



NAVAL FACILITIES ENGINEERING SERVICE CENTER  
Port Hueneme, California 93043-4370

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# Technical Memorandum

## TM-2237-AMP

### EXPEDITIONARY MODULAR FACILITIES

by  
Bill Varnava

February 1997

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## **INTRODUCTION**

The Naval Facilities Engineering Service Center (NFESC) has been tasked by Marine Corps Systems Command (MARCORSYSCOM) Amphibious Warfare Technology Directorate (AWT) to examine the necessary logistics system for supporting and implementing the Operational Maneuver from the Sea (OMFTS) doctrine. The OMFTS concept calls for the ability to project power and sustain an operational force from a seabase located many miles offshore. This future concept may be employed by the expeditionary Marine Corps forces in the next 15 to 20 years.

One goal of this concept is to provide facilities that can operate aboard a seabase and also be used ashore. This is referred to as modular suiting. The term modular means something is dimensionally standard and allows for many uses, a container for example. Suiting refers to a collection of similar items and functions.

## **BACKGROUND**

In a traditional amphibious operation, the Marine Corps forces establish a Beach Support Area (BSA), providing logistical support to an Amphibious Objective Area (AOA) located inland. All material and facilities needed to provide combat service support (CSS) to the operating forces are brought ashore. In the OMFTS scenario, the BSA may be bypassed with logistical support provided directly from a seabase to the objective area. The seabase is envisioned as a series of ships carrying troops and equipment which can be brought ashore as needed. However, the ability to provide logistical support from a seabase reduces the footprint of equipment and personnel needed ashore. Modular facilities that can be used on a seabase as well as ashore avoid duplication of equipment (since undoubtedly OMFTS won't be used for every expeditionary endeavor) and provide increased flexibility to the deployed forces. If designed with flexibility in mind, these modular facilities could be brought ashore if needed for installation in the operational area. The type of function and number of personnel supported would determine the need for a particular facility ashore.

The use of breakbulk ships for storing equipment and supplies used for U.S. military logistical support is expected to decline in the next ten years because storing supplies and equipment in this manner is time consuming and inefficient. Current and future trends for shipping equipment and supplies are definitely directed toward containerships. It is expected that 90 to 95 percent of the equipment and supplies that would be needed aboard a seabase could be containerized versus storing as breakbulk type cargo. The facilities and equipment used aboard the seabase should be housed within containers because this improves ease of handling and transporting. It is expected that the majority of the facility functions aboard a seabase could be housed in 8- by 8- by 20-foot containers. This size container is one frequently used by the Marine Corps and commercial industry and storage capacity is usually expressed as 20-foot equivalent units (TEU). Smaller sized containers such as TRICONs, PALCONs and

QUADCONs could also serve as modular suites. When connected together they form 8- by 8- by 20-foot units. Larger sized containers, such as 8- by 8- by 40-foot units, would probably not be used by the USMC as modular suites due to their excess weight and difficulty with mobility.

Research programs have been conducted by several military services over the past two decades regarding modular type facilities. NFESC designed a shower facility during the late 1970s that could be used inside as well as outside an 8- by 8- by 20-foot container. This modular facility has been purchased by the Marine Corps and Air Force and represents perhaps the first in a series of facility designs needed to implement the OMFTS concept. However, the design intent and operating requirements of this earlier work were not centered around seabasing.

The Navy and Marine Corps currently have mobile facilities (MF), which provide expeditionary logistic, administrative, and maintenance support by using a variety of tactical shelters. There are currently six types of mobile facilities housed within 8- by 8- by 20-foot rigid wall containers. Different types of side and end openings are available and these MFs can be connected together to form a variety of modular units. The Marine Corp Expeditionary Shelter System (MCESS) also uses 8- by 8- by 10-foot and 8- by 8- by 20-foot knockdown containers which fold down flat after use. Four of these knockdown units will fold down and fit within one 20-foot container.

Another Navy program, the Merchant Ship Naval Augmentation Program (M-SNAP), looked at modifying commercial containerships. In this program, a variety of support modules for storage, personnel support, and access were developed. The personnel support modules were developed for berthing, head, shower, messing, medical, and administrative uses. It is possible that some of these modules could be adapted for use as modular suites aboard a seabase.

An Air Force program related to modular type facilities is known as Bare Base. This system has evolved since the 1960s and is designed to provide all the necessary facilities and equipment to a remote area which only has a source of water and an aircraft runway. The Bare Base system is designed to support around 1,100 persons per module and consists of soft wall shelters. These soft wall shelters are referred to as TEMPER tents or tent extendable modular personnel shelters. There are two versions of Bare Base; these are known as Harvest Eagle and Harvest Falcon. In Harvest Eagle, only personnel and logistic support are provided, while Harvest Falcon provides both personnel and weapon system support. When fully developed, the Bare Base system can support up to 50,000 personnel. The TEMPER tents that house the various facilities are stored on the 463L pallet system and transported using the C-130 aircraft.

The Army program related to modular facilities is called Force Provider (FP). It has been developed since 1992 in response to the poor living conditions Army soldiers endured during Operation Desert Shield and Operation Desert Storm. The Force Provider system consists of modules designed to provide the full range of combat service support functions such as billeting, messing, laundries, shower, latrines, and recreation for 550 persons. Force provider also uses the TEMPER soft wall shelter as a basic building block when constructing a camp. The TEMPER is a 32- by 20- by 15-foot soft wall shelter that weighs about 800 pounds. The FP system is packed in about 100 TRICONs and six 20-foot containers. Each Force Provider 550-person camp requires a setup time of about 120 hours with 60 to 70 personnel required, and takes up about 15 to 18 acres of space when fully deployed.

## **APPROACH**

The requirement for modular suiting was divided by the functions, services, and facilities needed aboard a seabase. This involved examining the main functional areas of CSS, the subtasks for each area, their importance to the seabase, the need to operate on the seabase, and the type of space that would be required. Each functional area and subtask was given a ranking. The highest rated areas were further broken down into what specific types of functions and services would be required.

Since the seabase design is still evolving, assumptions made as to the importance and need for each functional subtask was not meant to be a final determination of the seabase facilities needs but to help identify what areas may require further development. A list of equipment requirements identified by the Marine Corps Program Manager (PM) Support Services Engineer (AM SSE) office for the FY97 Marine Corps Exploratory Development Program was integrated with the key areas of CSS functions. The most applicable technology areas to modular suiting and facilities support were identified.

A few basic assumptions regarding modular facilities were made and are as follows:

- Same facility should provide function/service on seabase and ashore
- Existing facilities and technology would be used as much as possible
- Modular facilities would fit within an 8- by 8- by 20-foot container
- Certain facilities could operate inside a container and outside a container for increased flexibility

## **RESULTS**

The area of combat service support (CSS) covers a wide range of functions, services, and capabilities. There are six doctrinal functional areas of CSS: supply, maintenance, transportation, engineering, health services, and services. Each of these functional areas have several subtasks which must be provided to a Marine force. A CSS operations center oversees these CSS units and provides liaison between them.

Tables 1 through 6 show the rankings for each functional area subtask. The type of space needed by the command and control structure is shown in Table 7. The three categories were: need on seabase (not applicable (na), no, low, med, high), functional on seabase (na, no, low, med, high), and type of space needed (na, administrative, container, engineered system). It was identified that the areas of supply, maintenance, health, and services have the most subtasks and requirements related to modular suiting and seabasing. The following paragraphs describe each functional area in relation to its subtasks.

### **Supply**

As shown in Table 1, the subtasks of requisition, storage, and distribution were given high scores for being functional on the seabase. Requisitioning materials is important in terms of resupplying the seabase and could be performed in a container designed for administrative use.

This would be a container outfitted with tables, chairs, and office equipment. The storage and distribution of supplies is, of course, crucial to the logistics support system. The type of space needed to perform these tasks could be a container with storage racks, pull-out drawers, and open space. The ability to use and modify existing containers for these functions is considered high. The other subtasks of supply - salvage, disposal, and procurement - were given low scores because it was assumed these tasks would be done only to a limited degree, if at all, on a seabase.

### **Maintenance**

As shown in Table 2, the three areas with high scores were repairing, rebuilding, and reclamation. These tasks of maintenance were felt to have the most importance to a seabase. The other areas consisting of inspection, testing/calibration, modification, and evacuation were assumed to have low to moderate priority to the seabase. These subtasks all lend themselves nicely to containerization and in fact most of the expected maintenance functions are already being performed in existing containerized units. These mobile maintenance facilities (MMF) are already used aboard aviation support vessels and are quite versatile. However, the maintenance and repair of large oversized pieces of equipment like a jet engine cannot be currently accommodated.

### **Transportation**

As shown in Table 3, material handling, freight/passenger transportation, and aerial delivery received high scores for being functional on the seabase. These tasks are all important in transporting the materials, equipment, and personnel to the objective area. However, in terms of modular facilities, there is not much that can be adapted to provide these functions on a seabase except perhaps for storing the equipment needed to do these tasks. Motor transport, landing/embark support, and port operations were assumed to have a low need on a seabase.

### **Engineering**

As shown in Table 4, the only task under engineering that would be applicable to the seabase is facilities maintenance. This would include maintaining the various utility systems and equipment needed aboard the seabase and could be done using existing MMFs. The other tasks, construction, reconnaissance, demolition/obstacle removal, and explosive ordinance disposal would be done in the objective area but not aboard a seabase.

### **Health Services**

There is a significant need for providing functional medical services aboard a seabase as shown in Table 5. The tasks of health maintenance, casualty collection, medical treatment, and hospitalization/evacuation are all considered important to effective seabase operations in support of combat operations. The type of space needed for health services would consist of an engineered system built within a container. Containerized medical facilities with operating rooms and specialized equipment already exist and could be used aboard a seabase.

## **General Services**

As shown in Table 6, the functional area of general services encompasses a wide variety of combat service support tasks. It includes the areas of postal, disbursing, law enforcement, enemy POW management, information systems, exchange services, utilities support, legal/civil affairs, and graves registration. These subtasks, with the exception of enemy POW management, were considered to have a high or medium priority aboard a seabase. The majority of these tasks are administrative in nature with the exception of utilities support, and could be housed in containerized facilities with desks, chairs, and storage areas.

Utilities support covers many functions and services considered to be high priority aboard a seabase. As shown in Table 8, it can be broken down into the following areas: hygiene/water systems, energy systems, food service, and berthing. The hygiene/water systems consist of laundry, latrines, showers, water purification, and wastewater treatment equipment and facilities. Energy systems include lighting, heating/air conditioning, power generation, and distribution. Food services include galley areas while berthing consists of beds and personal storage areas for the troops aboard a seabase. These areas consist of utility and life support functions necessary for the comfort and well being of the troops aboard a seabase.

The type of space needed to provide these life support utility functions is an engineered system within a container. Many of these functions have been containerized/shelterized or developed for field use. However, placing these utilities into modular suites that are transportable, dual functional, and operable inside or outside of a container has not been fully achieved. Although the current Air Force and Marine Corps shower unit designed by NFESC can operate inside or outside an 8- by 8- by 20-foot container, adapting all utility functions to meet specialized seabase needs will require an equipment development program.

## **FY97 PM Engineers Technology Areas**

A candidate list of technology areas was prepared by the PM Engineer's office at Quantico, Virginia. This list presented the areas where the Marine Corps would like to improve their current capabilities. Each area was given a priority ranking along with a brief problem description. The equipment areas most applicable to modular facilities were identified and are shown in Table 9.

On the PM Engineer's technology list, six out of seven potential areas identified could be classified under utilities support. Three topics were related to power/energy systems: Alternate Environmental Controls, Battery/Photo Cell/Uninterrupted Power Sources, and Field Illumination and Lighting. There were three topics relating to hygiene/water systems: Field Sanitation/Hygiene, Non-Effluent Latrines, and Waste Water Purification/Recycling. These six topic areas correspond to the areas where research and equipment development is needed to provide modular suites aboard a seabase. The topic Advanced Material Handling was also identified because of the important role it would have in moving the modular facilities, equipment, and personnel from a seabase to the objective area.

## **CONCLUSIONS**

The concept of modular suiting where dual use facilities are transportable, flexible, and functional is important to the implementation of the OMFTS. The following conclusions regarding modular facilities and seabasing were made:

1. Modular facilities should be containerized within an 8- by 8- by 20-foot area.
2. Existing systems and technology may provide a certain level of modular suiting.
3. The functional areas of supply, maintenance, health, and general services are the most adaptable to modular suiting.
4. Life support utility functions and equipment need further development to meet seabasing requirements.
5. The PM Engineer's technology list identifies shortfalls in many life support utility requirements.

## **RECOMMENDATIONS**

The area of life support utilities consisting of hygiene/water systems, power systems, food services, and berthing should be further investigated during FY97 to determine the necessary requirements for seabasing and modular suiting. It is recommended that life support utilities be the primary focus of this effort because of the need for further development and the relationship to the PM engineer's technology list.

The following outline a proposed work plan in modular suiting during FY97:

1. Determine the requirements of various life support utilities aboard seabase and shore.
2. Coordinate findings with Naval working groups on seabasing.
3. Further investigate existing DOD/commercial systems applicable to modular suiting.
4. Identify DOD/commercial systems that meet requirements for life support utility functions.
5. Identify new technologies and equipment areas that can meet shortfalls in providing utility functions in support of OMFTS.
6. Prepare a report on findings.

Table 1  
Functional Area: Supply

Subtask	Need on Seabase	Functional on Seabase	Type of Space Needed
Requisition	high	high	admin/container
Procurement	no	no	no
Storage	high	high	container
Distribution	high	high	container
Salvage	low	low	container
Disposal	low	low	container

Table 2  
Functional Area: Maintenance

Subtask	Need on Seabase	Functional on Seabase	Type of Space Needed
Inspection	med	med	container
Testing/calibration	low	low	container
Repair	high	high	container
Modification	med	med	container
Rebuild	high	high	container
Evacuation	low	low	container
Reclamation	high	high	container

Table 3  
Functional Area: Transportation

Subtask	Need on Seabase	Functional on Seabase	Type of Space Needed
Motor Transport	no	no	na
Material Handling	high	high	admin/container
Freight Transp.	high	high	na
Aerial Delivery	high	high	na
Port Operations	na	na	na
Embark/Landing	low	low	admin

Table 4  
Functional Area: Engineering

Subtask	Need on Seabase	Functional on Seabase	Type of Space Needed
Reconnaissance	na	na	na
Construction	na	na	na
Facilities Maintenance	high	high	container
Obstacle Removal	na	na	na
Explosive Ordnance Disposal	na	na	na

Table 5  
Functional Area: Health Service

Subtask	Need on Seabase	Functional on Seabase	Type of Space Needed
Health Maintenance	high	high	engineered system
Casualty Collection	high	high	engineered system
Medical Treatment	high	high	engineered system
Hospitalization Evacuation	high	high	engineered system

Table 6  
Functional Area: General Services

Subtask	Need on Seabase	Functional on Seabase	Type of Space Needed
Postal	high	high	admin
Disbursing	high	high	admin
Law Enforcement	high	high	admin/container
Enemy POW	low	low	container
Information System	high	high	admin
Exchange Services	high	high	admin
Utilities Support	high	high	engineered system
Legal Affairs	med	med	admin
Civil Affairs	med	med	admin
Graves Registration	high	med	admin/container

Table 7  
CSS Command and Control

Task	Need on Seabase	Functional on Seabase	Type of Space Needed
S-1, Personnel/Admin	high	high	admin
S-2, Intelligence	high	high	admin
S-3, Operations	high	high	admin
S-4, Logistics	high	high	admin

Table 8  
Utilities Support Functions

Area	Functions Provided
Water/Hygiene Systems	latrine, laundry, showers, water purification, wastewater treatment
Energy Systems	lighting, heating, air conditioning, power generation and distribution
Food services	galley
Berthing	beds, personal storage areas

Table 9  
PM Engineer FY97 Technology List-Modular Facilities

Topic	PM Engineer Priority	Type of Modular Facility
Alternate Environmental Controls	high	energy system (utility)
Field Sanitation and Hygiene	med	hygiene/water system (utility)
Non-Effluent Field Latrines	high	hygiene/water system (utility)
Battery/Photo Cell/ Uninterrupted Power Supply	med	energy system (utility)
Waste Water Purification/Recycling	med	hygiene/water system (utility)
Field Illumination and Lighting	med	energy system (utility)
Advanced Material Handling	high	related to transportation of equipment

**Appendix A**

**DESCRIPTION OF CANDIDATE TOPICS FOR  
EXPLORATORY DEVELOPMENT IN SUPPORT OF  
PROGRAM MANAGER, ENGINEER SYSTEMS**

**From:** Program Manager, Engineer Systems  
**To:** Director, Amphibious Warfare Technology

**Subj:** ENGINEER TECHNOLOGY BASE DEVELOPMENT MASTERPLAN

**Ref:** (a) Mid-year review bwtm MG Mutter and Col Thompson on 8 March 96  
(b) Meeting between representatives of AWT and SSE on 8 May 96

**Encl:** (1) Description of Candidate Topics for Exploratory Development in Support of Program Manager, Engineer Systems

1. In accordance with the references, request review of the enclosure and include the described topics in the FY 97 Technology Program Plan for the Marine Corps Exploratory Development Program.
2. This PM is attempting to initiate new engineering technology that will provide for greater equipment reliability, more precise performance, reduce the size of the inventory and reduce the dependence on external support equipment. This will in turn allow Marine Engineer units to continue to support emerging concepts quickly and efficiently without the traditional bulk and logistic tail associated with past engineer efforts.
3. SSE point of contact for technology base coordination is LtCol Kelish. This PM has assigned individual points of contact for each specific topic for more detailed coordination.

**R.A. Kelish**  
By direction

**DESCRIPTION OF CANDIDATE TOPICS FOR EXPLORATORY DEVELOPMENT IN SUPPORT OF PROGRAM MANAGER, ENGINEER SYSTEMS (SSE)**

**Priority: SBIR Candidate**

**Topic: Advanced Foam Technology**

**Description:** The use of advanced foam technology to provide increased buoyancy to the Ribbon Bridge and/or to act as a low load bearing structural member for fighting positions, revetments and other such simple structures. Foam would be transported into theater in a liquid form, mixed in the proper medium and dispensed by nozzle into a form to achieve the desired shape. Foam shall be high density and environmentally benign so as to allow its use without restriction.

**POC: LtCol Kelish, DSN 278-2242 ex294/Fax 3292**

**Priority: High**

**Topic: Alternate Environmental Control Technology**

**Description:** Air Conditioners are one of the principle electrical power consumers in the Fleet. With the increased fielding of advanced C4I systems a requirement exists to reduce the demand on electrical power through the use of alternate environmental control units that provide the same level of temperature control without the corresponding demand for electrical power. The use of spot coolers, thermal plates, etc. may be examples of possible technology that can be applied.

**POC: MSGT Field, DSN 278-2242 ex236/Fax 3292**

**Priority: Medium**

**Topic: No-Maintenance/Just -In-Time Maintenance**

**Description:** What are the possible savings in time, money, service life and structure by doing no maintenance on selected items of equipment or performing just-in-time maintenance as opposed to the current schedules for Preventative Maintenance. It has often been thought that we over PM our equipment and actually create more of a maintenance burden on ourselves.

**POC: LtCol Kelish, DSN 278-2242 ex294/Fax 3292**

**Priority: Medium**

**Topic: AOA Land Management**

**Description:** This item is a software program originally developed by NFESC in the 1980's which bears capabilities that are applicable today and under the series of new emerging concepts like OMFIS, AOA Land Management can prove to be an invaluable tool for operational planning under a crisis action timeline. AOA Land Management shall make use of digitized mapping technology and construction planning factors to provide detailed time, labor and material planning factors in order to produce construction plans and schedules for operational planning and execution.

**POC: LtCol Kelish, DSN 278-2242 ex204/Fax 3202**

**Priority: Medium**

**Topic: Field Sanitation and Hygiene**

**Description:** This effort will look at highly efficient, environmentally benign technology to provide state-of-the-art bath/shower facilities and laundry facilities. Candidate systems shall make

use of energy efficient motors, pumps and engines coupled to closed loop plumbing and recycling systems to achieve lightweight, modular field sanitation and hygiene facilities.

POC, CWO-2 Alston, DSN 278-2242 ex 235/Fax 3292

Priority: High

Topic: Non- Effluent Field Latrines

Description: Human solid waste is a major health concern and cost driver during extended field operations. This effort will explore current and future technology to provide lightweight, modular field latrines that essentially transform solid waste into a condensed and environmentally safe form that can be returned or shipped out of the AOR without the corresponding health hazards and contracting costs that are currently used.

POC: CWO-2 Alston, DSN 278-2242 ex235/Fax 3292

Priority: Medium

Topic: Battery/Photo Cell/Uninterrupted Power Sources

Description: This effort will focus on alternate power sources to the current family of power generators and look at the use of UPS in conjunction with power generators to improve the quality of electrical power. The use of long life battery packs vice generator sets or embedded photo cell technology in tentage, vans, shelters, etc in order to provide essential electrical current for equipment operation or convenience applications in billeting tents.

POC: GySGT Lawson, DSN 278-2242 ex232/Fax 3292

Priority: High

Topic: Fire Fighting Technology

Description: This effort is focused on a market research of the most advanced and environmentally safe fire fighting technology. Additionally, this effort shall look at the Marine Corps organic fire fighting state for such functional areas as bulk fuel, ammo storage points, tent camps and supply/maintenance facilities under field conditions and recommend "smart" fire fighting technologies, sensors and passive planning factors to preclude a fire from occurring.

POC: LtCol Kalish, DSN 278-2242 ex 294/Fax 3292

Priority: High

Topic: Bridging Systems

Description: New advances in the use of lightweight high strength composites allows for a complete review of our current bridging systems and methods. This effort is intended to develop optimum bridging components to allow for the greatest span length, military load class, portability and ease of erection to ensure the Marine Corps maintains a capability to cross gaps and other obstacles where bridging is traditionally employed.

POC: Maj Weber, DSN 278-2242 ex 223/Fax 3292

Priority: SBIR Program

Topic: Power Distribution Technology

Description: This effort is designed to reduce/eliminate the footprint of our MEPDIS and other hard wiring application by looking at advance technology to distribute power via microwave, electrical pulse discharge or other methodology. The potential for this technology to reduce the

dependence of power generation sets in combat and increase the mobility of the MAGTF results in greater survivability on the electronic battlefield of tomorrow.  
POC: LtCol Kelish, DSN 278-2242 ex294/Fax 3292

Priority: Low

Topic: Wide Area Decontamination

Description: This effort is focused on the mission and tasks associated with conducting a wide area decontamination. Engineers by virtue of their organic equipment would play a significant role in clearing/cleaning operations required to bring a contaminated area back to an acceptable state that allows for habitability, maneuver or passage. It is assumed that NMCB's would be considered in this effort along side Marine engineer assets required to accomplish the task.  
POC: LtCol Kelish, DSN 278-2242 ex 294/Fax3292

Priority: Medium

Topic: Automomous/Semi-automomous Equipment Operation

Description: Commercial industry offers numerous technology that allows for automomous/semi-automomous operation of heavy equipment. This effort will determine availability of such technology for a particular type of construction task and the life-cycle costs/saving that can be achieved. Said technology offers the potential for reduced training of operators and increased quality control on the job site. Combined with Built in Test Equipment (BITE), optimum performance and maximum time on the job can potentially provide increased capability.  
POC: LtCol Hilliker, DSN 278-2242 ex 226/Fax 3292

Priority: High

Topic: Advanced Material Handling Equipment

Description: This effort will look at current and future technology for advanced material handling equipment to include forklifts, cranes, container handlers, packaging technologies, dollies, trucks and transporters. Systems must be interoperable with each other and to the extent possible capable of multiple functions.  
POC: LtCol Hilliker, DSN 278-2242 ex 226/Fax3292

Priority: High

Topic: Mission/Task Analysis

Description: Under the new emerging concepts like OMFTS, From the SEA, Maneuver Warfare, etc. a requirement exists to identify the role engineer forces will play in support of these concepts. What can engineers expect in the way of changes to its traditional missions and tasks. What amount of time will engineers be expected to play on the modern battlefield performing other expeditionary operations (OEO) or sustained operations ashore (SOA) and is their equipment and structure prepared to support this.  
POC: LtCol Kelish, DSN 278-2242 ex 294/Fax 3292

Priority: Low

Topic: Manpower/Structure/Skills Assessment for 2010

**Description:** What can/must the engineer community do now to prepare itself for success in the year 2010. What kind of missions and tasks will be required in 2010 and what should the structure and skills for individual Marines in the engineer community be. This effort should closely follow the effort regarding mission and tasks analysis in order that the individual Marine engineer is prepared to support the requirements identified.  
**POC:** LtCol Kelish, DSN 278-2242 ex 294/Fax 3292

**Priority:** Medium

**Topic:** Waste Water Treatment and Clarifiers

**Description:** Environmental concerns have had a tremendous impact on training and have for many equipment items all but eliminated realistic field training opportunities. This effort will look at waste water treatment and clarifier technology that can be deployed to the field in order to allow the field operation of ROWPU's, laundry units and shower units without the restrictions currently experienced now for the disposal of gray water.

**POC:** CWO-2 Alston, DSN 278-2242 ex 235/Fax 3292

**Priority:** Medium

**Topic:** Soil Analysis and Soil Stabilization

**Description:** The Marine Corps has a requirement for a state of the art, portable soil analysis capability in order to support the construction of roads, airfields, landing zones and conduct trafficability studies. This effort looks at current technology that is available for possible adoption by the Marine Corps and also reviews current and future technology in the area of soil stabilization.

**POC:** CWO-3 Kedzerzaowski, DSN 278-2242 ex 234/Fax3292

**Priority:** SBIR Program

**Topic:** Lightweight Power Generation

**Description:** This effort looks at emerging technology to produce lightweight power generation systems for use on the modern battlefield. A requirement exists for a diesel engine powered generator that weights less than 65 lbs and produces a minimum of 1 KW. More and more systems are being developed that require small amounts of electrical power yet are highly mobile and the current family of generators are to large and heavy to meet the requirement.

**POC:** GySgt Lawson, DSN 278-2242 ex 232/Fax 3292

**Priority:** High (current AWT effort)

**Topic:** Standoff, All Weather Precision, Supply Delivery System

**Description:** This effort will review and develop technology for a aerial, GPS guided, all weather supply delivery system for supporting independent units with essential items for extended field operations. NCSC has performed some preliminary work in this area and the technology promises to revolutionize logistics support for the forward deployed units on the battlefield.

**POC:** LtCol Kelish, DSN 278-2242 ex 294/Fax3292

**Priority:** High

**Topic:** Use of the Gatling Gun for Obstacle Breaching

**Description:** This effort will evaluate the use of the 30mm Gatling Gun mounted on a mobility enhancement vehicle, such as the Combat Breacher Vehicle, for its potential as an obstacle (tetrahedron, wire obstacle, concrete barriers, log cribs, etc.) reduction weapon.

**POC:** LtCol Hilliker, DSN 278-2242 ex 226/Fax 3292

**Priority:** SBIR Candidate

**Topic:** Development of Lightweight, Superstrong Construction Materials and Mobile Barriers

**Description:** The Marine Corps deploys MAGTF's throughout the world to meet operational commitments, MAGTF's are require to defend facilities, camp sites and defensive positions during various levels of conflicts. To assist in this requirement construction material and mobile barriers are needed that are lightweight, easily transportable, quickly deployed, durable and high strength with a reduced storage space requirement.

**POC:** LtCol Hilliker, DSN 278-2242 ex 226/Fax 3292

**Priority:** Medium

**Topic:** Field Illumination and Lighting

**Description:** This effort will look at current and future technology for confined area lighting and field illumination. Current systems are based on residential practices and are labor intensive requiring the use of multiple lighting fixtures, bulbs, etc. The Marine Corps has a need for highly efficient lighting systems that make optimum use of reflective material lightwave transmission to provide the greatest amount of lighting from a single source.

**POC:** Maj Weber, DSN 278-2242 ex 223/Fax 3292