Officers and Chief

Here we can see the specific capability of skills each battalion had in order to perform construction operations. Related to equipment, we have assigned a specified table of allowance to support expeditionary efforts and other activity, and we have more than enough to perform construction on the region. Our only limitation is when the equipment is not situated in Japan or Korea, this will require some equipment rentals, but at this moment, this is not an issue for the NCF.

Material

Our material is for construction operation, and they are very common in the market. Our only problem is finding Vendors capable of providing the material to be required by the NCF to complete projects according to the customer timeline. However, the construction material is common; each country has a construction code completed different from the United States. The difference can be addressed by customizing the material to meet the country requirements. This customization is very expensive and can increase the price to almost five times the normal cost in the commercial standard. As well we have to take into consideration the time consuming to produce this material and the time to transport to the final destination. (Gaul, 2019)

Supplier/Vendor

This is the biggest fault in the NCF operations in according to almost everyone I interviewed they all bring to the same conclusion. The root of this is because in the DoD we have to take in consideration all the federal regulation listened under (Policy), this will create a challenge to keep the supply chain flexible and efficiency to sustaining construction operation in the Pacific. At the same time, we do not have enough Contracting Officers to keep managing the contracts in the supply chain. (Velazque, 2019)

Financial

The Cash Flow in construction operation is the blood of the project as expected. After the funds are allocated to a particular project, the NCF created several Line of Accounts with a diversity of vendors to enable the procurement of material and services in support for any project. This Line of Accounts has expedition days in almost every project; this is more related to the agreement of the project completion day and the closure of the Federal Fiscal year. The material can be procured and storage to prevent losing the funds, but this is creating another problem we will discuss in the analysis section (Jolan, 2019). To complete the assessment on this constraining, we need to mention in the US Navy, the Facility Investment Program (including construction) is the last priory in the budget. The US Navy program only 5% of the budget is for construction sustainment everything else is going to personnel and the blue Navy (Ships and Submarines) (Departmnent of the Navy, 2018)

Knowledge/Competence

In the war of Iraq and Afghanistan, our Seabees focus on contingency construction for more than ten years in order to support the forward operation. This contingency construction is pre-set tents, bridges, concrete pad, and others like these. This took away time from the Seabees to continue learning to Plan and Estimated big project like the one for War World II. Little by little, the NCF lost the skill to Plan and Estimate complex projects. After the war, our Seabees still struggle to perform this task. This task is essential in order to build the Bill of Material.

Policy

In the US Navy, we have several rules and policies to follow, and especially when we are in another country. I will list the deferent regulations; however, they are constraining, but this constraining will never be removed, and the NCF will never have the power to manage a reduction or change on this matter.

1. Federal Acquisition Regulation (FAR)
2. Department of Defense Federal Acquisition Regulation (DFAR)
3. Navy Federal Acquisition Regulation (NFAR)
4. Naval Facilities Engineering Command Federal Acquisition Regulation
5. Government Service Contract Policy
6. Navy West Government Credit Card Policy
7. Each Federal Contract Active

This is to show how complex is this constraining and the reason this project will remain out of this topic.

Analysis

Identification of waste

In this section, we are going to address five major waste with a huge root in the supply chain enterprise in order to implement lean in support of a better process.

Waste 1: Overproduction

In the process, the Regiment orders long lead items to prevent a hold on construction operations. This is a great practice but, in many occasions, it has been abused, driving the procurement of material and placing in storage over more than one year. This will create a problem on construction due to the deterioration of the material and sometimes the change of building code on the construction. The NCF has some storage capabilities, but they are very limited, the construction material is intended to keep flowing in order to gain "WIP" Work in Place.

On another hand of the flow, we can observe overproduction when we change the leadership of a project, or when we have to turn over between Battalions. Construction operations are very particular, and each project supervisor has a completely different approach from another project supervisor. When we turn over a project, we expect full accountability in the new leadership, and the Regiment has zero-tolerance on excuses after turnover is completed. This is a great concept and mitigates the unpleasant of lack of accountability from the new leadership. On the other hand, it creates a bottleneck in the process, and most of the time, many construction activities are going to be repeated just to ensure quality from the new leaderships point of view.

At the Regiment level, sometimes they had poor forecasting on demand in order to balance the resources and tasking across the different units. The poor forecasting and planning will drive to overproduction where we see construction teams complete a project package after spending more than 45 days on homeport to be ordered to drop the efforts and focus in a different project. In the construction world, we cannot just transfer the package to another unit and order the execution of the project as planned in the package. Each unit most plan and approach the project in their way in order to expect full accountability.

Waste 2: Waiting or Queuing

Time is one of the most important resources the NCF needs to manage. In the Pacific, as mentioned previously, we have three Construction Battalions in rotation. One we are always deploying, and two of them are under preparation for deployment, this creates an 18-month cycle.

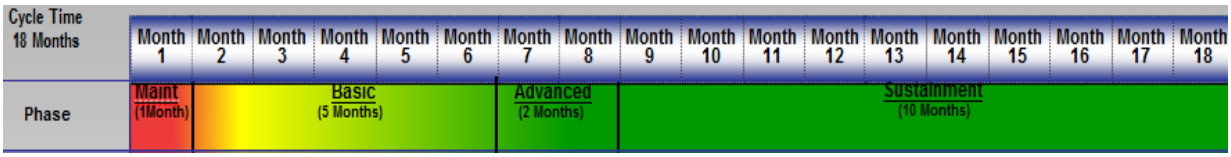


Figure 11 Battalion Cycle

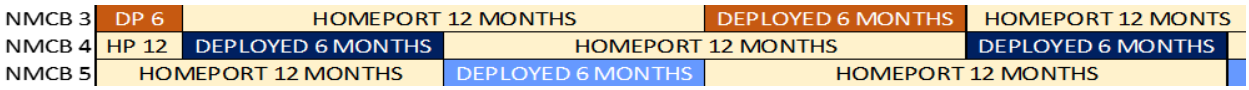


Figure 12 Pacific Battalion Rotation

In Figure 11 and 12, we can observe the dynamic cycle between units. I want to take these two figures and create a timeline table to undertint this dynamic better, starting with NMCB 4.

Months	NMCB 4	NMCB 3	NMCB 5
1	Turnover and Deployed	Field Exercises	Off Time
2	Deployed	Field Exercises	Basic Training (Schools)
3	Deployed	Planning and Estimated	Basic Training (Schools)
4	Deployed	Planning and Estimated	Basic Training (Schools)
5	Deployed	Preparation for Deployment	Basic Training (Schools)
6	Deployed and Turnover	Preparation for Deployment	Basic Training (Schools)
7	Off Time	Turnover and Deployed	Field Exercises
8	Basic Training (Schools)	Deployed	Field Exercises
9	Basic Training (Schools)	Deployed	Planning and Estimated
10	Basic Training (Schools)	Deployed	Planning and Estimated
11	Basic Training (Schools)	Deployed	Preparation for Deployment
12	Basic Training (Schools)	Deployed and Turnover	Preparation for Deployment
13	Field Exercises	Off Time	Turnover and Deployed
14	Field Exercises	Basic Training (Schools)	Deployed
15	Planning and Estimated	Basic Training (Schools)	Deployed
16	Planning and Estimated	Basic Training (Schools)	Deployed
17	Preparation for Deployment	Basic Training (Schools)	Deployed
18	Preparation for Deployment	Basic Training (Schools)	Deployed and Turnover

There are two types of waste in waiting on this process; this first is in the change-over between units. Once the Battalion is deployed, they need to redistribute 600 personnel across 20 different geographic location and conduct change over in each location in other to turnover equipment, tool, material, spaces, and many other items required as part of the deployment. On another hand, the deployed Battalion will be replaced in six months, and they need to execute turnover with the incoming Battalion and recollect 600 personnel to redeploy back to homeport. In general, we are looking for three weeks in front and three weeks in the back, reducing the operation capability from six months to four and a half months. This is a huge chunk of wasted time for operations.

The second type of time being wasted is in the NCF on delayed material. The Regiment and the Battalion always place efforts to procure and deliver at least within the first 60 days the material required for construction operations for each project. So far, the NCF struggles to coordinated to accomplish this target, resulting in a loss of time of Seabees deployed without material to conduct construction. This is due to poor planning and synchronization between the leadership units and the Regiment as main supervisors. As well the lack of lean in the Acquisition process between the Installation-Regiment-Battalions.

Waste 3: Transportation & Unnecessary Motion

In the NCF, we still have an immature Enterprise process related to the database. Per years the Naval Construction Group is looking to centralize the inventory control and project package into one data-controlled base with a continued update by all sources such as Material Liaison Department for each Battalion, Projects Team, Vendors, Contractor, Costumers, and the Regiment. At this moment we are using a Department of Defense portal to allocate the information. However, the only personnel authorized to access is the Battalions and the regiment personnel. This creates a huge waste of motion on transferring information from different formats and platforms across all requirements in the Chain of Command, reports, status, and management.

Waste 4: Over processing

As a military institution, the NCF intends to track the decision authority up to the highest rank possible. This is great for accountability; however, it creates an over process in the steps to

obtaining approval or smooth communication channel between customer and project teams as well as designers and project teams.

Waste 5: Inventory

This is the biggest waste of the NCF considering, what the NCF has, where it is in the warehouse, and when stock is going in and out can help lessen costs, rapid completion of the task, and prevent loss of time and other resources. The Seabees Enterprises also trust in inventory control systems to assess the current assets, the balance of the accounts, and provide financial reporting. Inventory control is also vital to maintaining the right balance of stock in the warehouses; the Naval Construction Forces only have limited space for stocks. Constant inventory issues can drive customers to other suppliers entirely. The final word is, When the inventory control succeeds, the Battalion can provide better customer service. It will also help to get a better, more real-time understanding of what it is the customer expectation. The NCF also does not want to have excess inventory taking up space in the warehouses as it is unnecessary. Key to proper inventory control is a deeper understanding of customer demand for your products. A continuation I would like to present a Cause and Effect diagram to analysis this waste.

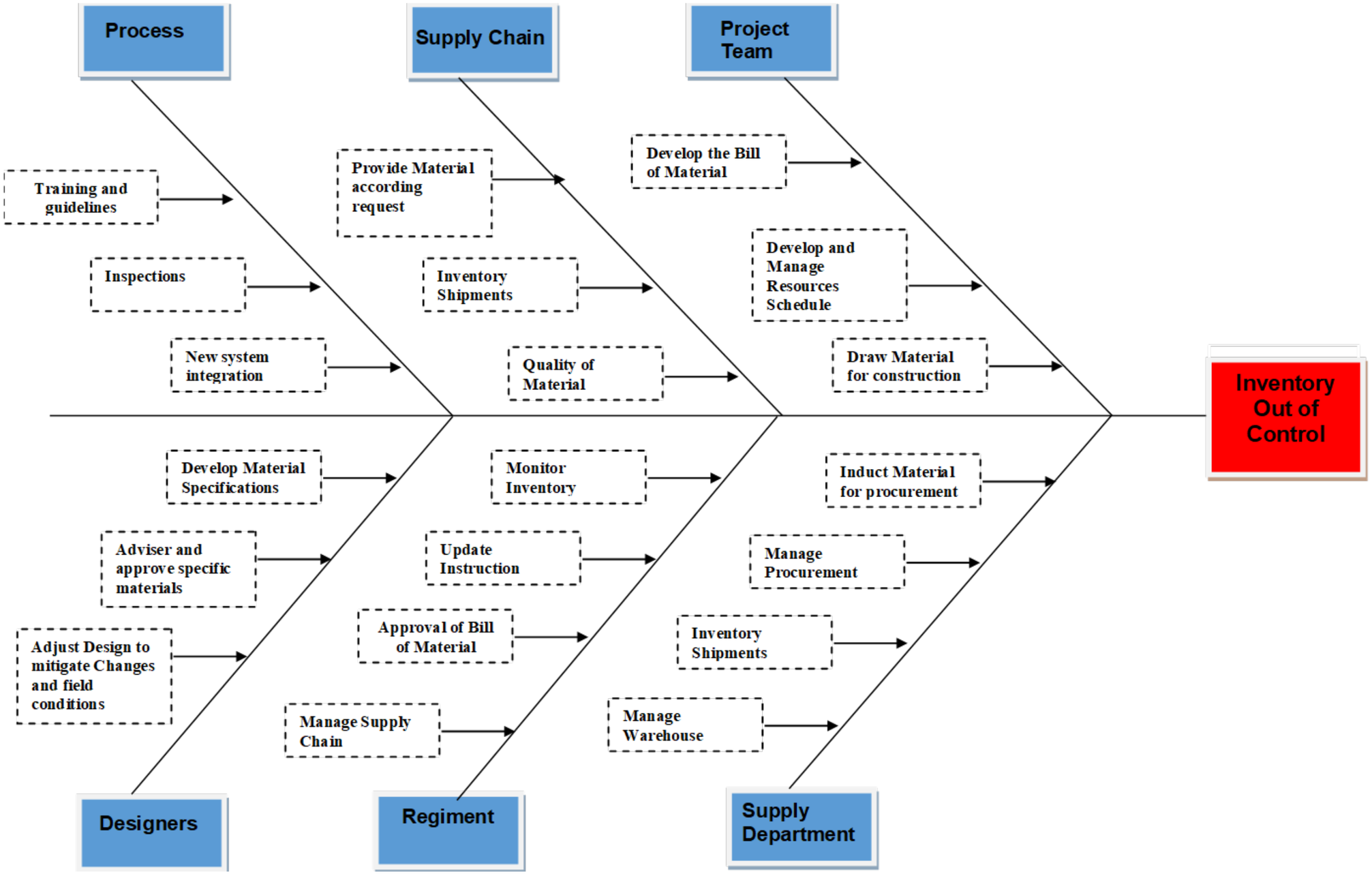


Figure 13 Cause and Effect Inventory

This Cause and effect diagram recollect the six main factors contributed to as waste. The Project team is responsible for developing the Bill of material in the planning phases. Knowledge and precision are a key factor in the development of this bill of material as well in the execution phases where the Project supervisor needs to manage the resources scheduled with all the different entities to ensure proper management of inventory. The last one of these factors will be the drawing material from the warehouse to be transported to the construction site for use. This is very important and will be the last iteration of the inventory. In the Construction Battalion level beside the project team, we have the supply department. This department needs to induct the bill of material, manage the procurement, inventory the shipment, and manage the warehouse.

On another hand, we have the supply chain component from the Prime Vendor and the third logistic transportation component. Together they are responsible for the accuracy and quality of the product from the stock or manufacturer until the delivery. The regiment is responsible for managing this supply chain, approval of the bill of material, creation, and approval of the financial account, monitor the inventory across the Pacific Region and updating all instruction related to the relationship of all stakeholder in the process.

This Regiment supervision includes the Design Component and the process two main factors in the logistic process of material procurement. The design is the development of the requirement and rulers on main material factors. Sometimes the Design Management approval is requiring mitigating with the change of design or field adjustments in order to complete the project.

Using a stratified approach collected all data for one year (2015) on projects under the Construction Readiness Program on the Pacific Area restricted to (Okinawa, Yokosuka, Sasebo, Atsugi, Diego Garcia, Chinhea and San Clemente). The Regiment is collecting spot inspections on this project across all the units on that particular year. After the recollection, I analyzed data related to Inventory and others. Concerning the Inventory and taking into consideration, the definition previous established then I was able to identify, and construct Pareto Chart appreciated the range on material waste. Before jump in the number and some analysis less put in perspective the different key holder of the cause and effect relationship leading to the Inventory out of control.

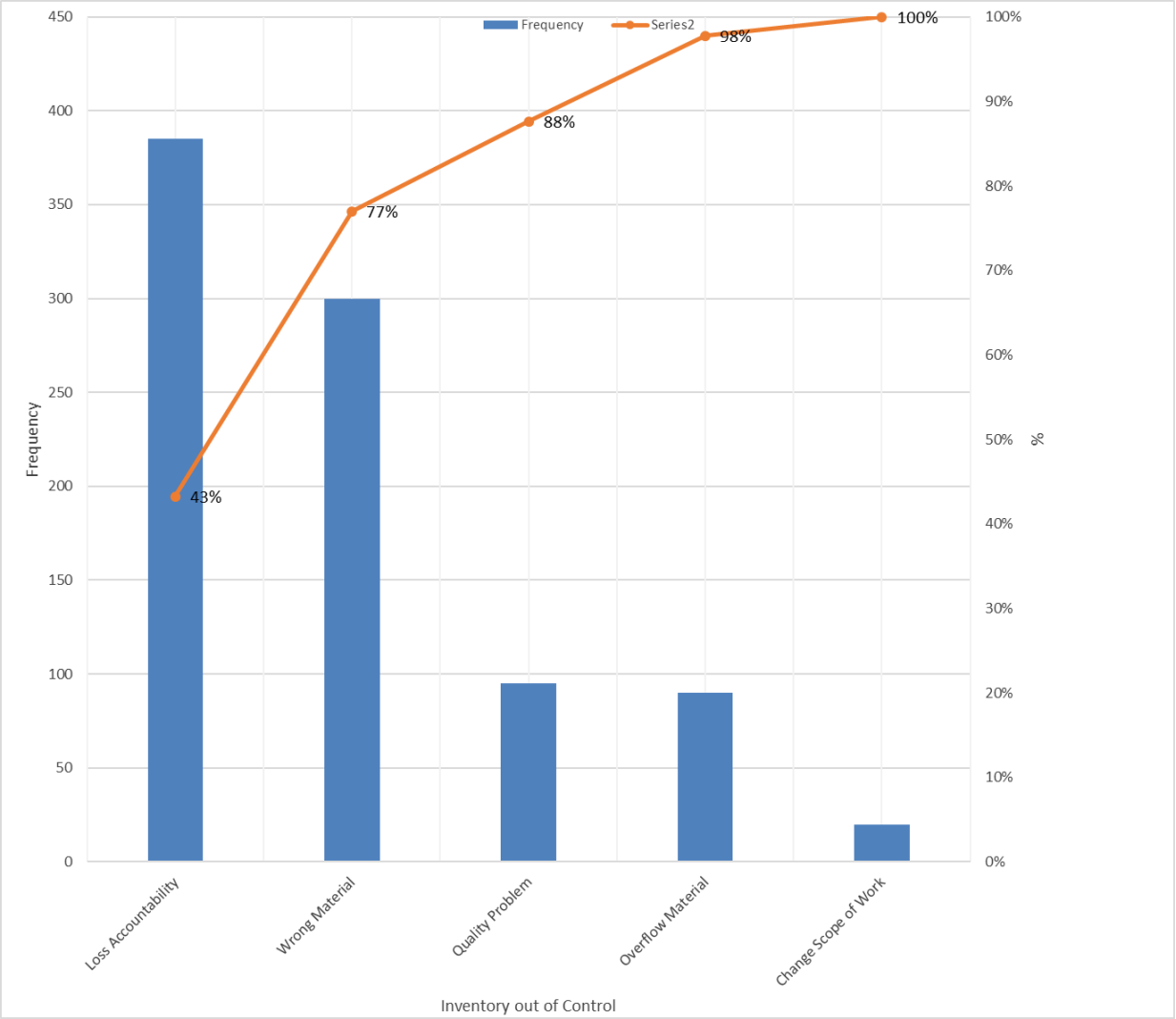


Figure 14 Pareto Chart Summary Inventory

On this Pareto Chart, we can identify the primary cause on the out of control inventory is related to losses of accountability with a frequency 385 represented with 46% of the ration. However, this category has so many stakeholder and opportunities to occur than we decided to break it in more elements for better analyze.

Loss of accountability

This is the first and the most commune of all the factors. When we lose accountability in any of the phases of the material. This factor is observed in the following ways:

In-Bound Inventory

This type of error is observed when the material has been shipped to the destination with a third logistic entity, and the Constructing Battalion is responsible for receiving inventory and accepting at a specific destination. The important central position on this process is the Material Liaison Officer and the staff to ensure the shipped inventory equals the order of bill of material and account information.

Out-Bound Inventory Warehouse

After the material has been processed in the Construction Battalion, now is ready to be drawn and transferred to the construction field. This is when the material liaison Petty Officer and the Project supervising team need to agree. Without reasonable control from the management side, the results are loss accountability in the process of drawing material from the warehouse.

Out-Bound Inventory Field

After the inventory passes from the Supply Department to the Project Team, we have some risk of miss placing the product in the job site, this enables the opportunity to lose the inventory, and in other situations, the material is just stolen from the project.

Accounting Management

At the Project Management, Construction Management and Material Liaison Officer they need to balance the checkbooks and account files to match the physical bill of material in all the phases of the inventory when we find errors in this level it is due to poor management and supervision from the top management.

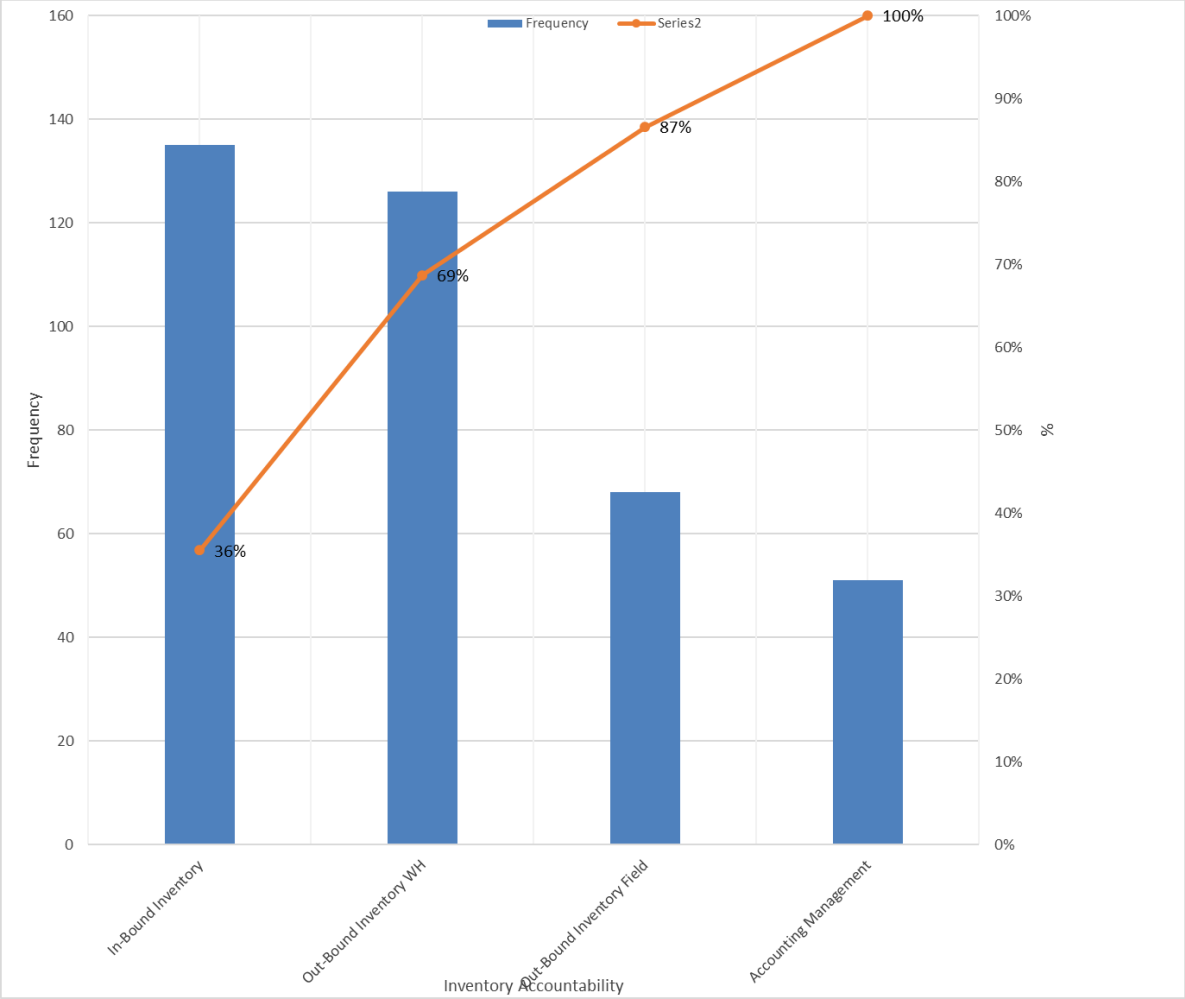


Figure 15 Pareto Chart in Loss of accountability

Inventory Out of Control	Frequency	%
In-Bound Inventory	135	36%
Out-Bound Inventory WH	126	33%
Out-Bound Inventory Field	68	18%
Accounting Management	51	13%

Cross-reference with the cause and effect diagram we can observe how the most massive error on inventory is found in the In-Bound management where the Regiment, Supply Department and the Supply Chain are the leaders of operations and execution. Having so many vital holders are ones of the driver to have a large rate of errors under this category. The next most substantial errors have been found in the Out-Bound Inventory at the Warehouse; these operations are mainly responsible for the Supply Department. The next two remaining factors are Out-Bound Inventory in the field where 100% of the accountability belongs to the Project Team and the

accounting management belong to the top management (Project Management, Construction Management, and Material Operation Management).

Wrong Material

In the construction phases, the design goes for several revolutions. In some cases, errors are made, and they are not identified in time. When the project crew starts planning and estimating, they are following the specifications and design to create the bill of material. In several activities, the design specification is not precise. As well the Construction Battalion are US workers, and they are not familiar with some other country's construction codes leading to order the wrong material

With 34% of proportion, the next observation of inventory out of control is found as incorrect material. Crossing references with the cause and effect diagram, we can observe the main section leading this factor, such as:

Primary: Project Team

In the planning and estimation, it is a great challenge training to interpreting the US design when the construction will be executed in another country following different requirement to adjust the construction in via to incorporate the facility in the current utility system. As well we are running with the challenge where we do not have enough knowledge in the team to develop an appropriated bill of material, or the project team is running out of time to complete the bill of material leading to an inefficiency and rush bill of material with many errors to be observed.

Primary: Designers

The designers are facing an enormous challenge in design development. They need to take in consideration many construction codes factors in order to complete a suitable design. As well the designers must travel to the location to execute a survey in order to incorporate the design in a specific location. Funds for traveling and the ability to execute this type of site visited are very costly and most likely will be related to a third party, and in a majority of the case, the information is not correct leading to design with many errors. The customer provides the design.

Secondary: Supply Department

After the bill of material has been approved by the Regiment, the Material Liaison Officer under the Department of Supply is responsible for inducting all the requirements in the acquisition

system for a quote. This is another challenge in many occasions the person inducting the list does not know the details of construction, and sometimes the induction is not just copied and paste but must be translated from construction to procurement leading to many errors for lack of knowledge. As well after induction, the vendors will have several questions (Request for Information) where the Supply department needs to manage in order to guarantee the right material and the right scheduled. These questions from the vendors are usually transferred to the project team; however, the communication between the project team and the supply department tends to be deficient in many cases.

Secondary: Supply Chain

In some small cases, we found an error from the vendor in the material procurement in these cases; the vendor will take full responsibility and expedited any gap related to this type of incident.

Secondary: Regiment

The regiment is responsible for the quality assurance of the bill of material delivery. At the regiment level, the project is reviewed, and the bill of materials are approved or rejected for improvements. However, in many cases, the time is against the process, and an 80% solution must be approved in order to have material on time.

Quality Problem

This issue is simple to identify, the project team builds below the quality standards, and it must be demolished. This element is not discounted from the project, it is a loss, and it will be part of the final value. For example, the quality of the concrete delivery, even then we have some test to ensure some quality in the moment of placement, the most important test will be at the 21 days after placement took place.

Most likely, we are going to agree; then the material is a loss due to poor quality used will be a fault from the project team. This is not true; they are executing, but many other players must be taken into consideration. Let us give attention to the next graphic.

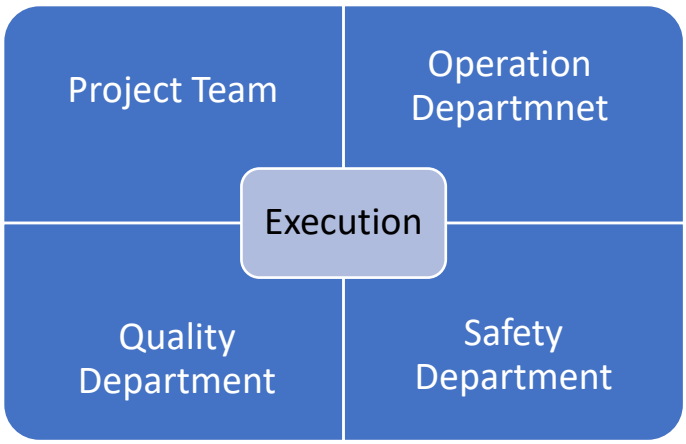


Figure 16 Execution and Quality Relationship

While we always investigate the Project team, we still need to pay attention to the Operation Department for the Construction Battalion they are responsible for providing immediate supervision in the region while the Regiment will provide supervision at the highest echelon. The quality department is responsible for the daily quality of the project, and they respond directly to the Executive Officer of the Construction Battalion. In the end, with less impact on the quality outcome of the project is the safety department, they will focus more on the safety process of the execution.

Overflow Material or Assess

The Construction Battalion only have less than six months to complete most of the projects. For sure, a good planner will always foresee and prepare for the worst-case scenario in the field. This is always important and is recommended. Being 3,000 miles away from the United States and not being able to complete the project because you need one item to complete the project. This usually will happen at the end of the deployment cycle. All the material required to complete a project will be processed to be part of an assessment inventory for the same customer in the future.

In 2015 the Regiment investigated the inventory at the warehouses and discovered a large number of this inventory did not belong to open projects. They were remaining of the complete project and had not been reallocated to another project. The inventory was obsoleted, and no longer possessed the quality to be used in any project or just the construction code changes. The loss of this discovery was more than seven million dollars. We know we are always going to have material remaining for a project the critical factor missing here is the ability to

communicate across all other geographic locations and another project to allocate the material for a new use. (MLO's, 2019)

Change the scope of work

In any project, we always have Field Adjustments and Design Changes. A good KPI for the project manager is to keep this the lowest as possible. In the design phases, we spend time in the engineering site research; however, we cannot bring the whole team to the site. Sometimes will be missed or in other cases existing drawing, utilities are not accurate. All these elements will make the design to change, and the bill of material will change chasing this new element to complete the construction.

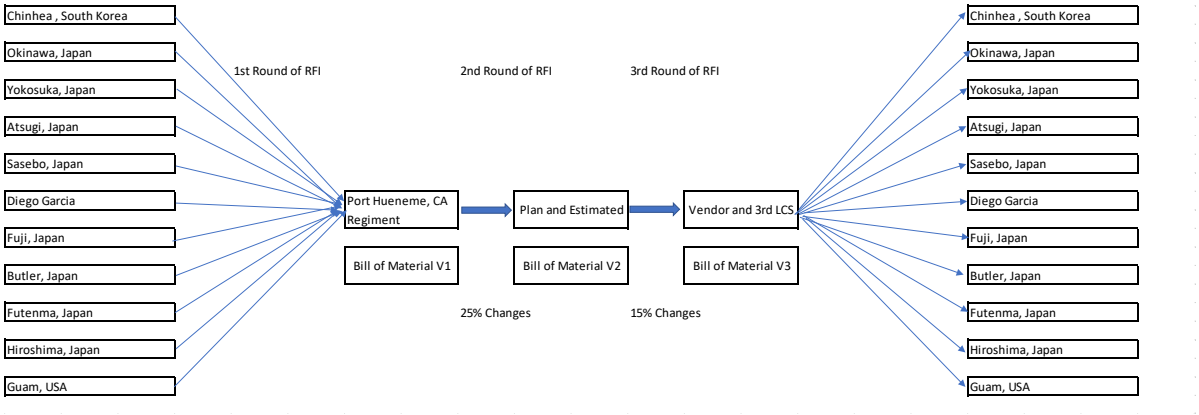
This is the least observed but also an important category because it must pass for a process before it can be considered as overflow material. The cost of this element can be huge and must be processed with care. All material no longer needed must be returned to the vendor or used in another project. If this material cannot be relocated, then it must be considered the loss of the project and transferred to the overflow material.

Recommendation

Based on the waste observed in the Value Stream Map and having in consideration the opportunity to be improved I bring six recommendations to enable the opportunity to optimize the NCF resources into the main mission to be ready XXX

Recommendation 1: Centralize the design

Currently, each geographic location develops the design for the project designated to that location. After the design is completed, they are submitted to the regiment for review and created in the bill of material and cost estimation. Let us assess the creation of the bill of material in the following illustration.

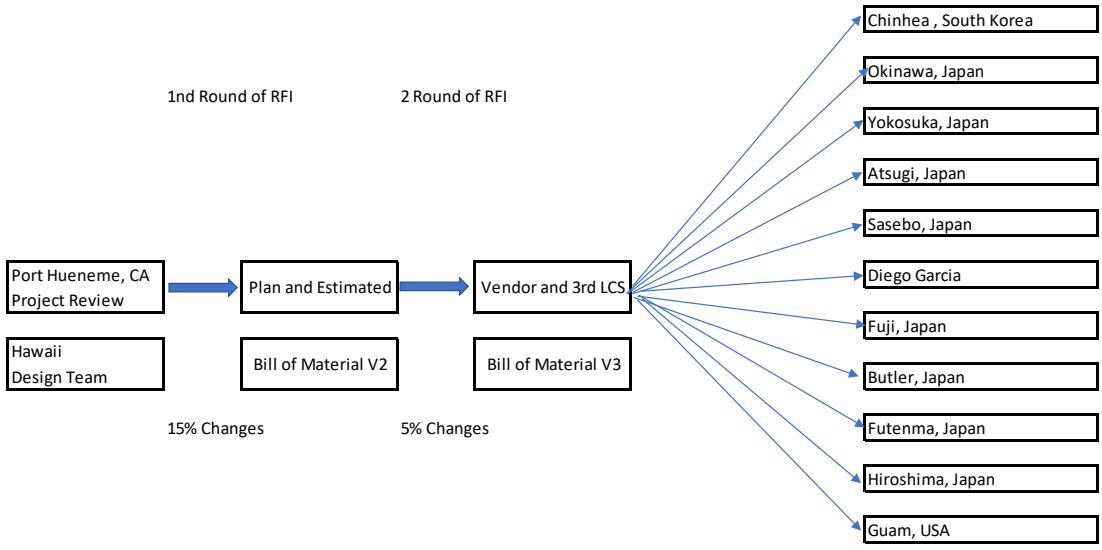


Each location has its design team and its design profile. In the construction, we follow the UFC and some other standards to meet the United States requirements and quality expectations in this Country. However, the design team allocated in this location are a hybrid diversity between Host Nation Designer and US designer. This gives the design outcome more interest. The design cannot follow the US codes alone they must follow all the codes from that country and all the codes of the US as well as making the design very confusing. Each design is reviewed before starting the planning, and an estimate has at least 20 questions back to the Design Manager who needs to distribute the question back to each designer.

After the completion of the design review, it is passing to the Planning and Estimated where we could expect on average of 40 questions back to the Design Manager who needs to distribute the questions back to each designer. Finally the bill of material gets in the hand of the vendor for quote and they are trying to meet Japanese, Korean and other specifications with the US system creating at least 100 questions back to the Planning and Estimated Team and around 20 questions

from the vendors need to be sent back to the Design Manager who needs to distribute the questions back to each designer.

All these requests for information and communication just create many discrepancies in the Bill of material, creating a scenario where we lose control of the inventory. This is why we centralize the design where we create a design coordinator to each country who will be responsible for creating a library to translate all the Country Specification to US standards and ensure to incorporation in the design evolution. At this moment, the Naval Facilities and Engineering Command for the Pacific allocated in Hawaii can support the design workload for the Seabees. As well by moving the Design team to Hawaii, we enable us to work closely with the Project Review Team in order to Synchronize construction feasibilities, funding, and Initial Bill of material. The centralization of design is represented in the next figure.



This recommendation will enable a cleaner design and more comfortable to comprehend, and the communication will be clearer, and the response of Request for Information can be guaranty within 24 hrs. This will enable a clean Bill of Material and less confusion for the Inventory Management.

Recommendation 2: Add the Planning and Estimate into the Readiness Program

It would be wrong to just isolate the procurement of material in order to improve it. While I believe the procurement chain can be and has to improve it, moreover, the input on the process holds the largest deficiency — the NCF struggle on Planning and Estimate construction projects. Like I mentioned previously; the last war of Iraq consumed the time of the NCF only on contingency construction without the requirement to plan or estimate this type of construction.

Under waste two-sections regarding waited and delay, figure 11 and 12 bring the cycle of construction Battalions. On homeport, the Battalion are training and working to obtaining the required readiness to be able to deploy. Now, what is readiness, "The ability of U.S. military forces to fight and meet the demand of the national military strategy. Readiness is the synthesis of two distinct but interrelated levels.

UNIT: "The ability to provide capabilities required by the combatant commanders to execute their assigned mission. This is derived from the ability of each unit to deliver the outputs for which it was designed."

JOINT: "The combatant commander's ability to integrate and synchronize ready combat and support forces to execute his or her assigned missions."

(Department of Defence, 2018)

Add this moment the Planning, and Estimated skill is part of the readiness program as an insolate factor. After the deployment is over a percentage of the Battalion goes to training in planning and estimate any construction project. This is in order to full fill the requirement of readiness, but we all know the training is a week and does not bring the knowledge to require implementing of the skill for deployment task. Going back to the cycle on deployment the Battalion is under the operation authority of the Regiment versus at homeport where they are under the operation of the Naval Construction Group. This is done in order to prevent the Regiment from interfering with the Readiness of any Battalion and enabling the unit to full recovery and refurbish the Readiness require to deploy in 12 months.

The biggest observation is that the Regiment is the Subject Matter Expert on planning and estimate construction projects, they are doing this every single day, and they are always under operation stress, and the leadership and staff are senior, moreover, with a lot more experience. The project development team is on homeport; this team has four civilians working in support of the Regiment requirement.

My recommendation is to fulfill this planning and estimated skill and readiness under the supervision of the Regiment under the Project Development team. The Regiment has the design and the specification of the projects each unit will be executing in the deployment. This recommendation will incorporate the training using the same project that the unit will execute in the Pacific. This will be required efforts from all parts including the Battalions, the Regiment, the Group, and Naval Expedition Command.

NECC: Accepting the requirement

Group (NCG 1): Stablishing and defining the requirement and the resources of fulfillment.

Regiment (30th NCR): Providing all the design and specification for each project early to enable the training. As well as providing the personnel to enable the training.

Battalions: Proving suitable personnel to attend the training.

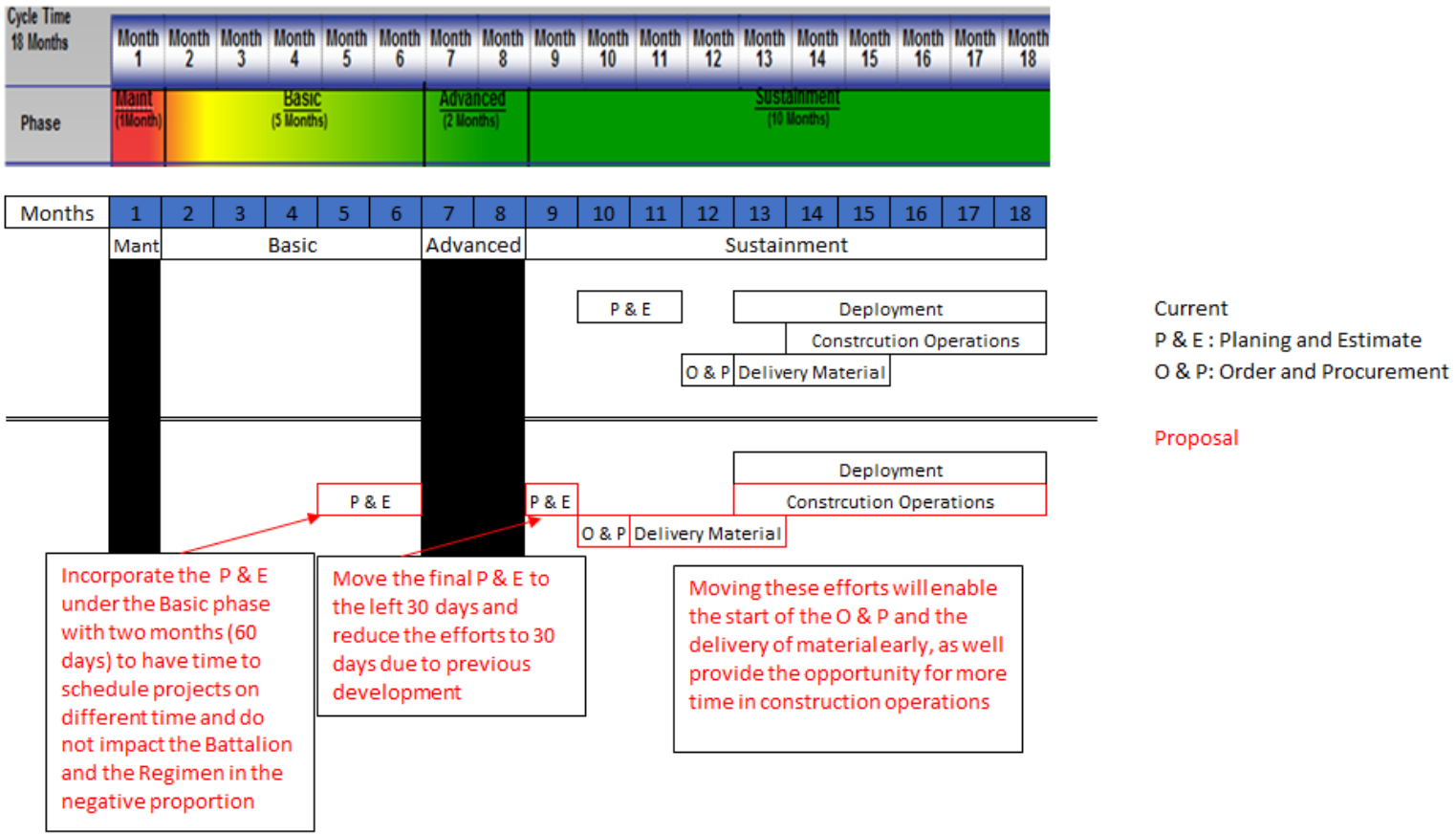


Figure 17 Proposal adjustment to the Cycle

Recommendation 3: Extend the Supply Chain Network

The first Supply Chain network has a prime main supply contractor, and they have around 100 small vendors in the US. It looks like a vast Network however it is the same contractor at the end. This avenue is old and poses the restriction of "Buy America," the specification of the contract was build based on the procurement of equipment and tools. Finally, the contrition material is classified as raw material for class II procurement means its construction. With this classification, the contract can be modified to add the jurisdiction in the Pacific Region removing the Regiment from the business of inventory and resources a third logistic component to pack and transfer all the material from Port Hueneme CA to more than 20 different cities in the Pacific.

This was one of the reasons for Inventory Discrepancies the turnaround between one contractor to another contractor was making the process very slow and inefficient to hold the accountability of the Inventory.

After some researches can be found other acquisition avenues to increase and build up the current supply network such as;

(1) Fleet Logistics Center (FLC), allocated in Yokosuka, Japan

This entity operates primarily in support of the sustainment of the Ships and Submarines. However, they can order construction material or as we know as consumables. This requirement from the NCF required extra support and will leed to extra tax and fee to incorporate this avenue. (Supply Corp, 2019)

Advantage:

(1) They are allocated in Japan and Korea geographic jurisdiction
(2) Pre-approved Host Nation vendors in the list with construction material in according country codes
(3) The logistic network already incorporated in the Host Nation
(4) Storage and Warehouse allocated for material flow and processing
(5) Capability to execute Simple Acquisition Procurement with local Warrant, however, limitation on staff

Disadvantage:

(1) Limitation of 7th Fleet Credit Card limitation of $5,000 per transaction

(2) Incrementation per description is not allowed

(3) Limitation of staff to support the NCF

Coverage:

All the Pacific region including Guam and Hawaii

Time of delivery: Between 7 to 20 days

(2) **Defense Logistics Agency via Blanket Purchase Agreement (BPA)**

This program is under the Supply Corp under the US Navy. The BPA is a preset contract with four basic contractors creating a small competition between these contractors to protect the fair and reasonable price for the government. This requirement from the NCF will require a fee of 15% of the procurement to incorporate this avenue. (Navy Supply Corp, 2017)

Advantage:

(1) They are allocated in Japan geographic jurisdiction

(2) Pre-approved four Host Nation vendors in the list with construction material in according country codes

(3) The logistic network already incorporated in the Host Nation

(4) No limitation of contract and no expiration on funds after the obligation

Disadvantage:

(1) Only Japan mainland region.

Coverage:

Japan mainland region.

Time of delivery: Between 21 to 45 days

(3) Government Purchase Card (GPC under 3rd Fleet)

Each unit in the US Navy possess a Government Purchase Card, and each card is subject to the specific rules of the Authority Area Officer in the case of our Seabees in the Port Hueneme they are subject to the 3rd Fleet Policies. This only requires research from the Battalion to provide at least three different quotes in order to select the must include an economic one. (US Supply Corp, 2019)

Advantage:

(1) They can support operation in each location of the world

(2) The unit owns the process

(3) Storage and Warehouse allocated for material flow and processing

Disadvantage:

(1) Limitation of 3rd Fleet Credit Card limitation of $2,500 per transaction

(2) Incrementation per description is not allowed

Coverage:

Worldwide

Time of delivery: Between 1 to 21 days

(4) Outsourced under Contracting Officer (KO)

The Department of the Defense provides Procurement Warrant to execute the contract in behave of the Federal Government across several organization. This support can be found under the installation engineering supports such as Public Work Department or something similar.

Advantage:

(1) Can implement any ware is an exciting Contracting Officer

(2) The award will bring the best price and competition possible for the NCF benefits

(3) Do not have any limitation on the threshold

(4) Tailor the contract as the NCF requirements fulfillments

(5) Capability to execute Simple Acquisition Procurement, however, limitation of staff and under the $25,000 (Faster Route ~30 days)

Disadvantage:

(1) Several Contracting Officers are against using their warrant to support a unit outside of their supervision.

(2) One single award without options, each modification will require at least 60 days for execution.

(3) Limitation of staff to support the NCF

Coverage:

Worldwide

Time of delivery: Between 45 days to 120 days

(5) Government Services Administration

The GSA's acquisition solutions offer private sector professional services, equipment, supplies, and IT to government organizations and the military. They have a library of

vendor already validated with prices negotiated. This requirement from the NCF to use this avenue will be a 10-20 % fee of the procurement. (GSA, 2019)

Advantage:

(1) Pre-set vendor and prices

(2) Pre-approved Host Nation vendors in the list with construction material in according with country codes

(3) The logistic network already incorporated in the Host Nation

(4) Storage and Warehouse allocated for material flow and processing

(5) No limitation on amount threshold

Disadvantage:

(1) Limitation of vendors in Japan, Philippines and Korea

(2) Incrementation per description is not allowed

Coverage:

Worldwide

Time of delivery: Between 30 days to 45 days

(6) Government Purchase Card (GPC under 7th Fleet)

Similar to the 3rd Fleet but subject to the 7th Fleet Police. (US Supply Corp, 2019)

Advantage:

(1) They can support operation in each location of the world

(2) The Regiment owns the process

Disadvantage:

(1) Limitation of 7th Fleet Credit Card limitation of $5,000 per transaction

(2) Incrementation per description is not allowed

(3) Limitation of staff to support the NCF

(4) Each unit needs approval from the Regiment on each transaction

Coverage:

Worldwide

Time of delivery: Between 7 days to 20 days

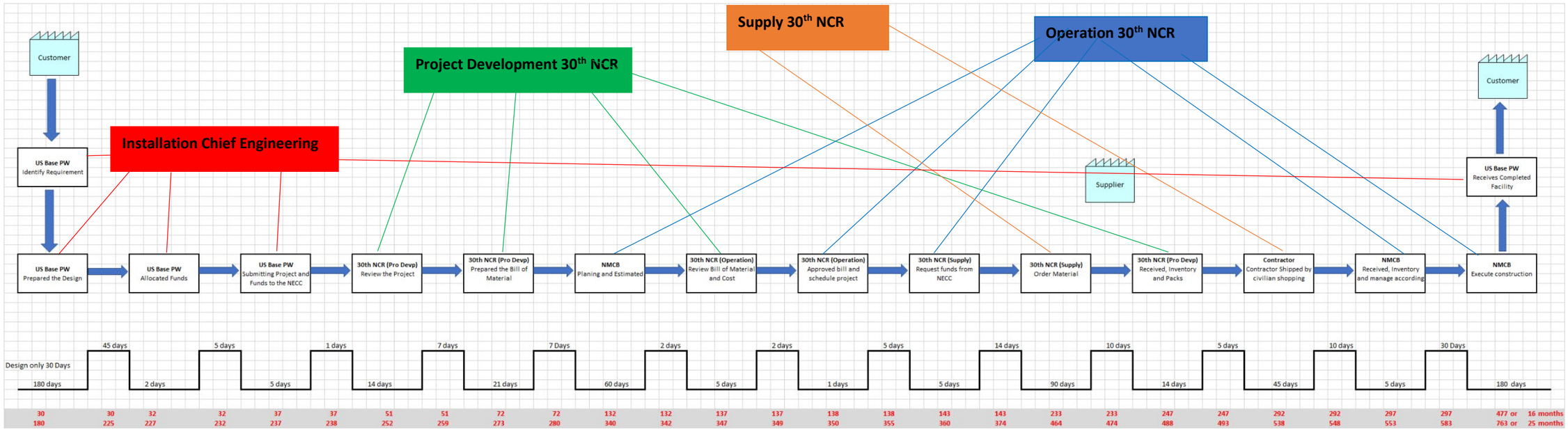
Regarding the Prime Vendor we need to incorporate in the contract the requirements to deliver all material to the specific location within the same original timeframe required to deliver in Port Hueneme CA; this will save almost 45 days and hold the accountability to only one contractor until delivery of the material to the Construction Battalion. As well, this implementation will increase the requirement of overseeing and accountability in the supply department. However, the network is not impossible to be expanded; they need to expand slow and to test each increase to ensure feasibility and proper function.

Procurement Sources	**Funding Type**	**To**
Fleet Logistics Center (FLC)	NAVCOMPT FORM 2275 (Order for Work and Services)	NAVFAC Far East PSC 473, BOX 13 FPO, AP 96349-0013 UIC: N40084 Kimio Nakazawa
Defense Logistics Agency via Prime Vendor (Prime Vendor)	MIPR (Military Interdepartmental Purchase Order)	DSCP C&E Finance Defense Supply Center Philadelphia 700 Robbins Ave Philadelphia, PA. 19111-5096
Defense Logistics Agency via Blanket Purchase Agreement (BPA)	MIPR (Military Interdepartmental Purchase Order)	DSCP C&E Finance Defense Supply Center Philadelphia 700 Robbins Ave Philadelphia, PA. 19111-5096
Government Purchase Card (GPC under 3rd Fleet)	OPTAR	Unit of execution
Outsourced under Contracting Officer (KO)	NAVCOMPT FORM 2276 (Request for contractual procurement)	Contractor Officer of execution
Government Services Administration	MIPR (Military Interdepartmental Purchase Order)	GSA GLOBAL SUPPLY CENTER 819 TAYLOR STREET, RM 6A06 FORT WORTH, TX 76102 POC is Anita Clark
Government Purchase Card (GPC under 7th Fleet)	OPTAR	Unit of execution

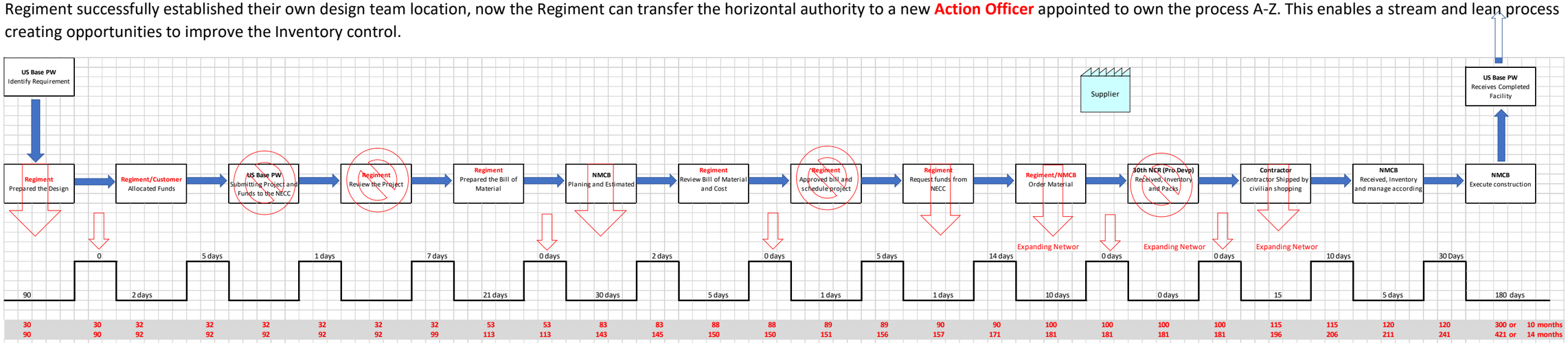
Figure 18 Point of Contact and type of Funding for each Acquisition avenues

Recommendation 4: Create a program owner

Let us take a look at the Value Stream Map; the first observation is the lack of process control. This is just the result of having the Construction Battalion Services process with many subprocesses with independent owners. While all these owners or stakeholders are committed to the NCF process, the fact is that each owner will prioritize his resources according to his installation interest. Therefore, the NCF Process will be push back or move forward with a lack of quality. At the Regiment, we have too many sub owners and holding the accountability and operation efficiency can get very challenging. Establishing a single point of the program, we can rebalance all of the resources in the process to meet a common target. In this approach, we are going to focus on the Navy Installation only.



We can appreciate four Process Owner with independent accountability, and they have a horizontal authority in the process. The coordination of these stakeholders is hard and require a lot of integration and follow up from the Operation Department to deliver a single project. Appointing a Naval Officer to lead and own the process from A to Z will take away the time wasted on lack of communication and approvals. Assuming the Regiment successfully established their own design team location, now the Regiment can transfer the horizontal authority to a new **Action Officer** appointed to own the process A-Z. This enables a stream and lean process creating opportunities to improve the Inventory control.



#	Step	Assessment
1	**US Base PW** Identify Requirement	**Owner:** Installation Chief of Engineering **Time:** Between 5-10 days ~~* in the VMS they are incorporated in the design~~ **Operation Risk:** **(1)** If one of the requirements is missing, the project can be completed but not suitable for occupancies and operation. **(2)** The missing requirement can delay the design. **Yield:** 90%
2	**Regiment** Prepared the Design	**Owner:** ~~Installation Chief of Engineering~~ Action Officer **Time:** Between 10 -180 days **Operation Risk:** ~~**(1)** Poor physical assessment creating more risk on the construction phase.~~ **(2)** Missed requirements for that particular country or installation. ~~**(3)** Can be a delay to the point where the project is no longer needed.~~ **Yield:** ~~50%~~ 90% - The design will be centralized with a full geographic assessment by locations, and the resources will be working only for the NCF requirement
3	**Regiment/Customer** Allocated Funds	**Owner:** Installation Chief of Engineering /Action Officer **Time:** From the moment the design is completed, most of the time, sitting in the shell on average 45 days until another department takes for funding. The allocation of funding normally takes two days. **Operation Risk:** **(1)** Funds expiration are too close to the start of the project. ~~**(2)** Do not follow the appropriation requirement by Congress.~~ **Yield: 99%** - The Action Officer will be part of the Funding Allocation process to double ensure of proper process
4	 **US Base PW** Submitting Project and Funds to the NECC	~~**Owner:** Installation Chief of Engineering~~ ~~**Time**: From the moment the funds have identified the need to be the route for approval on average five days, until start the processes where normally takes five days.~~ ~~**Operation Risk:**~~ ~~**(1)** Send the wrong funding document stream.~~ ~~**(2)** Send to the wrong person or the wrong amount~~ ~~**(3)** Lack of knowledge from the installation and how to submit the project.~~ ~~**Yield: 99%**~~ - No longer need it, this step was included in step 3
5	 **Regiment** Review the Project	~~**Owner**: Regiment~~ ~~**Time**: On average 14 days~~ ~~**Operation Risk:**~~ ~~**(1)** Approval without balancing the schedule and resources~~ ~~**(2)** Miss critical point of the design and requirements~~ ~~**Yield: 70%**~~ - The Regiment has access to the design process; it is no need for extra review.

6	**Regiment** Prepared the Bill of Material	**Owner:** ~~Regiment~~ Action Officer **Time**: On average 21 days **Operation Risk:** ~~**(1)** Unsuitable Initial Cost Estimate~~ ~~**(2)** Unsuitable Initial Bill of Material~~ ~~**(3)** Lack of staff to perform a good review~~ **Yield:** ~~**50%**~~ **80%** - With the involvement of the design team and the project development team under the supervision of the Action Officer, the Operation Risk are mitigated
7	**NMCB** Planning and Estimated	**Owner:** NMCB **Time**: ~~Between 30-60 days~~ 30 days **Operation Risk:** ~~**(1)** Late delivery of the project package~~ ~~**(2)** Poor Bill of Material and Resources level~~ ~~**(3)** Lack of knowledge to produce a Project Package~~ **Yield:** **90%** - Involving the Battalion on the Planning and Estimated as recommended will increase the skills and pre-stage a lot of the work for P & E at the front and not in the process
8	**Regiment** Review Bill of Material and Cost	**Owner:** ~~Regiment~~ Action Officer **Time**: On average five days **Operation Risk:** **(1)** Approval project closest to the Congregational Threshold without gap for rework **Yield:** **99%**
9	**Regiment** Approved bill and schedule project	~~**Owner:** Regiment Action Officer~~ ~~**Time**: On average one days~~ ~~**Operation Risk:**~~ ~~**(1)** Poor resources level between a unit of execution~~ ~~**Yield: 80%**~~ - Due to the involvement of the Action Officer in step 8, this step is no longer needed.
10	**Regiment** Request funds from NECC	**Owner:** ~~Regiment~~ Action Officer **Time**: ~~On average five days~~ one day **Operation Risk:** ~~**(1)** The poor description of the bill of material~~ **(2)** Wrong funding document submission **(3)** Wrong line of account created **Yield:** **99%** - The project team have more comprehension of the scope of work of the project

11	**Regiment/NMCB** Order Material	**Owner:** Regiment/ NMCB **Time**: ~~On average, 90 days; however, this step can be a night mirror and take up to 180 days.~~ Ten days **Operation Risk:** ~~**(1)** The poor description of the bill of material~~ ~~**(2)** Delay on Request for Information from the vendor~~ ~~**(3)** Order wrong requirement according to the design and specification~~ ~~**(4)** Wrong avenue of acquisition to obtain some material~~ **(5)** Order beyond approval for safety stoke ~~**(6)** Wrong out of funding~~ **(7)** Delays in the material due to customization **Yield: ~~50%~~** 90% - Appointing an Action Officer will synchronize all efforts and resources on this evolution to ensure full optimization of the process and the Chain of Supply. - The expansion of the Networking will enable more resources for the NCF
12	**30th NCR (Pro Devp)** Received, Inventory, and Packs	~~**Owner**: Regiment~~ ~~**Time**: On average 14 days~~ ~~**Operation Risk:**~~ ~~**(1)** Misplace inventory~~ ~~**(2)** Delay Inventory due to lack of staff to perform~~ ~~**Yield: 85%**~~ - The expansion of the Network will enable more resources for the NCF, and step 12 will no longer needed.
13	**Contractor** Contractor Shipped by civilian shopping	**Owner:** ~~Regiment~~ Contractor **Time**: On average ~~45~~ 15 days **Operation Risk:** ~~**(1)** Misplace inventory~~ ~~**(2)** Delay Inventory due to Q hold on Ships~~ **Yield: 95%** - The expansion of the Network will enable more resources for the NCF will no longer need to outsource this effort, this will be part of the procurement of material
14	**NMCB** Received, Inventory and manage according	**Owner:** NMCB **Time**: On average five days **Operation Risk:** **(1)** Misplace inventory **Yield: 90%**
15	**NMCB** Execute construction	**Owner:** NMCB **Time**: On average 180 days **Operation Risk:** **(1)** Misplace inventory **(2)** Quality Issues **(3)** Changes in the project scope due to unforeseen condition **Yield: 70%**

16	**US Base PW** Receives Completed Facility	**Owner:** Installation Chief of Engineering **Time:** N/A **Operation Risk:** **(1)** Miscommunication on the requirement **(2)** Quality Issues **Yield: 99%**

Recommendation 5: SMED between NMCB Turnover in the Pacific

In order to apply Single-Minute Exchange of Dies, we need to identify all the step in the process to execute a construction Battalion in the Pacific. Following is all the steps involved in the process:

1. Battalion A conclude construction operation
2. Battalion A conduct a retrograde of all material, equipment, and tools back to headquarters
3. Battalion A conduct a full inventory of all material, equipment, and tools
4. Battalion B arrived
5. Battalions execute the joint inventory
6. Battalion B takes ownership of all material, equipment, and tools
7. Battalion B conducts a retrograde of all material, equipment, and tools back to the project sites
8. Battalion B begins construction operations

Step 1: is not required

The Battalion has a tradition to stop construction operation in preparation to turn over the mission to the next Battalion. This will prevent rushing construction leading to a quality problem in the end. As well many leaders argue the exhauster of continuous operation while turnover is in process. While it is true, the NCF still can reinforce quality and plan according to complete any remaining task while the next Battalion arrived in the region and gets ready to assume construction operations.

Step 2: is not required

This is tradition accountability in the NCF, however, it's just a preference and not a requirement. If the Battalion A, follows the process of the 5S' and continues inventory it's not a reason to have many discrepancies in the field. The battalion can execute the joint inventory on the construction sites.

Step 3: can be classified as an external element

Like mentioned in Step 2, this can be done as an external operation of the turnover.

Step 4: can be classified as an external element

This is an external operation while it requires some support elements to help with the evolution; the Battalion can continue construction.

Step 7: is not required

If we eliminated step 2 then step 7 is not required.

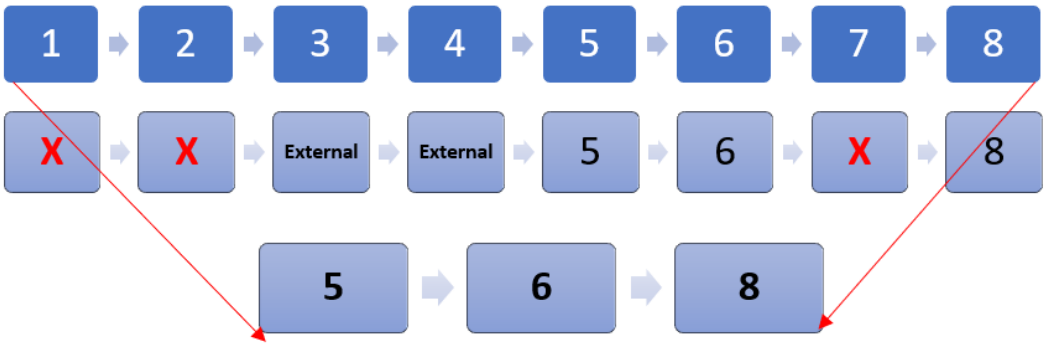


Figure 19 SMED on turnover Construction Battalions

Recommendation 6: Create an inventory system and allocated one common data-based

Per year the Navy has been working and promoting to the management of the Navy inventory with the excellency and efficiency of the privet enterprise. Integration of system and platformer are the trend of technology. The world is moving forward of data share and inter-geographic visibility and accessibility of information. The Seabees have been working the inventory, procurement, and accountability in several differences' platform and paper tracking sheet. This is completed the obsoleted system and is creating a huge waste of material and over-processing. Lest analyze a tradition flow of information and inventory control of a Battalion in the Pacific.

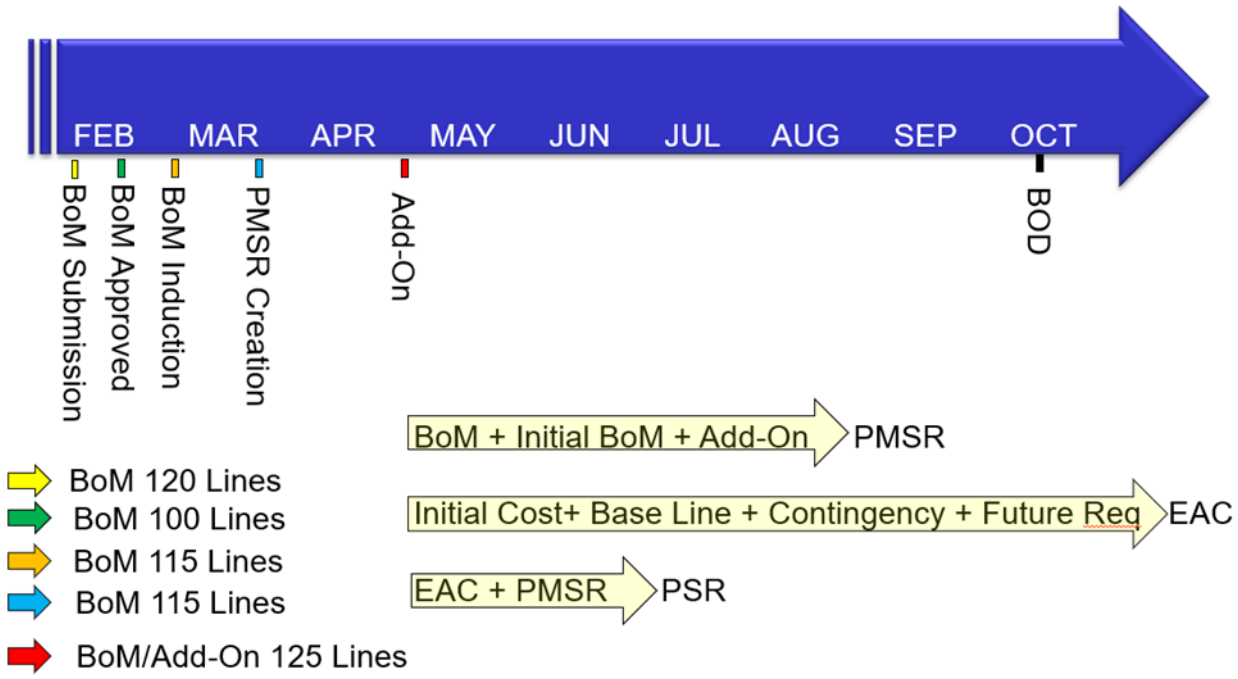


Figure 20 Traditional Inventory control flow for a small project

The **BoM** (Bill of Material) this report has many evolutions for across the life of the project. This first evolution is with the Project Development Team at the Regiment. This initial BoM is only focused on long-lead items such as the procurement of a Pre-Fabric Engineering Building or an Electrical Transformer. The Initial BoM can reach 50% of the budget, however, will include on average 30 lines (items). Then the Battalion executes a completed full Plan and estimate and creates a detail BoM based on construction approach. After the Battalion presented the proposal BoM to the Regiment and the regiment makes some changes the NCF now have an approved BoM with an average of 400 lines per project. This BoM will increase up to 450 on average

after being inducted on the commercial market for a quote. The increase is based on the decision of the MLO Officer on negotiation with the vendor looking for the best prices as well sometimes the project team only needs two items of a specific element; however, the commercial vendor only sells a minimum of four.

Moreover, for last evolution we have the add-on, each project will have the unforeseen condition as well the project team will miss some items on the planning, creating a new requirement in the life of the project. This is how a BoM con increases on average up to 500 lines per project. An example is presented on Encloser 2

After the induction of the BoM on the commercial enterprise requesting quotes the BoM will remain in the project package, and the following status will be transferred to the **PMSR** , this is the main report (Project Material Status Report) and is very detailed comprehended and is delivered to the Regiment for 100% revision bi-weekly the responsible for the report is the Material Liaison Officer, who is working for operation under Supply Administration. An example is presented on Encloser 3

The EAC (Estimation After Completion) is the report for funding this report belong to the Supply Officer and this report containing all the funding for each project and all the Lines of Accounts created by Fiscal Years. This report is delivered monthly, and an example is presented on Encloser 4

The PSR is a Project Status Report and belongs to the Project Team responsible for executing the project. This report is weekly. An example is presented on Encloser 5

The combination of all these reports must be 100% accurate and must match with each other. The Regiment possesses control to see and monitor all transactions. However, they will remain as a supervisor and act as required following the law and orders. All these reports are a repetition of information and accountability across the NCF. We spend a significant amount of time and resources on managing this data based independent while we have so many tools to incorporate all in one share point.

As part of these efforts, we can include the barcode label or RFID. At this moment, the NCF does not have labels or a professional way to track inventory. The RFID is recommended in ISO

9001 as part of a good quality management process and has been implemented in the majority of the privet enterprises (Hamade, 2018).

The RFID key opportunities for the NCF is to increase the management and control of its fixed and mobile assets. The identification, tracking, and monitoring of assets have traditionally been labor-intensive and complex, particularly for mobile assets where asset location often changes. Many software's addresses these challenges, allowing more modernized and automated data capture. (RAMP, 2019)

Applications

1. Location – Know the exact location of all assets.
2. Dispatch and Receive – Automate the receiving and dispatching of assets
3. Stock Levels – Quick and easy stocktaking of all assets
4. Asset Maintenance – Performing scheduled services and ensuring maintenance history is updated to reduce time and cost associated with typical processes.
5. Process Automation – RFID technology is used to improve location and status data to automate workflow operations.
6. Asset Security – Alerts are generated when unauthorized activity is detected. Alerts can take the form of an alarm, a flashing light, or an email.
7. Item Accountability – Personnel & items are both tagged to record the identity of the Seabees performing the tasks, to provide better accountability.
8. Usage History – Track the usage history of assets, including movement and engine hours.

Benefits

1. Increased productivity – Employees spend less time tracking down missing or misplaced equipment.
2. Accuracy – Collect data faster in greater detail & eliminate human error.
3. Compliance – Reporting flexibility with more accurate records.
4. Accountability – Enforces personal responsibility and accountability for company property.
5. Improved efficiency – Streamline current processes.

Recommendation 7: Mapping FMEA and Operation Risk

To understand the service is useful to break down into a set of sub-processes. Service break down, in general, is conducted according to the process perspective because service definitions are formed mainly from the process perspective (Shostack, 1987). The breakdown is a good way of focusing on customer activity to understand the dynamic interactions between customers and the service system.

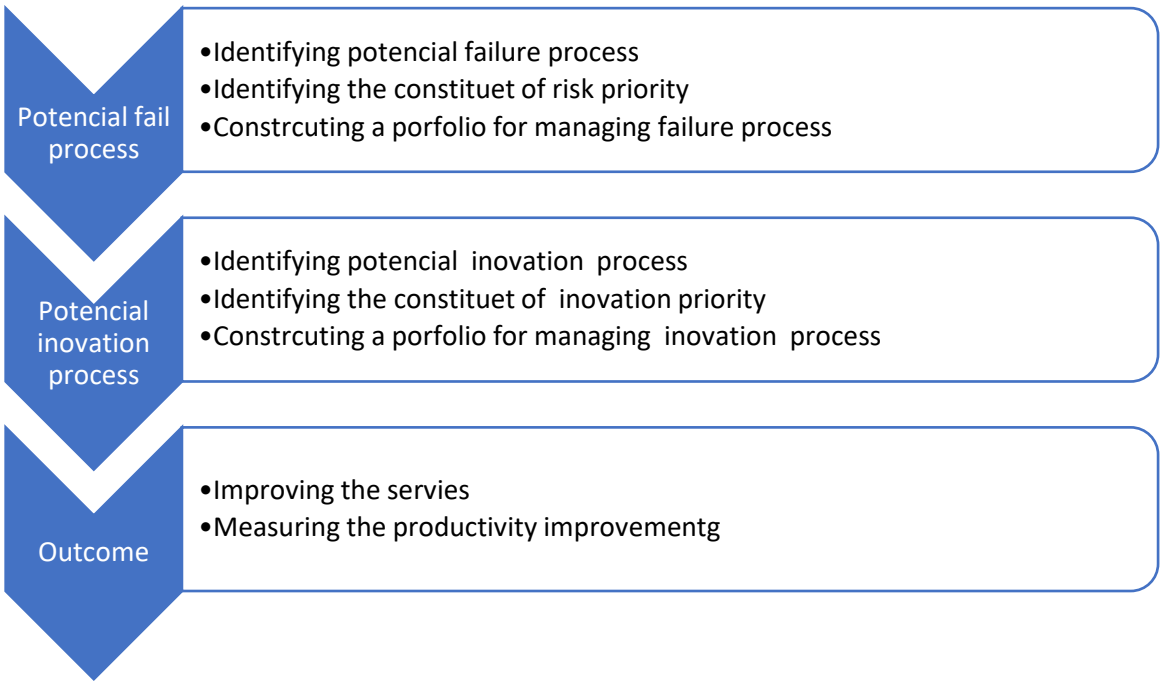


Figure 21 Overall process assessment

The failure process is defined as the degree to which a process or a sub-design process is probable to fail, causing either design failure or a decrease in quality (Kneip, 2004). Thus, detecting and improve failure process can result in productivity improvement. In a service situation, a failure process can be well-defined as a potential occurrence that can cause customer displeasure or reduction the customer's perceived quality. They are some consideration point for identifying failures process in services such as customer participation and interaction in services process, customization, service visibility, service encounter, output heterogeneity, and resources (Geum, 2010).

Treating the failure process can increase productivity by eliminating or amending the possible failure points. The purpose of a failure process remediation is to minimize losses, whereas that of the innovation model is to create value. We have some fundamental driving forces for service

innovation, such as technology, knowledge, market, human resources, and organization. Now we are going to assess the fail process using an FMEA criterion to create a portfolio in according with “FMEA-Base portfolio approach to service production improvement.”

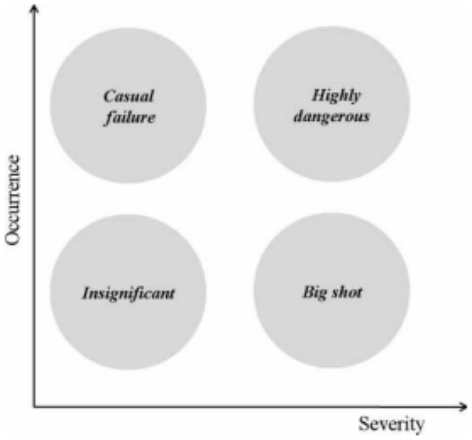


Figure 22 Portfolio matrix for failures process

The ‘**highly dangerous’** quadrant is characterized by high severity and high occurrence, point toward failure process with the frequent occurrence and great damaging influence. The uppermost importance should be given to the processes in this ‘highly dangerous’ quadrant.

The **‘big shot’** quadrant is characterized by high severity and low occurrence. The failure process in this quadrant arises when a failure is not as frequent but causes a massive loss to the total design process when it does occur. If the effect of a particular source is connected to many distributed processes, the unforeseen break-down of this resource may cause several processes to fail simultaneously, resulting in a severe impact on the whole design process.

Contrary to the ‘big shot’ quadrant, the **‘casual failure’** quadrant is characterized by low severity and high occurrence. These failures process is generated very frequently but has a negligible impact on the operations. These failures are an everyday occurrence and thus usually become a target of productivity improvement. Failure process with both low severity and low occurrence belong to the **‘insignificant’** quadrant and are not critical to overall productivity.

Taking into consideration the survey serves in the NCF at the Pacific region; we can create our portfolio to focus our effort tour the most significative process on modifying and improving.

In the same way, we can create a portfolio for the innovation process is built on two axes of impact and feasibility, as illustrated in Figure 19. The matrix is divided into four quadrants: core to innovation, tracking required, incremental innovation, and dud.

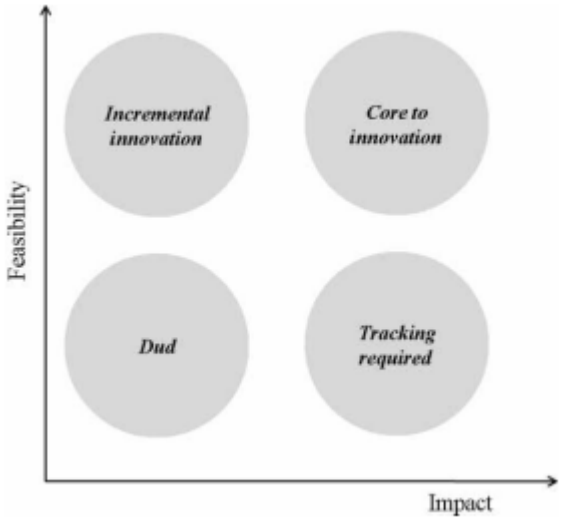


Figure 23 Portfolio matrix for the innovation process

The **'core to innovation'** quadrant is characterized by high impact and high feasibility. The innovation process in this category has the potential to upsurge the overall efficiency to a great extent. Above all, these rates should be measured as solid candidates for resource asset and implementation to improve productivity.

The **'tracking required'** quadrant is characterized by high impact and low feasibility. These innovation processes have high potential but face critical and hard impediments. Nevertheless, if expertly executed, these processes can significantly improve the overall system performance.

Innovation process under the **'incremental innovation'** quadrant is exactly the opposite of those in the 'tracking required' quadrant. Characterized by low impact and high feasibility, these processes are likely to be possible for specific modernizations but results in restricted output development.

Innovation process in the **'dud'** quadrant show low impact and low feasibility. Almost without exception, these factors are not probable to improvement modernization.

The meaningful metrics of input and output should be distinct not only from an operational viewpoint but also from a customer viewpoint. Thus, calculating service efficiency development should be well balanced between the customer and operational viewpoints (Johnston, 2001). Operational efficiency is measured through the old-style method by using the weighted entirety of input measures to that of output measures. This method has a habit of using simple quantitative measures such as time and cost. Customer efficiency measures, however, are based mostly on customer awareness and appraisal, concentrating on qualitative features (Rutkauskas, 2005).

Based on the waste identified and the Value Stream Map in the previous section, we are moving forward to create the NCF FMEA Portfolio matrix for failures process to observe how the recommendation will mitigate operational risk in the process as an example. In order to create a detailed portfolio, a team has to be appointed and committed to recollect that data point across the process for some time in order to provide an accurate portfolio and implement six sigma and lean according.

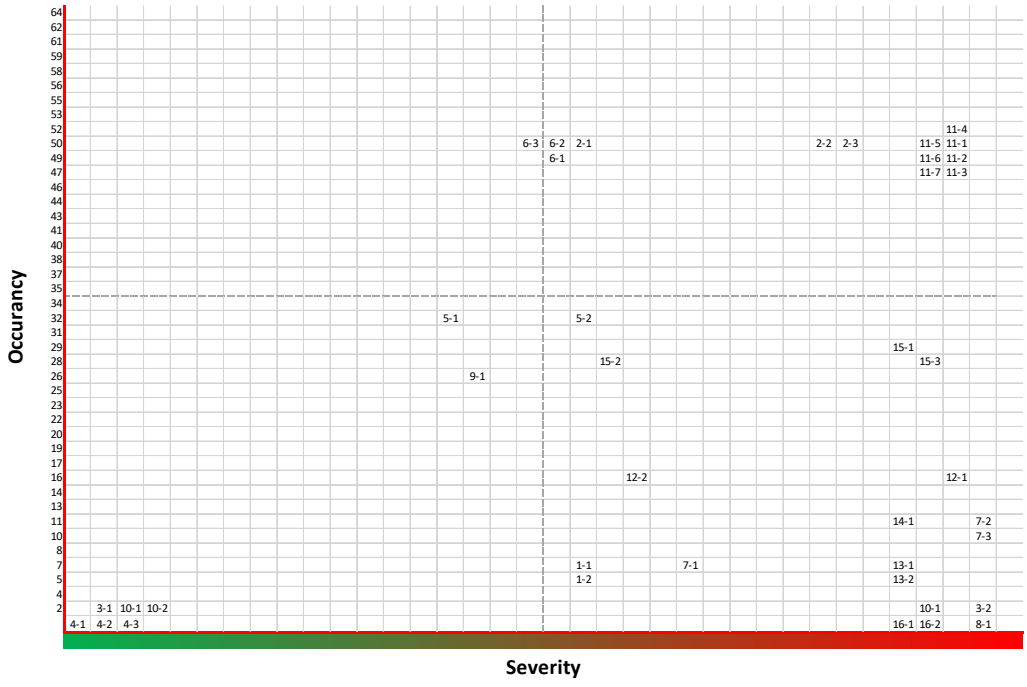


Figure 24 Draft Example of FMEA Failure Process Portfolio

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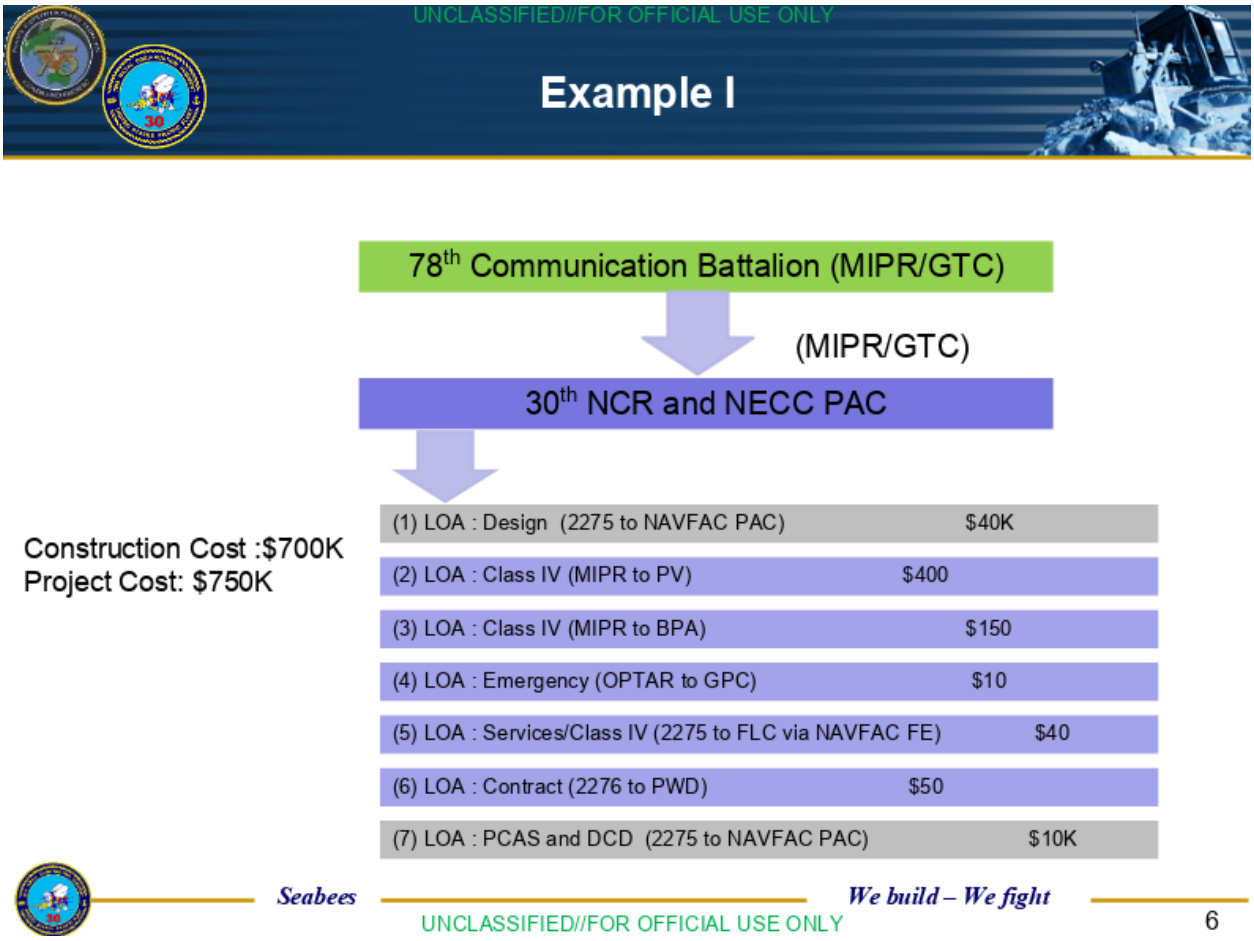
Enclosure 1: Allocation of Line of account



Example II

CNIC

(MIPR)

30th NCR and NECC PAC

Construction Cost :$500K
Project Cost: $515K

(1) LOA : Design (2275 to NAVFAC PAC)	$10K
(2) LOA : Class IV (MIPR to GSA)	$150
(3) LOA : Class IV (MIPR to PV FY16)	$250
(4) LOA : Emergency (OPTAR to GPC)	$10
(5) LOA : Services/Class IV (2275 to FLC via NAVFAC FE)	$40
(6) LOA : Class IV (MIPR to PV FY17)	$50
(7) LOA : PCAS and DCD (2275 to NAVFAC PAC)	$5K

Enclosure 2: Bill of Material

Example of Bill of Material

YO15-815 **CONSTRUCT WOODWORKING SHOP ADJACENT TO** Estimator Porter

Remarks: Phone#:

Supplycore **Q #** **RFQ:** **RFQ Comp:** BOM Series YODG

YO15-815 BOM: 100L-

L/I	CSI Div	Description	Note:	QTY:	UM:	Est UPrice:	Ex Est Price
1	3 30 00	CONCRETE, 28 MPA (4000 PSI), 10 CM SLUMP READY MIX, JIS 5308.	WITH PUMP TRUCK	80	CZ	$320.00	$25,600.00
2	3 21 03	STEEL, REINFORCING BAR, DEFORMED, D 10, GRADE 420, (6MR/LG).	FOR PEDESTALS	36	LG	$5.50	$198.00
3	3 21 03	STEEL, REINFORCING BAR, DEFORMED, D 13, GRADE 420, (6MR/LG).	FOR SLAB	661	LG	$8.60	$5,684.60
4	3 21 03	STEEL, REINFORCING BAR, DEFORMED, D 16, GRADE 420, (6MR/LG).	FOR TYING SLAB TO FOOTER	28	LG	$12.80	$358.40
5	3 21 03	STEEL, REINFORCING BAR, DEFORMED, D 19, GRADE 420, (6MR/LG).	FOR FOOTERS AND PEDESTALS	264	LG	$18.00	$4,752.00
6	3 20 00	SUPPORT, REINFORCING BAR, HIGH CHAIR, 100 mm, CLASS 1 PLASTIC, W/ BASE, EPOXY COATED, (100EA/BX) OR LOCAL EQUIVALENT OR BETTER	FOR SUPPORTING PAD AND FOOTERS REINFORCING BAR	30	BX	$35.00	$1,050.00
7	7 26 00	VISQUEEN, VAPOR BARRIER 15 MIL, 4MX 42M ROLL, OR LOCAL EQUAVALENT OR BETTER	FOR VAPOR BARRIER UNDER SLAB	4	RO	$110.00	$440.00
8	7 26 00	TAPE, VAPOR BARRIER SEALING AND REPAIR,100mm X 65M, VAPOR BOND, (65M/RO) OR LOCAL EQUAVALENT OR BETTER	FOR VAPOR BARRIER	2	RO	$7.40	$14.80
9	3 20 00	WIRE, TIE, 16 GAUGE, BLACK, ANNEALED, (100/ RO) OR LOCAL EQUAVALENT OR BETTER	FOR TYING ALL REINFORCING BAR IN SLAB AND FOOTERS	6	RO	$5.90	$35.40
10	6 11 01	LUMBER, 50mm X 100mm X 3050mm, S4S, DOUGLAS FIR STRUCTURAL GRADE OR LOCAL EQUAVALENT OR BETTER	FOR FORMWORK	500	LG	$4.15	$2,075.00
11	6 16 02	PLYWOOD, 19mm X 1220mm X 2440mm, ACX. OR LOCAL EQUAVALENT OR BETTER	PLYWOOD FOR FORMWORK AND INTERIOR WAINSCOT WALLS	510	SH	$41.98	$21,409.80
12	3 11 03	STAKE, STEEL FLAT BAR, 10mm X 39mm X 762mm WITH PRE-DRILLED NAIL HOLES, (50 EA/BD), OR LOCAL EQUIVALENT OR BETTER.	FOR FORMWORK	4	BD	$258.00	$1,032.00

APPROVED

28-Nov-2017 Page 1 of (FOUO)

YO15-815		BOM: 100L-					
L/I	CSI Div	Description	Note:	QTY:	UM:	Est UPrice:	Ex Est Price
13	3 22 00	REINFORCEMENT, WELDED WIRE MESH, 104 X 104 MM W9.1/9.1, SHALL CONFORM TO JIS G 3551, 2.5M X 6M SHEET.	FOR RAMP AND LANDING	3	SH	$120.00	$360.00
14	5 15 02	STUD, METAL, 20 GAGE, GALVANIZED STEEL, 92MM X 3MR LENGTH.OR LOCAL EQUAVALENT OR BETTER	FOR SHOP,OFFICE,RESTROOM,STORAGE CLOSET WALLS	125	LG	$5.60	$700.00
15	5 15 03	STUD, METAL, 20 GAGE, GALVANIZED STEEL, 156 MM X 3MR LENGTH.OR LOCAL EQUAVALENT OR BETTER	FOR RESTROOM WALLS	15	LG	$17.97	$269.55
16	5 15 15	TRACK, METAL, 20 GAGE, GALVANIZED STEEL, FOR 92MM STUDS, 3MR LENGTH.OR LOCAL EQUAVALENT OR BETTER	FOR INSTALLATION OF SHOP, OFFICE,RESTROOM AND STORAGE CLOSET WALLS	80	LG	$5.74	$459.20
17	5 15 15	TRACK, METAL, 20 GAGE, GALVANIZED STEEL, FOR 156MM STUDS, 3MR LENGTH.OR LOCAL EQUAVALENT OR BETTER	FOR INSTALLATION OF REST ROOM WALLS	6	LG	$13.92	$83.52
18	5 15 15	TRACK, METAL, 18 GAGE, GALVANIZED STEEL, FOR 156MM STUDS, 4.9MR LENGTH.	FOR RESTROOM AND STORAGE CLOSET DRYWALL CEILING	4	LG	$13.92	$55.68
19	5 15 03	STUD, METAL, 18 GAGE, GALVANIZED STEEL, 156MM X 3MR LENGTH.OR LOCAL EQUAVALENT OR BETTER	FOR RESTROOM AND STORAGE CLOSET DRYWALL CEILING	9	LG	$14.37	$129.33
20	49 00 00	SHOT, HILTI , .27 CAL. SHORT. IN MAGAZINES OF 10 EA. COLOR: RED (100/PK).OR LOCAL EQUAVALENT OR BETTER	http://www.homedepot.com/p/Hilti-0-27-Caliber-Red-Boosters-100-Pack-50353/202057641. FOR INSTALLATION OF METAL STUD TRACKS	10	PK	$65.76	$657.60
21	49 00 00	ANCHOR, X-U 22 P8 S15, (100EA/BX), BY HILTI # 237370 R LOCAL EQUAVALENT OR BETTER	https://www.hilti.com/direct-fastening/general-purpose-powder-actuated-systems/237370	10	BX	$63.75	$637.50
22	32 12 00	ASPHALT, CONCRETE, 3/4" MINUS, HOT MIX.	FOR REPAIR OF ALL ASPHALT DAMAGED OR REMOVED FOR UTILITY INSTALLATION IN COMPLETION OF PROJECT	7	TN	$478.00	$3,346.00
23	32 12 00	TACK COAT, EMULSIFIED, ASPHALT.OR LOCAL EQUAVALENT OR BETTER	FOR ALL EDGES OF ADJACENT SURFACES OF NEW ASPHALT INSTALLATION.	2	GL	$13.97	$27.94

YO15-815		BOM: 100L-					
L/I	CSI Div	Description	Note:	QTY:	UM:	Est UPrice:	Ex Est Price
33	95 00 00	CROSS TEE 4' LG, PRELUDE XL 2000 WHITE SEISMIC RESIST GRID, (60EA/ BX).OR LOCAL EQUIVALENT OR BETTER.	FOR OFFICE CEILING	1	BX	$200.00	$200.00
34	95 00 00	WALL ANGLE 10' LG PRELUDE XL 2000 WHITE SEISMIC RESIST GRID, (40EA/BX).OR LOCAL EQUIVALENT OR BETTER.	FOR OFFICE CEILING	1	BX	$230.00	$230.00
35	26 05 33	FASTENER,#10 x 3/4" HWH SELF-DRILLING SCREW WITH 90 DEGREE CLIP AND 36" WIRE 10 GAGE PRE-TIED PART# CL1HWHT1034 ORDER# PT3610CL1HWHT1034 OR LOCAL EQUIVALENT OR BETTER.	http://www.ceasattachments.com/index.php/catalogsearch/result/?q=CL1HWHT1034	20	EA	$1.10	$22.00
36	8 10 00	DOOR, HOLLOW METAL WITH FLUSH FRAME (FOR METAL STUD WALL) 914mm X 2134MM X 38MM , RIGHT HAND REVERSE, OVERHEAD CLOSER, STEEL STIFFENERS,NO THERMAL BREAKS.FACTORY PRIMED.OR LOCAL EQUIVALENT OR BETTER.	ASSURE DOOR FRAME FITS OVER 123.8MM TO ACCOUNT FOR METAL STUD AND DRYWALL. 1-1/2 PAIR SST HARDWARE SET.INCLUDE CYLINDRICAL LOCK SET,DOOR SEALS,EXIT LEVER, HINGES, &HEAVY-DUTY CLOSER. SEE DOOR SCHEDULE D3 ON SHEET A-7	2	AY	$1,250.00	$2,500.00
37	83 00 40	DOOR, HOLLOW CORE, METAL, FLUSH, METAL FRAME, 914MM X 2134MM X 38MM ,LEFT HAND DOOR, W/ 700MM WIDE X 800MM HEIGHT X 6.35MM THICK WIRE GLASS (VISION PANEL), (DOOR TYPE D3), OVERHEAD CLOSER, STEEL STIFFENERS,NO THERMAL BREAKS, FACTORY PRIMED.OR LOCAL EQUIVALENT OR BETTER.	ASSURE DOOR FRAME FITS OVER 123.8MM TO ACCOUNT FOR METAL STUD AND DRYWALL. 1-1/2 PAIR SST HARDWARE SET.INCLUDE CYLINDRICAL LOCK SET,DOOR SEALS,EXIT LEVER, HINGES, &HEAVY-DUTY CLOSER. SEE DOOR SCHEDULE D3 ON SHEET A-7	1	AY	$1,250.00	$1,250.00
38	85 20 10	WINDOW, FIXED, ALUMINUM(ANODIZED), , SIZE 914MM W X 914MM H, ROUGH METAL STUD OPENING.OR LOCAL EQUIVALENT OR BETTER.	ALL COLOR SCHEMES SHALL BE APPROVED BY CUSTOMER. SEE WINDOW SCHEDULE W2 ON SHEET A-7	3	EA	$225.00	$675.00
39	8 00 00	SHIM, WOOD, 203MM LENGTH(8IN) , (14EA/BD).OR LOCAL EQUIVALENT OR BETTER.	FOR INTERIOR DOORS AND WINDOW INSTALLATION.https://www.homedepot.com/p/8-in-Cedar-Shims-14-Piece-per-Bundle-WSSHW08/300663399	3	BD	$1.72	$5.16

YO15-815		BOM: 100L-					
L/I	CSI Div	Description	Note:	QTY:	UM:	Est UPrice:	Ex Est Price
40	5 40 03	BOLLARDS,100MM DIAMETER, GALVANIZED STEEL, (1525MM/EA) HD SUPPLY 270472 PAINTED REFLECTIVE YELLOW.OR LOCAL EQUAVALENT OR BETTER.		2	EA	$85.00	$170.00
41	9 98 00	KIT, PAINT ROLLER LINZER 8-PIECE ROLLER TRAY SET. THE SET INCLUDES A METAL ROLLER TRAY WITH LADDER-LOCK LEGS, SEVERAL ROLLER COVERS, A 3 IN. FRAME AND A 9 IN. FRAME, A 2 IN. BRUSH AND A PAINT-CAN OPENER. USE WITH MOST PAINTS TWO 3/8 IN. PYLAM ROLLER COVE	http://www.homedepot.com/p/Linzer-Roller-Tray-Set-8-Piece-RS-701-SP/100064287	2	KT	$11.51	$23.02
42	9 98 00	COVER, PAINT ROLLER, 3/8" KNAP FOR 9" ROLLER, HIGH DENSITY POLYESTER, LINSER # RS 1433, (3/PK) .	http://www.homedepot.com/p/Linzer-9-in-x-3-8-in-High-Density-Polyester-Roller-Covers-3-Pack-RS-1433/100090787	2	PK	$4.50	$9.00
43	9 98 00	BRUSH, PAINT, SET, INCLUDING 1", 1-1/2", & 2", NYLON POLYESTER BLEND.	FOR TOUCH UP PAINTING	2	SE	$24.68	$49.36
44	9 91 00	PAINT, INTERIOR, ACRYLIC LATEX, SEMI GLOSS,(19 LITER/ CN) OR LOCAL EQUIVALENT OR BETTER.	VERIFY COLOR WITH CUSTOMER BEFORE PRODUCTION	2	CN	$175.00	$350.00
45	9 97 13	PAINT, METAL, ALKYD, HIGH PERFORMANCE PROTECTIVE ENAMEL, BRAND: RUSTOLEUM (7.5 LITER/PK.)OR LOCAL EQUIVALENT OR BETTER.	INTERIOR DOORS-VERIFY COLOR WITH CUSTOMER BEFORE PRODUCTION	1	EA	$55.96	$55.96
46	51 00 00	SCREWS, Philips Bugle-Head Fine Thread,Drywall, #6 x 50mm. (1 lb.-Pack) For Metal Studs.OR LOCAL EQUIVALENT OR BETTER.	For Door installation	1	PK	$5.97	$5.97
47	51 00 00	SCREWS, WOOD, PHILLIPS PAN-HEAD 4x30 (10LB/BX) LENGTH,OR LOCAL EQUIVALENT OR BETTER.	Bought previously through Sanko for Project JK17-878	2	BX	$8.00	$16.00
48	3 11 00	AGENT, CONCRETE FORM RELEASE, NON-STAINING, DRIES CLEAR, (4 LITER/CN).OR LOCAL EQUIVALENT OR BETTER.	FOR FORMWORK.PREVIUOSLY PURCHASED THROUGH LOCAL VENDOR MANOI	1	CN	$14.97	$14.97

YO15-815		BOM: 100L-					
L/I	CSI Div	Description	Note:	QTY:	UM:	Est UPrice:	Ex Est Price
49	3 39 00	AGENT, CONCRETE CURING COMPOUND, WATER BASED CLR, TYP 1, ASTM STD, (4 LITER/BT).OR LOCAL EQUAVALENT OR BETTER	FOR SLAB INSTALLATION.PREVIOUSLY PURCHASED THROUGH LOCAL VENDOR YOZYOZAI	7	BT	$64.95	$454.65
50	49 00 00	SPRAYER, INDUSTRIAL 3 GALLON POLY, GENERAL DUTY, CHAPIN # 2553E OR LOCAL EQUAVALENT OR BETTER	ONE SPRAYER FOR FORM RELEASE APPLICATION AND ONE FOR CURING COMPOUND APPLICATION.	2	EA	$64.99	$129.98
51	3 15 19	BOLT, ANCHOR (19mm 3/4" X MIN 508MM 20") HEADED BOLT, ASTM F1554, GRADE 36. (LOW CARBON, 36 KSI YIELD STEEL), PORTLAND BOLT PART # 18024 (48) WITH TWO NUTS AND WASHERS EACH.	FOR SECURING PEB TO SLAB	48	EA	$10.42	$500.16
52	9 23 00	BEAD, CORNER 32mm X 32mm X 3050MM , DRYWALL, GALV STEEL, .OR LOCAL EQUAVALENT OR BETTER	FOR DRYWALL INSTALLATION. Https://www.homedepot.com/p/Gibraltar-Building-Products-10-ft-Galvanized-Metal-Corner-Bead-10524/100356006	40	EA	$1.82	$72.80
						Total Est Price	$77,450.89

Approved By JOLIN.DANIEL.ALBERT.1006403472

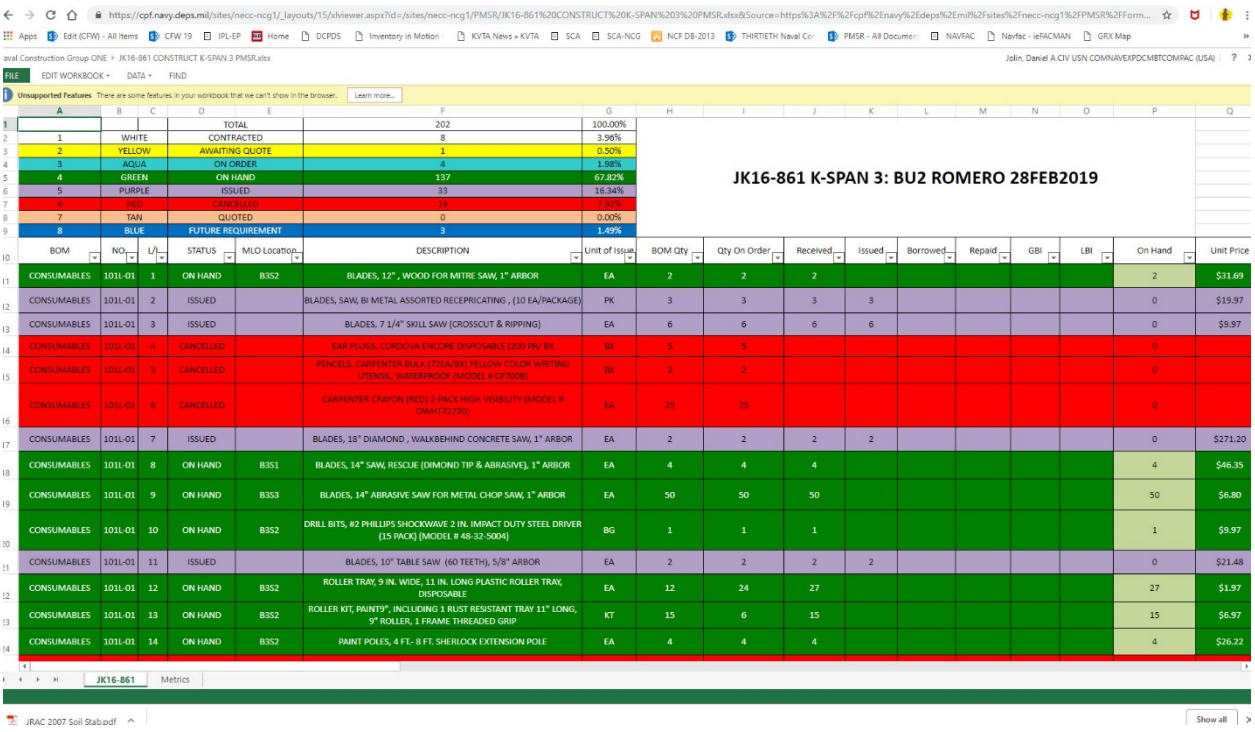
Digitally signed by JOLIN.DANIEL.ALBERT.1006403472
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USN, cn=JOLIN.DANIEL.ALBERT.1006403472
Date: 2017.11.28 13:17:13 -08'00'

APPROVED

YO15-815		BOM: 100L-					
L/I	CSI Div	Description	Note:	QTY:	UM:	Est UPrice:	Ex Est Price
24	32 12 00	PRIME COAT, EMULSIFIED, ASPHALT.OR LOCAL EQUAVALENT OR BETTER	PREPARE SURFACE FOR ASPHALT INSTALLATION	2	GL	$13.97	$27.94
25	9 21 00	WALLBOARD, GYPSUM, 16MM X 1219MM X 2438MM.OR LOCAL EQUAVALENT OR BETTER	FOR OFFICE, RESTROOM, AND STORAGE CLOSET WALLS	35	SH	$11.77	$411.95
26	9 21 00	WALLBOARD, GYPSUM ,TYPE XP, MOLD & MILDEW RESISTANT 16MM X 1219MM X 2438MM.OR LOCAL EQUAVALENT OR BETTER	FOR LOWER RESTROOM WALLS	15	SH	$15.72	$235.80
27	51 00 00	SCREWS,Philips Bugle-Head Fine Thread Drywall, #6 x 32mm. (1 lb.-Pack) For Metal Studs.OR LOCAL EQUIVALENT OR BETTER.	FOR ALL METAL STUD INSTALLATION	11	PK	$5.97	$65.67
28	9 23 00	COMPOUND, DRYWALL PRE-MIXED, ALL PURPOSE, SHEETROCK BRAND # 380119048 OR LOCAL EQUAVALENT OR BETTER (17 LITER/CN).	http://www.homedepot.com/p/SHEETROCK-Brand-4-5-Gal-All-Purpose-Pre-Mixed-Joint-Compound-380501/100321604?MERCH=REC-_-PIPHorizontal1_rr-_-204700931-_-100321604-_-N	4	CN	$14.98	$59.92
29	9 23 00	TAPE, DRYWALL, HIGH TENSILE STRENGTH TO HELP PREVENT TEARING, WRINKLING AND STRETCHING. PRE-CREASED, 2-1/16 IN. WIDE FOR USE WITH AUTOMATIC TAPING SYSTEMS, BANJO-STYLE MACHINES OR HAND TAPING, SHEETROCK BRAND # 382175, (250'/RO).	http://www.homedepot.com/p/SHEETROCK-Brand-250-ft-Drywall-Joint-Tape-382175/100321613?MERCH=REC-_-PIPHorizontal1_rr-_-100321604-_-100321613-_-N	3	RO	$1.98	$5.94
30	9 30 00	PRIMER, DRYWALL, INTERIOR, SEALER (19 LITER/ CAN)OR LOCAL EQUIVALENT OR BETTER.	https://www.homedepot.com/p/BEHR-Premium-Plus-5-gal-Interior-Drywall-Primer-and-Sealer-07305/100165023	2	CN	$60.97	$121.94
31	9 51 00	TILE, ACOUSTICAL CEILING, WHITE, 2' X 4', (10/BD), FINE FISSURED SECOND LOOK II, ARMSTRONG # 1861 OR LOCAL EQUIVALENT OR BETTER.	FOR OFFICE CEILING	3	BD	$70.46	$211.38
32	95 00 00	MAIN TEE 12' LG, PRELUDE XL 2000 WHITE SEISMIC RESIST GRID, (20EA/BX).OR LOCAL EQUIVALENT OR BETTER.	FOR OFFICE CEILING	1	BX	$200.00	$200.00

Enclosure 3: Project Material Statues Report

Example

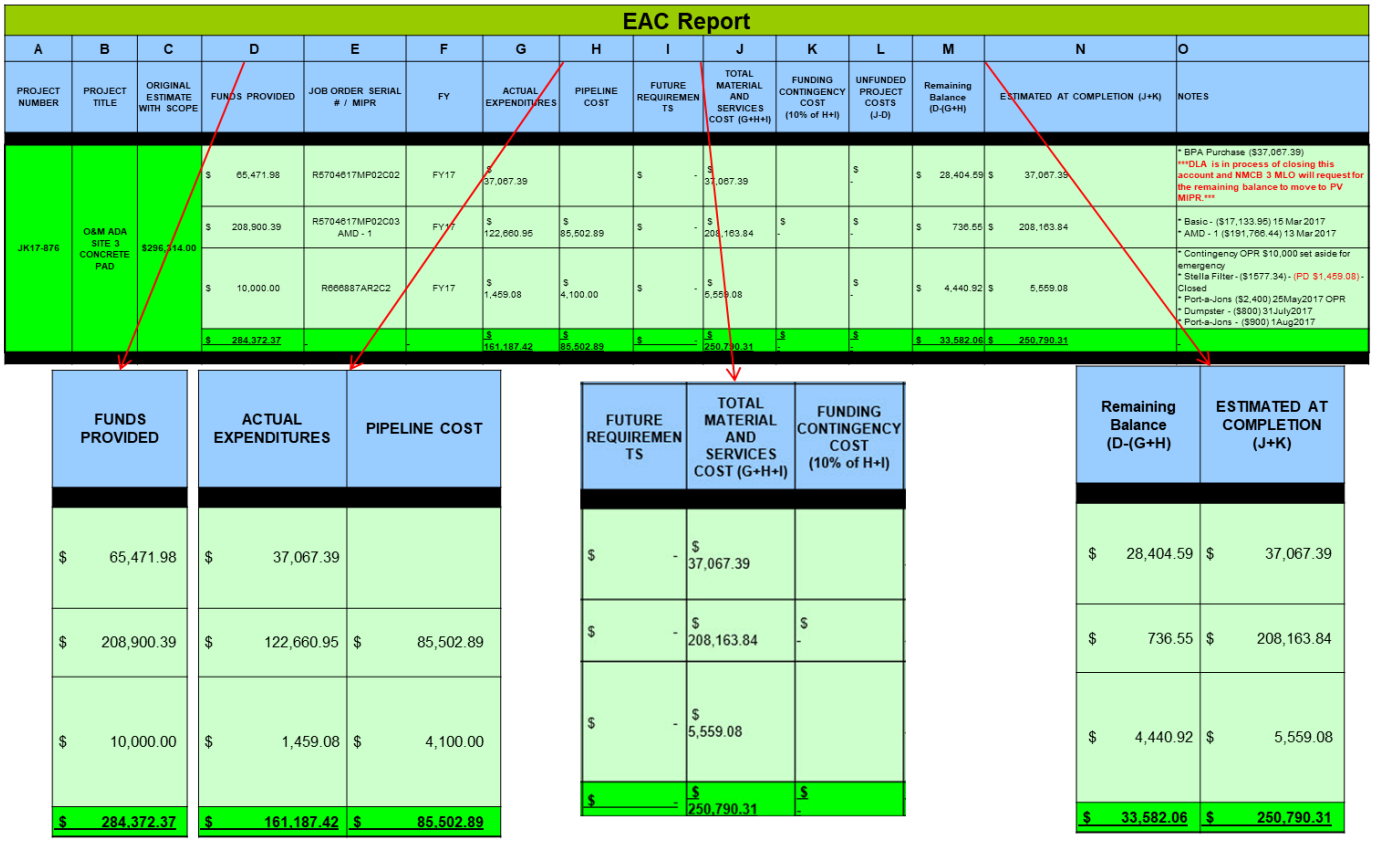


	TOTAL	202	100.00%
1	WHITE	CONTRACTED	8	3.96%
2	YELLOW	AWAITING QUOTE	1	0.50%
3	AQUA	ON ORDER	4	1.98%
4	GREEN	ON HAND	137	67.82%
5	PURPLE	ISSUED	33	16.34%
6	RED	CANCELLED	16	7.92%
7	TAN	QUOTED	0	0.00%
8	BLUE	FUTURE REQUIREMENT	3	1.49%

JK16-861 K-SPAN 3: BU2 ROMERO 28FEB2019

BOM	NO.	L/I	STATUS	MLO Location	DESCRIPTION	Unit of Issue	BOM Qty	Qty On Order	Received	Issued	Borrowed	Repaid	GBI	LBI	On Hand	Unit Price
CONSUMABLES	101L-01	1	ON HAND	B3S2	BLADES, 12" , WOOD FOR MITRE SAW, 1" ARBOR	EA	2	2	2						2	$31.69
CONSUMABLES	101L-01	2	ISSUED		BLADES, SAW, BI METAL ASSORTED RECEPRICATING , (10 EA/PACKAGE)	PK	3	3	3	3					0	$19.97
CONSUMABLES	101L-01	3	ISSUED		BLADES, 7 1/4" SKILL SAW (CROSSCUT & RIPPING)	EA	6	6	6	6					0	$9.97
CONSUMABLES	101L-01	4	CANCELLED		EAR PLUGS, CORDOVA ENCORE DISPOSABLE (200 PR/ BX	BX	5	5							0	
CONSUMABLES	101L-01	5	CANCELLED		PENCELS, CARPENTER BULK (72EA/BX) YELLOW COLOR WRITING UTENSIL, WATERPROOF (MODEL # CP700B)	BX	2	2							0	
CONSUMABLES	101L-01	6	CANCELLED		CARPENTER CRAYON (RED) 2-PACK HIGH VISIBILITY (MODEL # DWHT72720)	EA	25	25							0	
CONSUMABLES	101L-01	7	ISSUED		BLADES, 18" DIAMOND , WALKBEHIND CONCRETE SAW, 1" ARBOR	EA	2	2	2	2					0	$271.20
CONSUMABLES	101L-01	8	ON HAND	B3S1	BLADES, 14" SAW, RESCUE (DIMOND TIP & ABRASIVE), 1" ARBOR	EA	4	4	4						4	$46.35
CONSUMABLES	101L-01	9	ON HAND	B3S3	BLADES, 14" ABRASIVE SAW FOR METAL CHOP SAW, 1" ARBOR	EA	50	50	50						50	$6.80
CONSUMABLES	101L-01	10	ON HAND	B3S2	DRILL BITS, #2 PHILLIPS SHOCKWAVE 2 IN. IMPACT DUTY STEEL DRIVER (15 PACK) (MODEL # 48-32-5004)	BG	1	1	1						1	$9.97
CONSUMABLES	101L-01	11	ISSUED		BLADES, 10" TABLE SAW (60 TEETH), 5/8" ARBOR	EA	2	2	2	2					0	$21.48
CONSUMABLES	101L-01	12	ON HAND	B3S2	ROLLER TRAY, 9 IN. WIDE, 11 IN. LONG PLASTIC ROLLER TRAY, DISPOSABLE	EA	12	24	27						27	$1.97
CONSUMABLES	101L-01	13	ON HAND	B3S2	ROLLER KIT, PAINT9", INCLUDING 1 RUST RESISTANT TRAY 11" LONG, 9" ROLLER, 1 FRAME THREADED GRIP	KT	15	6	15						15	$6.97
CONSUMABLES	101L-01	14	ON HAND	B3S2	PAINT POLES, 4 FT.- 8 FT. SHERLOCK EXTENSION POLE	EA	4	4	4						4	$26.22

Enclosure 4: Estimation at Completion Report



EAC Report

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
PROJECT NUMBER	PROJECT TITLE	ORIGINAL ESTIMATE WITH SCOPE	FUNDS PROVIDED	JOB ORDER SERIAL # / MIPR	FY	ACTUAL EXPENDITURES	PIPELINE COST	FUTURE REQUIREMENTS	TOTAL MATERIAL AND SERVICES COST (G+H+I)	FUNDING CONTINGENCY COST (10% of H+I)	UNFUNDED PROJECT COSTS (J-D)	Remaining Balance (D-(G+H)	ESTIMATED AT COMPLETION (J+K)	NOTES
JK17-876	O&M ADA SITE 3 CONCRETE PAD	$296,314.00	$ 65,471.98	R5704617MP02C02	FY17	$ 37,067.39		$ -	$ 37,067.39		$ -	$ 28,404.59	$ 37,067.39	* BPA Purchase ($37,067.39) ***DLA is in process of closing this account and NMCB 3 MLO will request for the remaining balance to move to PV MIPR.***
			$ 208,900.39	R5704617MP02C03 AMD - 1	FY17	$ 122,660.95	$ 85,502.89	$ -	$ 208,163.84	$ -	$ -	$ 736.55	$ 208,163.84	* Basic - ($17,133.95) 15 Mar 2017 * AMD - 1 ($191,766.44) 13 Mar 2017
			$ 10,000.00	R666887AR2C2	FY17	$ 1,459.08	$ 4,100.00	$ -	$ 5,559.08		$ -	$ 4,440.92	$ 5,559.08	* Contingency OPR $10,000 set aside for emergency * Stella Filter - ($1577.34) - (PD $1,459.08) - Closed * Port-a-Jons ($2,400) 25May2017 OPR * Dumpster - ($800) 31July2017 * Port-a-Jons - ($900) 1Aug2017
			$ 284,372.37	-	-	$ 161,187.42	$ 85,502.89	$ -	$ 250,790.31	$ -	$ -	$ 33,582.06	$ 250,790.31	-

FUNDS PROVIDED	ACTUAL EXPENDITURES	PIPELINE COST
$ 65,471.98	$ 37,067.39	
$ 208,900.39	$ 122,660.95	$ 85,502.89
$ 10,000.00	$ 1,459.08	$ 4,100.00
$ 284,372.37	$ 161,187.42	$ 85,502.89

FUTURE REQUIREMENTS	TOTAL MATERIAL AND SERVICES COST (G+H+I)	FUNDING CONTINGENCY COST (10% of H+I)
$ -	$ 37,067.39	
$ -	$ 208,163.84	$ -
$ -	$ 5,559.08	
$ -	$ 250,790.31	$ -

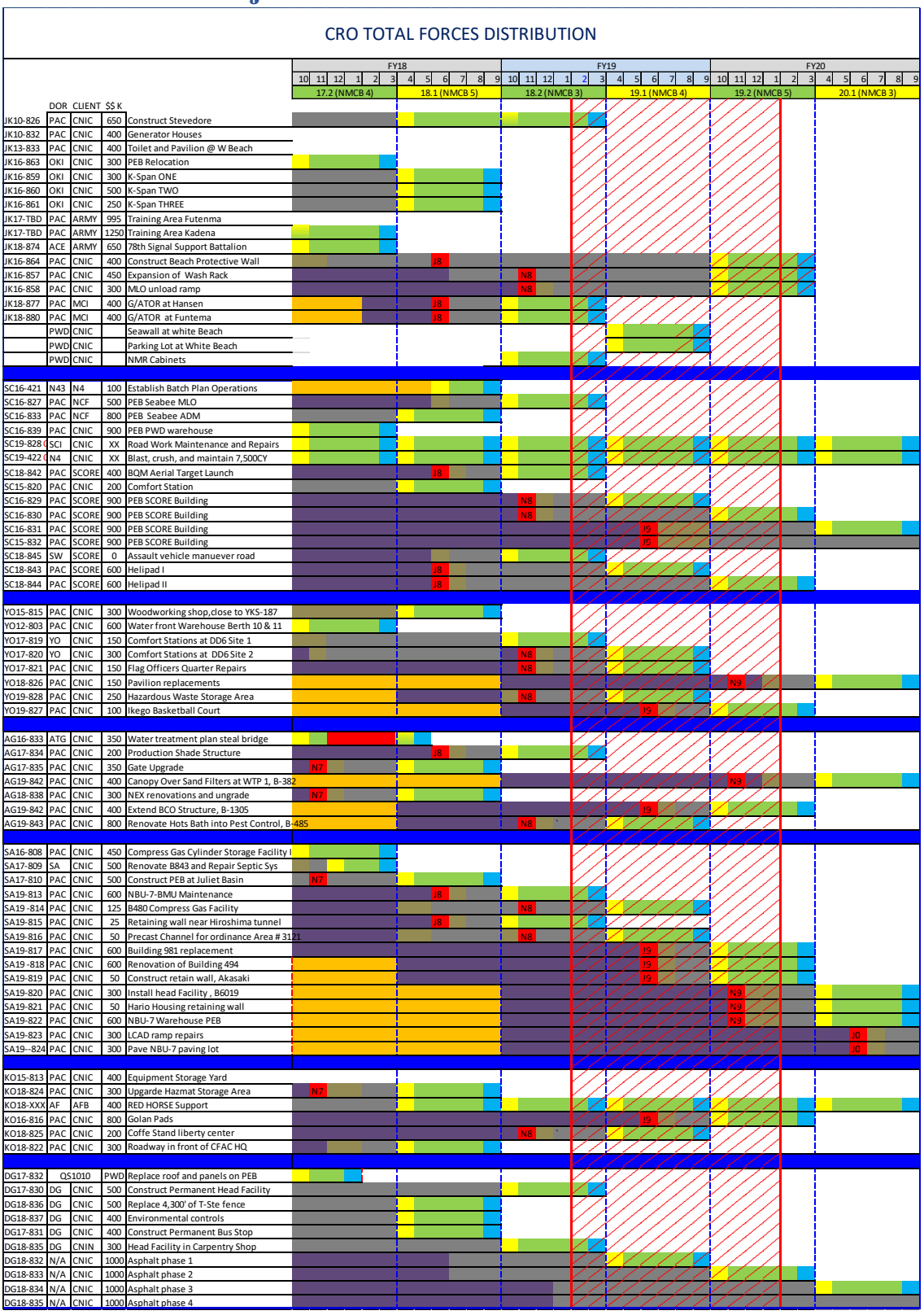
Remaining Balance (D-(G+H)	ESTIMATED AT COMPLETION (J+K)
$ 28,404.59	$ 37,067.39
$ 736.55	$ 208,163.84
$ 4,440.92	$ 5,559.08
$ 33,582.06	$ 250,790.31

Enclosure 5: Project Status Report

Bi-Weekly SITREP		**Date:** 04/19/2018	**Lat / Long:** 26°38'21"N 127°73'31"E		
NMCB 5 CCAD Timor Leste		**Project Name**	FATUMETA SECONDARY SCHOOL		
Customer	Timor Leste Ministry of Education		**NCF Project # OHASIS ID #**	TL17-819 30791	
WIP % (From MDs)	26%	**Total Project Mandays**	377	**Number of Workdays**	7
% Behind Schedule	0 %	**Average NMCB Crew Size**	1	**Average HN Crew Size**	N/A
Project Scope	Demolish existing school building and replace with a one-room classroom building in accordance with ROICC Thailand design and construction standards that include concrete slab, CMU block walls, steel truss roof with hat channel purlins and corrugated steel roof sheeting. A tree limb located above the school building endangering the building will be removed. Building will be patched with stucco, painted with high quality paint, and will have a brass dedication sign.				
Project Impact	Goal is to improve health and safety of roughly 1246 students currently attending school at this location. While building the school Det. Will improve construction skills enhancing phase two readiness.				
Funding Source	OHASIS	**Initial Project Cost (USD)**	$122,427.92	**Initial Completion Date**	23MAY18
Funds Provided	$174,891.00	**Estimated Cost (EAC)**	$174,891.00	**Estimated Completion Date**	23MAY18
Last Week OPS	• Conduct project turnover with NMCB FOUR 100% ASD: 3MAR ACD: 9MAR				
Next Week and Remaining OPS	• 04.20.00 OJT FOR BLOCK ASD: 20APR ECD 20APR • 04.20.05 PLACE AND CORE FILL 1st PHASE OF CMU BLOCK ESD: 20APR ECD 24APR • 04.20.10 PLACE RST FOR COLUMNS ESD: 25APR ECD 25APR • 04.20.15 PLACE AND CORE FILL 2ND PHASE OF BLOCK ESD: 25APR ECD 30APR • 04.20.15 PLACE AND CORE FILL 3RD PHASE OF BLOCK ESD: 01MAY ECD 05MAY				
OPS Concerns and Comments	• OJT for Block will be conducted before hand utilizing CASS. • Project will require additional earthwork to slope away from pad to control water runoff. • Allocation of MIPR funds to increasing project funding to 174K is vital to completion of project.				
Logistics Concerns and Comments	• Status of 30/60/90: 30 – 100% 60 – 25% 90 –0% • Material tools and equipment being delivered on project site after turn over during week of 16 April. To be able to start on time when crew arrives.				
HN/PN Involvement	• N/A				
Coordinating Partners	• NAVFACPAC (contracting authority) • DynCorp International (Prime KTR) • RMS Engineering and Construction (main sub-KTR				
VIP / KLE / PAO Comments	• N/A				

Enclosure 6: Projects Flow in 2018

CRO TOTAL FORCES DISTRIBUTION



	DOR	CLIENT	$$ K	
JK10-826	PAC	CNIC	650	Construct Stevedore
JK10-832	PAC	CNIC	400	Generator Houses
JK13-833	PAC	CNIC	400	Toilet and Pavilion @ W Beach
JK16-863	OKI	CNIC	300	PEB Relocation
JK16-859	OKI	CNIC	300	K-Span ONE
JK16-860	OKI	CNIC	500	K-Span TWO
JK16-861	OKI	CNIC	250	K-Span THREE
JK17-TBD	PAC	ARMY	995	Training Area Futenma
JK17-TBD	PAC	ARMY	1250	Training Area Kadena
JK18-874	ACE	ARMY	650	78th Signal Support Battalion
JK16-864	PAC	CNIC	400	Construct Beach Protective Wall
JK16-857	PAC	CNIC	450	Expansion of Wash Rack
JK16-858	PAC	CNIC	300	MLO unload ramp
JK18-877	PAC	MCI	400	G/ATOR at Hansen
JK18-880	PAC	MCI	400	G/ATOR at Funtema
	PWD	CNIC		Seawall at white Beach
	PWD	CNIC		Parking Lot at White Beach
	PWD	CNIC		NMR Cabinets
SC16-421	N43	N4	100	Establish Batch Plan Operations
SC16-827	PAC	NCF	500	PEB Seabee MLO
SC16-833	PAC	NCF	800	PEB Seabee ADM
SC16-839	PAC	CNIC	900	PEB PWD warehouse
SC19-828	SCI	CNIC	XX	Road Work Maintenance and Repairs
SC19-422	N4	CNIC	XX	Blast, crush, and maintain 7,500CY
SC18-842	PAC	SCORE	400	BQM Aerial Target Launch
SC15-820	PAC	CNIC	200	Comfort Station
SC16-829	PAC	SCORE	900	PEB SCORE Building
SC16-830	PAC	SCORE	900	PEB SCORE Building
SC16-831	PAC	SCORE	900	PEB SCORE Building
SC15-832	PAC	SCORE	900	PEB SCORE Building
SC18-845	SW	SCORE	0	Assault vehicle manuever road
SC18-843	PAC	SCORE	600	Helipad I
SC18-844	PAC	SCORE	600	Helipad II
YO15-815	PAC	CNIC	300	Woodworking shop,close to YKS-187
YO12-803	PAC	CNIC	600	Water front Warehouse Berth 10 & 11
YO17-819	YO	CNIC	150	Comfort Stations at DD6 Site 1
YO17-820	YO	CNIC	300	Comfort Stations at DD6 Site 2
YO17-821	PAC	CNIC	150	Flag Officers Quarter Repairs
YO18-826	PAC	CNIC	150	Pavilion replacements
YO19-828	PAC	CNIC	250	Hazardous Waste Storage Area
YO19-827	PAC	CNIC	100	Ikego Basketball Court
AG16-833	ATG	CNIC	350	Water treatment plan steal bridge
AG17-834	PAC	CNIC	200	Production Shade Structure
AG17-835	PAC	CNIC	350	Gate Upgrade
AG19-842	PAC	CNIC	400	Canopy Over Sand Filters at WTP 1, B-382
AG18-838	PAC	CNIC	300	NEX renovations and ungrade
AG19-842	PAC	CNIC	400	Extend BCO Structure, B-1305
AG19-843	PAC	CNIC	800	Renovate Hots Bath into Pest Control, B-485
SA16-808	PAC	CNIC	450	Compress Gas Cylinder Storage Facility I
SA17-809	SA	CNIC	500	Renovate B843 and Repair Septic Sys
SA17-810	PAC	CNIC	500	Construct PEB at Juliet Basin
SA19-813	PAC	CNIC	600	NBU-7-BMU Maintenance
SA19 -814	PAC	CNIC	125	B480 Compress Gas Facility
SA19-815	PAC	CNIC	25	Retaining wall near Hiroshima tunnel
SA19-816	PAC	CNIC	50	Precast Channel for ordinance Area # 3121
SA19-817	PAC	CNIC	600	Building 981 replacement
SA19 -818	PAC	CNIC	600	Renovation of Building 494
SA19-819	PAC	CNIC	50	Construct retain wall, Akasaki
SA19-820	PAC	CNIC	300	Install head Facility , B6019
SA19-821	PAC	CNIC	50	Hario Housing retaining wall
SA19-822	PAC	CNIC	600	NBU-7 Warehouse PEB
SA19-823	PAC	CNIC	300	LCAD ramp repairs
SA19--824	PAC	CNIC	300	Pave NBU-7 paving lot
KO15-813	PAC	CNIC	400	Equipment Storage Yard
KO18-824	PAC	CNIC	300	Upgarde Hazmat Storage Area
KO18-XXX	AF	AFB	400	RED HORSE Support
KO16-816	PAC	CNIC	800	Golan Pads
KO18-825	PAC	CNIC	200	Coffe Stand liberty center
KO18-822	PAC	CNIC	300	Roadway in front of CFAC HQ
DG17-832		QS1010	PWD	Replace roof and panels on PEB
DG17-830	DG	CNIC	500	Construct Permanent Head Facility
DG18-836	DG	CNIC	500	Replace 4,300' of T-Ste fence
DG18-837	DG	CNIC	400	Environmental controls
DG17-831	DG	CNIC	400	Construct Permanent Bus Stop
DG18-835	DG	CNIN	300	Head Facility in Carpentry Shop
DG18-832	N/A	CNIC	1000	Asphalt phase 1
DG18-833	N/A	CNIC	1000	Asphalt phase 2
DG18-834	N/A	CNIC	1000	Asphalt phase 3
DG18-835	N/A	CNIC	1000	Asphalt phase 4