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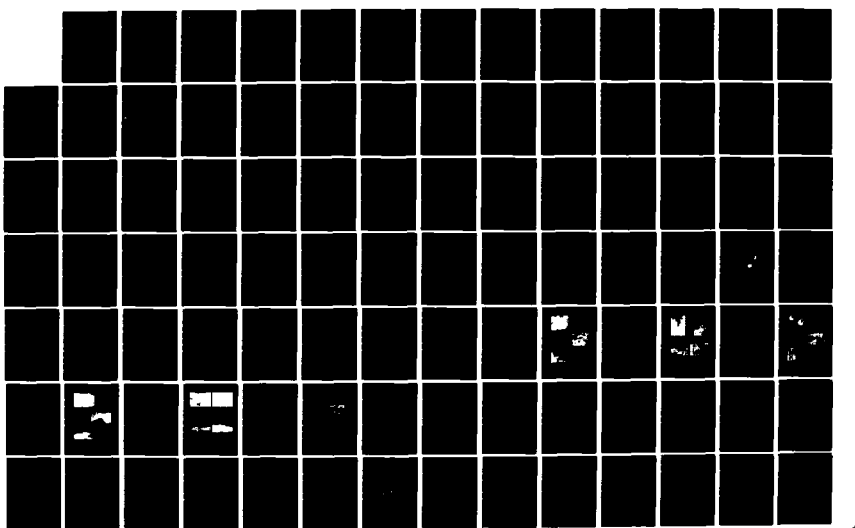

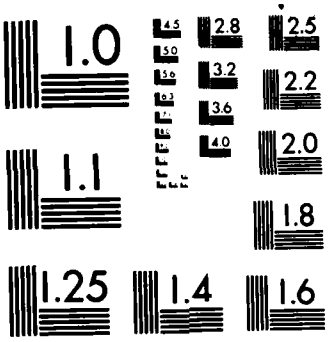

GENERAL URBAN WARFARE AMPHIBIOUS LOGISTICS APPLICATIONS
VOLUME I: TECHNICAL REPORT

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JUNE 23, 1983

FINAL REPORT

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UNITED STATES MARINE CORPS
MARINE CORPS DEVELOPMENT AND EDUCATION COMMAND
QUANTICO, VIRGINIA 22134

D 034/RTY/jmf
3913
10 August 1983

From: Commanding General
To: Distribution List

Subj: General Urban Warfare Amphibious Logistics Applications Study

1. The objectives of the study were:

a. Identify the role of logistics during combat in an urban area and isolate logistic peculiarities.

b. Identify requirements for specialized logistic concepts and systems for urban warfare.

c. Analyze present equipment inventories and mid-range equipment characteristics to satisfy urban area performance requirements and provide adequate throughput in an urban port facility.

d. Examine level of effort and support required by both the Naval Force and Landing Force/MAF to maintain command, control and coordination of logistics systems and equipment in an urban environment.

e. Evaluate performance capabilities and requirements of combat service support systems to function efficiently and effectively during operations in urban port areas.

f. Evaluate the capability of present state-of-the-art logistics systems to survive and operate in urban areas through all tempos of combat.

g. Develop land management techniques to provide combat service support in urban environments.

2. The objectives of the study were met.

3. The recommendations as set forth in the study are concurred in with the exception of recommendation 7.4.9. It is neither appropriate nor necessary to designate specific types of ships or aircraft to perform shuttle functions between the AOA and theater support facilities.

4. A copy of this letter will be affixed inside the front cover of each copy of the final report prior to its distribution.

J. E. HOPKINS
Deputy for Development

D 034/RTY/jmf
3913
10 August 1983

Subj: General Urban Warfare Amphibious Logistics Application Study

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GENERAL URBAN WARFARE AMPHIBIOUS LOGISTICS APPLICATIONS

VOLUME I: TECHNICAL REPORT

May 14, 1982

BDM/W-81-316-TR

Prepared for Naval Civil Engineering Laboratory, Port Hueneme, CA.

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

A. BACKGROUND

The Marine Corps has identified a likelihood of combat in an urban environment during the mid-range time frame. The capability to apply force in such areas is important and may be the key to achieving political and military objectives in a given circumstance. A requirement exists, therefore, for employing amphibious forces against urban targets located along the littorals of the world.

This analysis was undertaken in support of a program established to identify logistic requirements peculiar to an amphibious assault into a highly urbanized area. The area designated is SYNTHETIC CITY (SYN City), a map product and data base which provide an unclassified urban setting for examining tactical and logistical problems. Chapter I of this volume provides a description of SYN City and the method by which the data base was compiled.

Volume I of this investigation is a technical report in which the combat service support functions are defined in relation to their applicability to urban combat. This examination is based upon a family of operation plans, with their associated logistic annexes, having as their objective the seizure, isolation, or control of SYN City. Those plans comprise Volume II of this analysis.

The study of general urban warfare amphibious logistics applications is undertaken in two phases. Phase I is concerned with the offensive posture, which is reflected in Volumes I and II of this analysis. Phase II is concerned with the defensive posture. That effort will be concluded in 1982.

B. OBJECTIVES

- Identify the role of logistics in an urban environment and isolate peculiarities.
- Identify requirements for specialized logistic concepts and systems for urban warfare.
- Analyze present equipment inventories and mid-range equipment characteristics to satisfy urban area performance requirements and provide adequate throughput in an urban port facility.
- Examine level of effort and support required by both the Naval Force and Landing Force to maintain command, control and coordination of logistics systems and equipment in an urban environment.
- Evaluate performance capabilities and requirements of combat service support systems to function efficiently and effectively in urban port areas.
- Evaluate the capability of present state-of-the-art logistics systems to survive and operate in urban areas through all tempos of combat.
- Develop land management techniques to provide combat service support in urban environments.

C. TECHNICAL REQUIREMENTS

- All functions defined in FMFM 4-1, "Combat Service Support for MAGTF," shall be defined in detail as to when and what extent these functions relate to an urban environment
- The definition of support functions shall include quantities, levels of effort, and support necessary for the Naval and Landing Forces to provide complete combat service support.
- All CSS requirements or lack of requirements shall be identified.
- All deficiencies identified by the contractor shall be noted and wherever possible remedial recommendations shall be made.
- Usage rates for all classes of supply shall be developed by the contractor for operation in the SYN City environment.
- All equipment, techniques and methodologies shall be capable of functioning successfully within the 10th and 90th percentile range of the parameters identified for SYN City.
- Planning considerations, methodology, and prioritized planning criteria shall be developed to provide for the requirements.
- All technical data base elements utilized shall be noted, as shall all missing or desirable data elements which could have enriched the final documents.

D. METHODOLOGY

The Government provided five mission statements derived from Marine Corps Development and Education Command (MCDEC) Study 30-77-01. Each of the mission statements directs that amphibious assault operations be conducted in SYN City to achieve specific objectives within a given time frame.

The mission statements are included in Chapter III, "Concepts of Operations - Current Time Frame," and Chapter IV, "Concepts of Operations - Mid-Range Time Frame," of this Volume and in each of the Oplans contained in Volume II. Broadly stated, the missions are as follows:

(1) Deliberate Assault
(2) Seize Key Objectives
(3) Isolate and Contain
(4) Seize a Corridor
(5) Reduce Defenses

Concepts of operations were developed for each mission statement for the current time frame and for the mid-range period. The force used throughout is a composite Marine Amphibious Force, dubbed VII MAF to avoid confusing it with any of the three existing active MAFs or the Reserve MAGTF, IV MAF. The ground, air, and service elements are also described as composite units: 7th Marine Division, 7th Marine Aircraft Wing, and 7th Force Service Support Group. A MAF-sized force was deemed necessary in virtually all cases, primarily because of the reinforcing capability credited to the Aggressor motorized rifle division defending the general area of operations.

The deliberate assault mission in the current time frame was selected as the base case. A detailed operation plan with appropriate logistic annexes was developed for this case. Outline plans were then prepared for the remaining four missions in the current time frame. A concept plan was developed for the deliberate assault mission in the mid-range period, and, again, outline plans were prepared for the remaining four missions. These plans, which comprise Volume II of this study, provided the basis for examining combat service support functions as they relate to urban warfare.

The Threat force was considered to be deployed in a manner similar to that described in the MARCORS I Study. The Government designated the Aggressor force defending within SYN City as a motorized rifle battalion (MRB) reinforced with a company of tanks. Analysts deployed that force within the city based upon known Soviet doctrine for defense against amphibious landings and defensive combat on urbanized terrain.

A literature search was undertaken to compile Fleet Marine Force Manuals (FMFMs) and other doctrinal publications, Marine Corps Orders applicable to the preparation of operation plans and logistical analyses, official studies bearing on amphibious operations and logistics, studies and other documents relating to urban warfare, and opposing forces doctrine, tactics, and techniques. Discussions were held with military officers on active duty and with civilian technicians and staff personnel in the Department of Defense concerning matters of interest in amphibious operations and logistics.

Analysts reviewed historical examples of amphibious operations and urban combat, examined the mission statements, evaluated the Aggressor courses of action, and developed concept statements describing how each of the missions would be accomplished. These concepts were then evaluated with respect to Marine Corps doctrine, resources, training and development, and capabilities and constraints. These steps resulted in articulation of the concepts of operations for each of the operation plans that were prepared.

Throughout the preparation of the operation plans, the combat service support functions identified in FMFM 4-1, "Combat Service Support for Marine Air Ground Task Forces," (Draft), were studied to determine when and to what extent they relate to an urban environment. Combat service support requirements are set forth in the appropriate annexes to the family of Oplans in Volume II, and they are elaborated on in selected portions of this volume. Planning considerations and prioritized planning criteria uniquely applicable to amphibious logistics on urbanized terrain were identified in the course of the research for and preparation of the plans; they are described in Chapter V of this volume.

E. TECHNICAL REPORT ORGANIZATION

The technical report, Volume 1 of the Phase 1 study effort, is presented in the following general sequence and format:

CHAPTER I - Introduction and general description of SYNTHETIC (SYN) CITY.

CHAPTER II - Introduction to urban warfare and urban characteristics. This chapter provides an overview of urban warfare tactical considerations and functional characteristics for different types of urban infrastructures. Threat urban defensive measures in general and the Threat motorized rifle battalion in an urban defense are also discussed. Finally, the Threat MRB deployment within SYN City is detailed.

CHAPTER III - Overview of amphibious assault concepts presented in MCDEC Study 30-77-01 and their application to Operation BREAKER in SYN City. General and special situations are provided as are concepts for Demonstration and Advance Force Operations.

CHAPTER IV - Description of differences in assault operations in the 1990 time-frame and their impact on a deliberate assault into SYN City. Concept summaries are provided for five assault missions occurring in the mid-range period.

CHAPTER V - The "heart" of the technical report. Each of the 24 CSS functions is addressed in relation to an urban environment and the particular combat requirments of Operation BREAKER. Any necessary departures from standing operating procedures are detailed and recommendations to correct potential CSS deficiencies are made where appropriate.

CHAPTER VI - Description of the resources typically available in an urban area and those that will be utilized by VII MAF during the course of the amphibious assault.

CHAPTER VII - Development of usage rates for all classes of supply in the context of Operation BREAKER.

CHAPTER VIII - Evaluation of the SYN City Data Base developed under NCEL contract N68305-79-C-0037. Noted are data items found to be useful and those for which insufficient detailed information was provided. This evaluation may serve to provide a basis for further development of the technological data base.

APPENDIX A - Provides detailed results from automated fuel consumption analysis. Information presented in this appendix is summarized in Chapter VII - Class III - POL.

APPENDIX B - Mini-scenarios are developed corresponding to the tactical movements and assault operations envisioned during Operation BREAKER. Small-unit tactics applicable to different city patterns are used to estimate Class V consumption during the assault, seizure, and consolidation of SYN City. Information presented in this appendix is summarized in Chapter VII - Class V.

F. CONCLUSIONS AND RECOMMENDATIONS

1. Operational Considerations

This study effort was deliberately structured to require that a landing force launch an amphibious assault into an urban area. No alternatives were available that would enable the landing force to make a forced entry in a better location, after which SYN City could be isolated, occupied, or controlled as required. The physical characteristics of SYN City sorely constrained landing force initiatives, as did the deployment and capabilities of the Aggressor force defending the port area and major airfield. In the current time frame, Threat target acquisition and air defense systems make daylight amphibious landings more hazardous than in previous combat. The availability of guided weapons constitutes a significant threat to the slow moving LVTs and displacement landing craft, as well as to the LSTs that normally transport LVTs to within 6,000 meters of the shoreline. These factors militate in favor of conducting amphibious operations during hours of darkness and in conjunction with viable deception operations.

The initial consideration in attacking any urban area, including SYN City, is to isolate the city itself, mainly to prevent reinforcement from outside the city. Effective isolation also prevents the continuation of logistic support to the defenders. Significantly, however, a city that is isolated from vital external supply sources will quickly become a liability to the attacker. International law, to which the United States is an agreed party, requires that at least a subsistence level be maintained. The logistics planning for such an undertaking, in conjunction with the massive civil affairs activity that would be required, is addressed.

Helicopterborne operations provide the best, and often the only, means for isolating an urban area swiftly. The capability now exists for conducting these operations during the hours of darkness, although the state of training of each squadron committed to such an operation in actual combat should be carefully reviewed to ensure the compatibility of missions and squadrons and provide the greatest opportunity for mission accomplishment.

In only one of the missions did the analysts elect to initiate the assault during daylight. That mission called for the assault of SYN City, after maximum conventional fire support was used to reduce defenses. This was recognized to be the least likely type of assault that might be ordered, but it was considered in order to evaluate the impact such an operation might have on the size force required and the combat service support of that force. Analysts concluded that a two-regiment ground combat element would be adequate for this mission IF the reinforcing forces were subjected to heavy attrition at the same time that the forces within the city were under around-the-clock attack.

Except for the mission to reduce enemy defenses, preparatory fires within the urban area were restricted to the period immediately preceding H-hour, generally scheduled for BMNT. Restricting the use of firepower in an urban area derives from two basic considerations. The rubble caused by heavy fire power favors the defender and complicates matters for the attacker. Further, any unnecessary hazard to the civilian populace should be avoided, even in the case of a hostile citizenry as is the case in SYN City. All such fires should be specified to be of a discriminating nature and under positive control.

2. Mid-Range Influence

In the mid-range time frame tactical operations will be enhanced by the availability of the landing craft air cushion (LCAC), the light armored vehicle (LAV) and its variants, and the CH-53E heavy-lift helicopter which is expected to lift the LAV. It is important to note that the Soviets have lifted light tanks by helicopter, and they introduced air cushion vehicles in 1969. Currently, they have three different ACVs in the fleet, although their vehicles are not comparable with the LCACs that are soon to be operational in the U.S. fleets.

The heavy-lift helicopter will enable landing force commanders to lift a light armored force deep into an objective area, where that force can seize key objectives in the FBHL or attack a defender from the rear. It should be noted that notional T/Os for the LAA Bn do not include engineer variants of the LAV. Suitable engineer vehicles would be required as part of any light armored force to enhance the mobility of that force.

From a logistics viewpoint, the heavy-lift helicopter will enable the landing force to utilize a sea-based logistics system more effectively. The helicopter will provide a degree of responsiveness in speed and lift capability that cannot now be matched.

The LAV will improve the landing force capability to conduct urban warfare to some degree. Its most important contributions are considered to be better maneuverability than the LVT, protection against small arms fire and air burst artillery fire, and an NBC defense capability. The LAV is expected to have a swim capability, which would prove useful in the SYN City operations. The assault gun variant of the

LAV will provide direct fire support to infantry troops in urban combat, although the basic armament is not designed for urban fighting.

The LCAC is visualized to have the greatest impact on amphibious operations and amphibious logistics in the mid-range period. If used in conjunction with LVTs for landing assault waves, the LCAC will enable the commander to concentrate combat power ashore in combined arms teams very quickly. This means of employment, however, sacrifices surprise because of the lengthy period required to organize for and conduct the assault operations. Lifting LVTs in LCACs, together with a few tanks, limits the combat power that can be landed but capitalizes on the speed of the LCAC and facilitates tactical surprise. The LCAC will be able to lift three LVTs or one main battle tank. A flight of four LCACs, then, can lift nine LVTs and one tank, which is the equivalent of the assault elements of a reinforced rifle company. Which option is selected will depend on the mission, concept of operations, enemy capabilities, and relationship with other concurrent or ancillary operations.

3. Combat Service Support Functions

Each of the 24 CSS functions, as given in FMFM 4-1 (Draft) dated February 1980, was analyzed to determine when and to what extent that function relates to combat in an urban environment. Levels of effort required to provide CSS in such an environment were analyzed where appropriate and within the limitations imposed by the scope of this contract. The effort required was then compared with the organic MAF capability in each functional area. Conclusions and recommendations relate primarily to the influence of urban combat upon logistics in an amphibious assault situation. Existing deficiencies in the MAF CSS capability have been identified with respect to problems that would result during an amphibious assault into any area.

The figure opposite provides a graphic summary of the relationship between the CSS functions and the urban environment. The impact of an urban amphibious assault upon combat service support ranges from no appreciable impact to major impact. Several of the CSS functions are not performed during an assault operation. Capabilities to perform other CSS functions, even in a conventional environment, are deficient and will require augmentation, new equipment, or new operational concepts. Conclusions and recommendations regarding each CSS function are provided in the next several pages. Additional information can be found in Chapter V--Combat Service Support Functions and Requirements.

MAJOR IMPACT	MODERATE IMPACT	LOW IMPACT
CIVIL AFFAIRS	SUPPLY	FINANCIAL MANAGEMENT
ENGINEER	TRANSPORTATION	AUTO DATA PROCESSING
MILITARY POLICE	LANDING SUPPORT	FOOD SERVICE
	COMMUNICATIONS	POSTAL
	MAINTENANCE	ADMINISTRATION
	GRAVES REGISTRATION	ECCLESIASTICAL SERVICES
	CSS TRAINING	DENTAL
	LEGAL	

NOT PROVIDED	OTHER*
EXCHANGE SERVICES	EMBARKATION
SPECIAL SERVICE CLUBS	MATERIALS HANDLING
BAND (PRIMARY MSN)	MEDICAL SUPPORT
PASSENGER & FREIGHT TRANSPORTATION	

* PROBLEM AREAS NOT MOBA-UNIQUE

Figure EX-1. MOBA Impact Upon CSS Functions (Assault Phase)

Civil Affairs

- Offensive military operations in urban areas are likely to generate extensive logistic requirements in direct support of the populace; these requirements must be met to prevent civilian interference with tactical and logistic operations.
- The organic civil affairs capability in the Marine Corps is not adequate to support MAF offensive operations in a hostile urban environment; augmentation is essential.
- Analysis of the situation in SYN City disclosed that of the 20 CA functions, 12 were of key importance to successful accomplishment of the Landing Force mission and had to be provided for.
- CA functional areas in which the Marine Corps does not normally require or maintain trained personnel, but which are important in urban warfare, should be the basis for levying USMC requirements on the USMCR and US Army for USAR support.
- The presence of an unusually violent and aggressive populace may create civil affairs problems of such magnitude that a MAF could not accomplish the consolidation of a large urban area (deliberate assault option). In this situation, a more viable option would be to seize a corridor.

Engineer

- Most coastal urban areas contain facilities such as airfields and ports that would benefit the Landing Force.
- The VII MAF mission to assault, seize, consolidate SYN City and be prepared to continue the assault to the northwest must be accomplished within ten days of the D-day landing. Engineer resources will be in great demand to establish logistic support areas and rehabilitate LOCs.
- The engineer capability organic to VII MAF (or the notional MAF depicted in the MAGTF model) is judged not capable of completing the required tasks prior to D+10. The Naval Construction Regiment has therefore been embarked in the AFOE to assist with the rehabilitation of two airfields and the SYN City port.
- Establishment of an informal Engineer Group is recommended to facilitate control of all engineer resources and ensure that all engineer efforts are prioritized and accomplished in a timely manner. Under any circumstances, however, the division combat engineer battalion must remain under the command and control of the division commander.
- A Rapid Runway Repair capability must be structured (personnel and equipment) into the Wing Engineer Squadron. Actual NCR capabilities should be evaluated in respect to repair of typical port facilities.

Military Police

- Additional MP requirements due to the SYN City infrastructure include supervision or control of indigenous police personnel and assets, civilian evacuation, crowd control, and control of detention facilities and evacuee assembly areas.
- The level of MP augmentation depends in part on the attitude of the indigenous populace. This specific information is not provided in the SYN City data base.
- It is recommended that at least two additional MP Companies be embarked in the AFOE prepared for early debarkation. This force multiplier will allow combat units to devote their full attention to achieving designated combat objectives.

Supply

- The uniqueness of the urban environment is such that the development of MOBA PWRMS Project Stock should be considered. Items in this project stock would include selected Class II, IV, V, and VII items.
- Normal supply procedures and policies are adequate to provide assault support to VII MAF.
- Storage of supplies, especially Class V, requires large land areas and the use of selected buildings for covered storage. These areas are available once selected areas within the metropolitan boundaries and on the fringes of the city have been consolidated.

- As an interim measure until sufficient open areas are secured, Class V will have to be stockpiled along tertiary roads that provide separate ingress and egress.
- The impact of containerization is far more wide-reaching than that imposed by the assault into an urban environment.

Transportation

- Transportation requirements prior to embarkation and during the transoceanic deployment are not significantly affected by the existence of an urban objective.
- Transport resources must be compatible with containerized supplies--current equipment is not adequate to transport large quantities of containers.
- Transport equipment should reflect an echeloned introduction into the AOA commensurate with the total volume (and/or weight) of cargo to be moved.
- Current transport vehicles are judged to be capable of operating within an urban environment. No new items of equipment are necessary to provide transport support in such an environment.
- The increased vulnerability (and fixed level of assets) of MT vehicles in the SYN City area warrants additional hardening to protect personnel and cargo. Lightweight, easy-to-apply armor for critical areas should be procured and made available for deployment.

Landing Support

- Landing support operations are influenced to a greater extent by topographic and hydrographic conditions in the beach landing areas than by the urban complex immediately inland.
- A doctrinal employment of landing support resources has been used in Operation BREAKER with the exception of assets at BLUE Beach. The constricted landing area does not warrant the use of two separate Shore Party Teams to support the landing of two BLTs. One reinforced Shore Party Team is judged adequate to provide the required support.
- Landing support resources were adequate to structure and staff a total of 4 HSTs, 2 SPTs, and one austere Shore Party Group.

Communications

- Numerous studies have noted that communications will be degraded in an urban environment. SYN City is no exception.
- The indigenous communication system, including radio and television, will be used only to accomplish civil affairs liaison between VII MAF and the SYN City populace. VII MAF elements will use organic communication gear to accomplish their respective missions.
- Pending the introduction of more capable communications equipment, ad hoc measures will be undertaken to maintain communications in areas of degradation, with considerable reliance on wire.

Maintenance

- Like any assault operation, a greater reliance will be placed on forward contact teams during the early stages of the assault.
- The SYN City area is expected to provide numerous maintenance facilities that would be useful to accomplish maintenance functions.
- Current maintenance procedures and capabilities are judged to be adequate in an urban environment.

Graves Registration

- Criteria for temporary interment, as suggested in ECP 1-1, cannot be met in most (if not all) areas of SYN City.
- Psychological factors and public opinion press for the evacuation of all KIA back to CONUS.
- KIA during Operation BREAKER will be processed by the Graves Registration Platoon and evacuated by redeploying AE shipping or fixed-wing aircraft once Airfield 1 is operational.
- The use of refrigerated containers to hold KIA would provide a storage buffer alleviating the need for temporary interment should the retrograde operation be delayed. These containers should be embarked in the Assault Echelon.

CSS Training

- Selected combat service support elements will require additional training to properly interface with facilities anticipated in any urban environment.
- This training should be initiated by Mobile Training Team visits to CSS units followed by unit Professional Development Seminars. Identified training topics may be addressed by practical exercises (PE), command post exercises (CPX), and additional blocks of instruction at MOS-producing schools.
- Deficiencies in CSS training are not of such magnitude as to jeopardize accomplishment of the MAF mission. Combat and combat support training deficiencies, while not specifically addressed by this study, are judged to be more crucial than CSS deficiencies.

Legal

- An increase in the legal workload is expected during an amphibious assault into an urban area. The level of military crime will increase as well as civil claims against the US government.
- Additional legal teams will be staged at the theater air base and deployed into the FBH should the combined MAF and CAG capability not be adequate. Long-term operations in an urban environment will require the deployment of these teams on or about D+10. In long-term operations up to 60 legal augmentation personnel were calculated to be needed. For short-term operations (30-60 days) the assets available to the Staff Judge Advocate and Civil Affairs Group Detachments are judged to be adequate.

Embarkation

- Problem areas in embarkation center around the lack of required cube capacity rather than any specific MOBA influence.
- Shipping assets included within the Assault Echelon leave a shortfall of over 300,000 cubic feet. Additional "gray bottoms" or a diversion of assets from the AE to the AFOE will be necessary to embark VII MAF.
- Based upon the available shipping postulated for a notional MAF, the personnel and square capacity of the Assault Echelon vessels is adequate in both current and mid-range time frames. (In fact, the generous allocation of ships is not likely to be realized in an actual contingency, and significant readjustments in the embarkation and landing plans will probably be required. This observation applies to any amphibious asault and is not peculiar to urban warfare.)

Materials Handling

- Current materials handling resources are adequate to handle the landing of the Assault Echelon, which is breakbulk in nature.
- Fielded USMC MHE assets are not compatible with containerized cargo in the AFOE. Procurement of 50,000 lb. RTCHs, container trailers, and mobile ramps will be necessary to land and distribute AFOE cargo.
- The Amphibious Logistic System (ALS) with ELCASs and TCDFs will interface with urban port facilities. Selected subsystems must be embarked in the AE so that they are operational by the D+5 arrival of the AFOE.
- The MOBA environment is not significant factor with respect to MHE. Containerization influences are far more significant.

Medical

- A moderate level of casualties will exceed the medical capability ashore (in terms of bed availability) once assault shipping and CRTSs redeploy outside the SYN City area.
- Additional definitive treatment facilities with 1,200-bed capacity must be on station by D+10.
- Mass casualty situations will exceed the medical capability of VII MAF and supporting Navy units.
- Indigenous medical facilities, already at 85 percent utilization, will be fully required to handle additional civilian casualties.
- This deficiency in available medical support is not MOBA-unique. A moderate level of casualties in any combat environment will exceed the available bed capacity once AE shipping leaves the AOA.

CSS Functions with LOW MOBA Impact

- The CSS functions of Financial Management, Automated Data Processing, Food Service, Postal, Administration, Ecclesiastical Services, and Dental are not significantly affected by combat operations in an urbanized environment.
- These functions will continue to be performed in the same manner as in any other amphibious assault. Personnel should be provided with basic indoctrination concerning urban combat.

CSS Functions Not Provided During Amphibious Assault

- Exchange Services, Special Service Clubs, Band (performing primary mission) and Passenger and Freight Transportation will not be provided during the amphibious assault of SYN City.
- These functions would not normally be provided during an amphibious assault into any environment.

AUGMENT USMC CIVIL AFFAIRS CAPABILITIES - EMBARK SELECTED ELEMENTS WITH AE

EMBARK NCR IN AFOE TO COMPENSATE FOR PROJECTED ENGINEERING SHORTFALL

EMBARK MINIMUM OF TWO ADDITIONAL MP COMPANIES

ESTABLISH URBAN WARFARE PWRMS

CONDUCT URBAN WARFARE CSS TRAINING

INCREASE CUBE CAPACITY OF ASSAULT ECHELON

PROCURE CONTAINER-COMPATIBLE MHE AND TRANSPORT

PROVIDE 1,200 BED DEFINITIVE CARE FACILITY IN AOA BY D+10

Figure EX-2. Principal Combat Service Support Recommendations

4. Indigenous Resources

Urban areas have the potential for providing key resources or facilities that may be used to enhance the military capability of the landing force and sustain the indigenous populace. Preliminary analyses must be reevaluated once the MAF has landed and subordinate units have had the opportunity to conduct ground reconnaissance to supplement any information provide by in-country agents and photointerpretation teams. The object of the total reconnaissance effort is to provide a quantitative and qualitative analysis of all available resources.

While all of the resources are important to the Landing Force mission, the availability of selected areas, facilities, and supplies is vital. These key resources and their intended uses include:

- Fields, Surfaced Areas - Supply storage, maintenance
- Woods - Tactical billeting, supply storage
- Port - Focal point for cargo throughput
- Prison - Primary detention facility for POWs and civilian internees
- Airfields - Basing for high-performance aircraft, emergency resupply, medevac
- Schools - Primary relocation sites for evacuees
- Public Buildings - Major CPs, storage, sanitary facilities
- Private Dwellings - Billeting, minor CPs
- Bridges - Intact capture vital to conserve limited bridging assets
- Roads - Class V storage (tertiary roads), MSRs
- Construction Supplies - Airfield, road, and port rehabiiltation
- Key Municipal Workers - Civil/Military interface and operation of utilities

RESOURCE	RESOURCE UTILIZATION: MILITARY REQUIREMENT: MOBILITY	COUNTERMOBILITY	SURVIVABILITY	GENERAL ENGINEERING	CMD. CONTROL COMMUNICATIONS	SUPPLY	MAINTENANCE	PUBLIC SAFETY	PUBLIC HEALTH	RESOURCE UTILIZATION: CIVIL REQMT: PUBLIC INFORMATION	NO IDENTIFIED REQMT	MANAGEMENT BY VII MAF*: CA MANAGEMENT	GCE MANAGEMENT	ACE MANAGEMENT	CSSE MANAGEMENT
NATURAL	1.2. 4.6. 8	3.6. 7.8	3	3.6 8		2.3. 4.8	4	6.8	1.5. 6.8			1	2.3. 6.7		4
FACILITIES	3.6			5		1.3	4.5	2						6	1.2. 3.4. 5
STRUCTURES			**		1.3. 5.6	1.4	1	2.3	4.7	3	8	ALL			
UTILITIES AND COMMUNICATIONS				1.2. 3.4	5.6. 7.8			1.5	1.2. 3.4	7.8		ALL			
LOCs	ALL														1.2 3
EQUIPMENT	2.4	4	5	4		1.2	3	5	2			5		3	1.2. 4
SUPPLIES	1.3	1	1	1		1.3			2.4			2.4			1.3
HUMAN				2	1.3			3.4	2	1.5		ALL			

*GENERAL MANAGEMENT RESPONSIBILITY NOTED SHOULD BE REEVALUATED ON A CASE-BY-CASE BASIS ONCE ASSAULT UNITS HAVE LANDED

**AS REQUIRED. STRUCTURE TYPES WILL VARY

Figure EX-3. VII MAF Utilization of Indigenous Resources

NATURAL
1. Farms
2. Fields
3. Woods
4. Surfaced Areas
5. Interment sites
6. Lakes (Ponds
7. Swamps
8. Rivers

FACILITIES
1. Port
2. Prison
3. Bulk Fuel Complex
4. Naval Station
5. Industrial Areas
6. Airfields

LOCs
1. Roads
2. Bridges
3. Railroads

EQUIPMENT
1. MHE
2. Motor Transport
3. GSE (Aviation)
4. Engineer
5. Public Safety

SUPPLIES
1. Construction
2. Subsistence
3. Fuel
4. Medical

HUMAN
1. Civil Government
2. Utility
3. Public Safety
4. Equipment Operators
5. General Population

STRUCTURES
1. Warehouses
2. Schools
3. Police & Fire Stations
4. Stores/Shopping Centers
5. Private Dwellings
6. Hotels/Apartments
7. Medical
8. Churches & Museums

UTILITIES & COMMUNICATIONS
1. Water Treatment
2. Electric Power
3. Waste Treatment
4. Sanitary Disposal
5. Police & Fire Comm.
6. Telephone
7. Radio & Television
8. Newspapers

5. Logistic Planning Factors and Usage Rates

Planning factors for each class of supply were reviewed to ascertain their validity during an amphibious assault into an urban environment. The threat within SYN City consisted of a reinforced motorized rifle battalion, two 100-man garrison forces, and 1000 personnel at the naval station. The threat external to the city consisted of a motorized rifle divison (reinforced) minus the MRB in SYN City. Planning factors developed for Operation BREAKER, therefore, include aspects of the urban as well as conventional combat environments. Since many of the supplies required to support this type of combat operation would be preloaded and prepositioned, the principal task was to determine if existing planning factors, governing this prepositioning of supplies, differed appreciably from planning estimates generated from the peculiar requirements of Operation BREAKER. Significant differences affecting the accomplishment of the MAF mission were highlighted and are noted in pages following as well as in Chapter VII of this report.

Class I - The current planning factor of 7.05 lb/man/day overstates the actual requirement by 33%. This difference is due to the ration mix during the early stages of an amphibious assault versus a long-term (180-day) mix. No remedial action is recommended.

Class II - The utilization of selected secondary equipment items will be greatly influenced by the nature of the combat environment. An urban area favors the use of individual weapons, engineering tools, and miscellaneous industrial supplies. Body armor and chemical protective clothing will enhance the survivability of friendly forces. Other items such as administrative and housekeeping supplies will find a reduced usage during the assault phase. MOBA CARFs have been provided for those items whose usage is expected to differ markedly from a more conventional usage represented by USMC CARFs in NAVMC 1017.

Class III - BDM analysts concluded, based on the develoment of an alternate computational methodology for ground fuel use, that ground fuel requirements during the early stages of an amphibious assault were 50% (MOGAS) and 72% (DIESEL) of corresponding quantities based on planning factors contained in NAVMC 1017. The TAM methodology was found to overstate fuel requirements for elements within the city and understate fuel consumption by mechanized forces operating outside the urban area. Aviation fuel requirements were judged to be at a "normal" level due to the heavy use of fixed-wing assets outside the city. The bottom line is that normal planning factors for this supply class will be adequate in an urban environment and will provide a cushion, or safety factor.

Class IV - The overall use of barrier materials in an urban environment was found to approximate a normal usage level due to the availability of structures for use as temporary defensive positions. Rehabilitation, enlargement, and construction of airfields required 14,848 bundles (14,700 ST) of AM-2 matting, which accounted for approximately 90% of the total Class IV tonnage. With the exception of surfacing materials, the existing Class IV planning factor should be adequate during the assault phase. Indigenous materials will be used whenever possible.

Class V - The notional mount-out of ammunition items, with several notable exceptions, was found to be adequate for a MAF assault into SYN City given the threat deployment stated in Chapter III. The principal exceptions are these: over 76 percent of 7.62 mm linked ammunition carried in the AE and 98 percent of the organizational load of M 34 WP smoke grenades were expended in urban combat without regard to other combat requirements. Mount-out quantities of mines, particularly M18A1 Claymores, were grossly inadequate by a factor of over 600 percent. Other significant shortfalls of urban-peculiar Class V items include concussion grenades (not in the current inventory), man-portable breaching weapons, concrete-piercing fuses for artillery ammunition of all calibers, HE/HEP rounds for tanks, and CS grenades. These items should be procured and stored as a portion of a MOBA PWRMS Special Project Stock.

Class VI - Personal demand items during the assault will be furnished by the Ration Supplement Sundries Pack; AAFES suport will not be available until after D+30. Once this support does become available, the overall lb/man/day planning factor is not significantly different in an urban environment as opposed to a nonurban temperate environment.

Class VII - Selected major end items will find heavy use during the assault and consolidation of SYN City while other items, such as air conditioners and refrigerators, will not be required in the densities organic to MAF units. Each item must be evaluated in the light of an assault situation and the urban combat requirements for that item. BDM analysts have used a Delphi technique to provide MOBA (Assault) CARFs for selected items whose utilization patterns differed in this environment.

Class VIII - The normal mount-out of medical supplies and equipment is judged adequate to provide treatment for the moderate level of military casualties anticipated during Operation BREAKER. No restructuring of AMAL/ADAL blocks appears warranted for operations in an urban enviornment. Indigenous medical supplies will be used to treat civilian casualties; additional drugs and equipment may be required to ensure that civilian medical requirements can be met during long-term operations. These are provided for in Annex G (Civil Affairs) to Oplan 1-81 contained in Volume II of this report.

Class IX - Overall requirements for repair parts during Operation BREAKER should be at a relatively normal level after considering the influences of both open and urban environments. Unit commanders have the ultimate responsibility to ensure that adequate repair parts stocks have been identified, procured, and embarked.

CHAPTER I

INTRODUCTION

Introduction

PURPOSE OF THIS ANALYSIS

> THIS PROGRAM WAS ESTABLISHED... "TO INVESTIGATE, IDENTIFY, AND SOLVE THE LOGISTICS REQUIREMENTS PECULIAR TO AN AMPHIBIOUS ASSAULT INTO A HIGHLY URBANIZED AREA."

The Marine Corps has identified a likelihood of combat in urban environments during future time periods. Threat of force in such areas can be strategically and tactically crucial to the realization of military and political objectives. A requirement, therefore, exists for employing amphibious forces against urban targets located along the littorals of the world. Critical national logistics assets of countries, including rail and roadway hubs, docks, and airports, container shipment centers, commercial pierside support apparatus, fuel transfer points and storage areas which typify these urban environments require definition. Logistics and Combat Service Support (CCS) will present new logistics challenges and opportunities.

This program includes a requirement to conduct investigations to identify the role of logistics in urban environments, isolate peculiarities, and create a technological base from which to address and evaluate logistic technologies which can solve low to high-risk problem areas. Upon establishment of a technological base, developmental investigation could lead to the successful solution of problems such as the requirement for specialized logistic concepts and systems for urban warfare; the analysis of capabilities of present equipment inventories and mid-range equipment characteristics to satisfy urban area performance requirements and provide an adequate throughput in an urban port facility to support the conduct of an amphibious operation; the examination of level of effort and support required by both the Naval Force and the Landing Force to maintain command, control and coordination of logistics systems and equipment in an urban environment; the evaluation of performance capabilities and requirements of combat service support systems to function efficiently and effectively in urban port areas; the evaluation of present state-of-the-art logistics systems to survive and operate effectively in urban areas through all tempos of combat; and the development of land management techniques to provide combat service support in urban environments.

PHASE I

APPLICATION OF TECHNOLOGICAL DATA BASE FROM THE OFFENSIVE POSTURE

- DEFINE CSS FUNCTIONS FOR THE MAGTF AS THEY RELATE TO AN URBAN ENVIRONMENT
- IDENTIFY SPECIALIZED LOGISTIC CONCEPTS/SYSTEMS FOR URBAN WARFARE
- DETERMINE THE LEVEL OF EFFORT AND SUPPORT REQUIRED BY CATF/CLF TO MAINTAIN COMMAND, CONTROL, AND COMMUNICATIONS IN COORDINATING THE CSS SYSTEMS
- DETERMINE THE CAPABILITIES AND REQUIREMENTS OF THE CSS SYSTEMS
- EVALUATE THE SURVIVABILITY/EFFICIENCY OF LOGISTICS SYSTEMS
- DEVELOP LAND, EQUIPMENT, SUPPLY, AND ORGANIZATIONAL MANAGEMENT GUIDANCE

Introduction

SYNTHETIC (SYN) CITY

SYN CITY, A FICTITIOUS METROPOLITAN PORT CITY, AND ITS ASSOCIATED DATA BASE IS THE BASIS FOR THIS ANALYSIS OF GENERAL URBAN WARFARE AMPHIBIOUS LOGISTICS APPLICATIONS.

The SYN City map and associated Technological Data Base were prepared for the Naval Civil Engineering Laboratory, Port Hueneme, California to serve as the basis of this analysis of General Urban Warfare Amphibious Logistics Applications, and possible further studies in this field. It is a synthetic representation of an urban area on a seacoast. A data base was established for six separate city locales and a statistical synthesis of all the data on these urban areas was consolidated into a single fictitious metropolitan development. These locales are:

Casablanca, Morocco	Canton, China
Charleston, South Carolina, USA	Bremerhaven, Germany
Leningrad, USSR	Belem, Brazil

The map product is shown reduced on the facing page.

The data base is a synthesis of technical information representing the following:

- Open Space: Slopes, surfaces and vegetation
- Environment: Temperatures, precipitation and wind on a quarterly and annual basis
- Utilities and Communications: Garbage, sewage, water, electricity, telephones, radio/television
- Transportation: Geomorphology, terrain characteristics, surface and subsurface networks, water routes, bridges, tides, port facilities, rail routes and air facilities
- Medical: Hospitals, blood services, and medical hazards
- Resources: Local transportation (buses, trucks), construction, industry, foods, fuels, public buildings, warehouses, population

The SYN City data base is represented in two ways:

- A cartographic presentation to 1:20,000 scale with 1,000-meter universal transverse mercator grid network.
- A statistical and graphic presentation of the same data as a numerical technical data base.

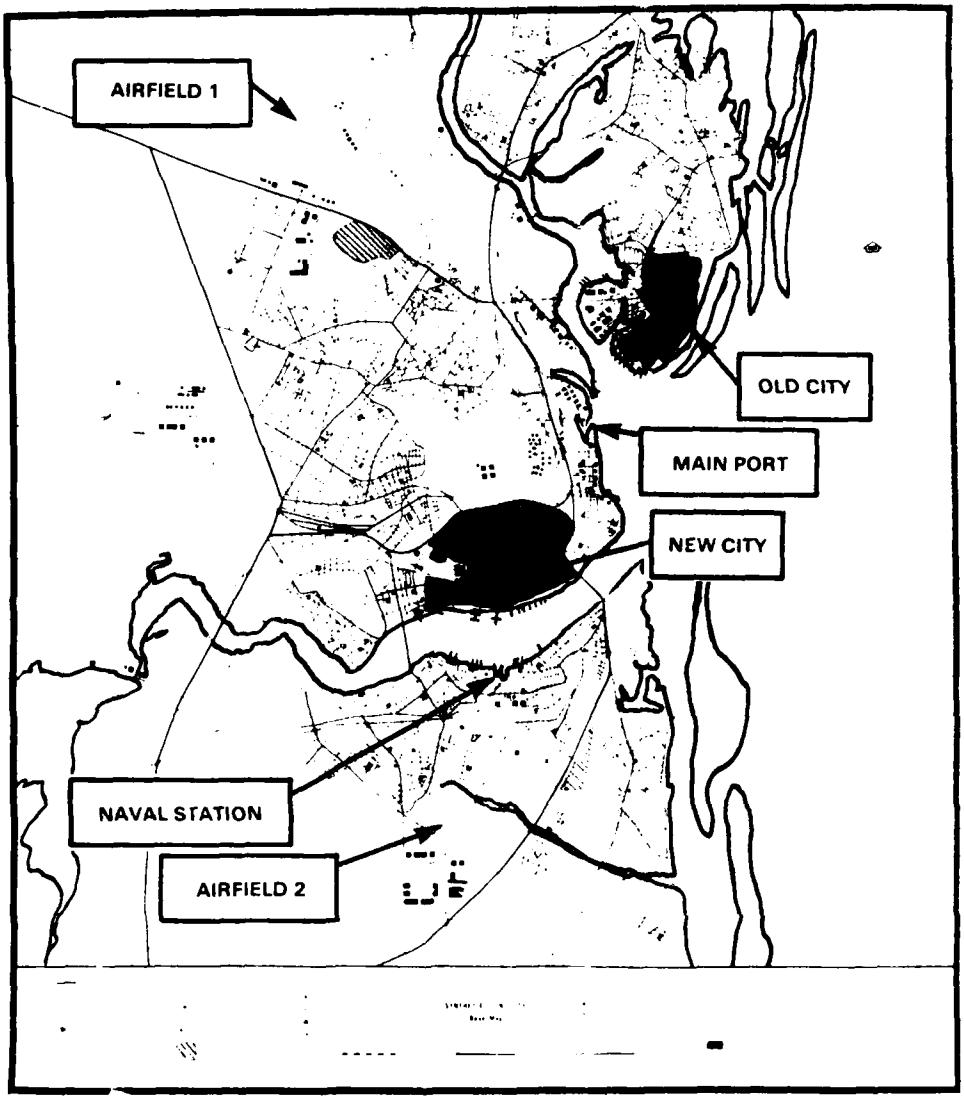


Figure I-1. The Synthetic (SYN) City Map Product

Introduction

ORIGIN AND DESCRIPTION OF SYNTHETIC (SYN) CITY

THE FOLLOWING DATA, TAKEN FROM THE SYN CITY DATA BOOK, IS THE BASIS FOR THIS STUDY.

SYN City lies in the north temperate zone at the confluence of two rivers, one flowing from west to east and the other from north-northwest to south-southeast. The confluence of these rivers forms a natural harbor which is 3,000 meters at its widest point. This area is further restricted by a breakwater extending northeast from the southern tip at the mouth of the southern river. Though the harbor is natural and protected by the breakwater, some dredging is required on an average 5-year cycle to maintain the 12-meter channel depth.

Prevailing currents from the south and southeast have created offshore islands to the east which probably at one time were part of the mainland. These islands range in length from 2,000 to 5,000 meters and 200 to 800 meters in width. They are sandy with very sparse clumps of reedy natural land cover, and are prone to be under water at flood tide since no point on the islands is more than one meter above mean sea level. Consequently, no attempt has been made to develop them, and they are accessible only by boat or swimming. The range of widths of the waterway between the islands and the mainland is 200 to 800 meters.

The population of the metropolitan area is 250,000 and covers an area of approximately 100 square kilometers. The city lies on the coastal plain with gently rising terrain to the west. The southern river separates two landmasses which extend from the distant piedmont and mountain areas. These fingers, one from the northwest and the other from the southwest, originally formed one large landmass which extended to the shore line. A fault separated them forming the southern river, which has slowly widened and deepened over the years. The three landmasses were worn down by glacial action and today appear like flat fingers reaching from the Piedmont plateau toward the sea. The southern river was impounded approximately 10.5 kilometers upstream in the early 20th century to control the fluctuating flow, provide a fresh water reservoir, and provide hydroelectric power.

The northern river has been bulkheaded on the western bank from the mouth to 7 kilometers upstream to control erosion and provide a landfill area for future growth and expansion. The landfill area already provides land for a major railhead and sea port interface.

Sandy-loamy soil predominates west of the sandy beach area. Vegetation ranges from reed grass up to scrub oak and pine less than two feet in diameter.

The oldest part of the city centers around the intersection of E+12, N+11. This peninsula tip provided protection for local natives against marauding bands from the west as it was protected by water on three sides. It also provided easy access to fishing areas. As the threat from the roving bands subsided, the population expanded to the area of E+10.5, N+8, and forts were built to protect the harbor against raiding pirate ships. As the city grew, major development occurred in the area of E+9, N+7, and this is considered the center of the metropolitan area today.

The city is considered a medium industrial city and a major throughport for commerce with its railhead and sea port interface. The major industrial areas are on or outside the metropolitan boundary with many small pockets of light, cottage-type industry interspersed throughout the older parts of the city. The naval station and shipyard on the southern shore of the southern river is a major employer of the population. The two army garrisons are still active although the activities are mostly administrative and ceremonial in nature.

Air and water quality in the area generally approach western standards. With the advent of sewage treatment there is only nominal polluting discharge, the most significant being the raw effluent discharging from the old city area. Air quality is generally good except for the rather extensive use of coal and wood burning stoves, furnaces and fireplaces in residential areas. This causes a yellow haze to be suspended over the urban section, especially during the heating season and when temperature inversion occurs. Industrial air pollution is minimal since most of the facilities are relatively new, having replaced the older, smoke-producing facilities within the last ten years.

The population in the most populous areas is pedestrian with only moderate mobility between the two, i.e., people live and work in the same neighborhood. Mobility is only slightly greater in the less populous suburban area, with an intracity bus transit system. This is augmented by intercity rail and bus service.

CHAPTER II

URBAN WARFARE

Urban Warfare

INTRODUCTION

MILITARY OPERATIONS IN BUILT-UP AREAS (MOBA) ARE NOT LIKELY TO BE AVOIDED IN FUTURE COMBAT SITUATIONS. INCREASING URBANIZATION AND THE IMPORTANCE OF MANY KEY FACILITIES THAT ARE FOUND WITHIN POPULATION CENTERS WILL OFTEN MAKE IT NECESSARY FOR A COMMANDER TO SEIZE ONE OR MORE TOWNS, VILLAGES, OR CITIES, PARTICULARLY THOSE WHICH SERVE AS COMMERCIAL PORTS OR POLITICAL OR COMMUNICATIONS CENTERS. COMBAT TRENDS FOR INSURGENCIES ALSO SHOW INCREASED RELIANCE ON URBAN WARFARE. THE PROLIFERATION OF SOPHISTICATED WEAPONS, EVEN AMONG COMPARATIVELY BACKWARD MILITARY AND PARAMILITARY FORCES, MAKES IT IMPERATIVE FOR MILITARY COMMANDERS, PLANNERS, AND TROOPS TO UNDERSTAND THE MANY DIFFERENCES IMPLICIT IN URBAN WARFARE.

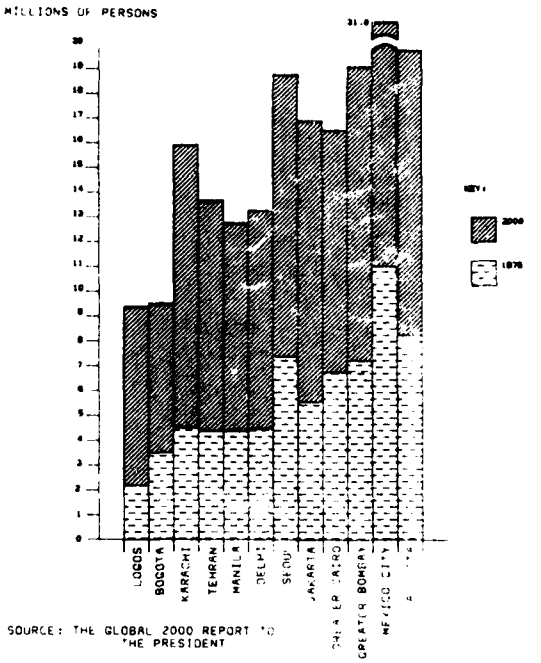
Until recently, military training manuals generally referred to MOBA or MOUT (Military Operations on Urbanized Terrain) as operations to be avoided. Populated areas were bypassed, to be mopped up later by follow-on forces. Tactics and techniques for combat in urban areas were not systematically developed, nor were the various weapons tested specifically for their applicability in MOBA operations.

During World War II, particularly in the European Theater, numerous battles were fought in villages and towns. Several major battles took place in large cities. A vast amount of practical experience was gained in that specialized nature of fighting. Unfortunately, much of that experience has since been lost. The battles for Inchon/Seoul in Korea and for Hue in Vietnam provided new experience in urban warfare, and in both cases the status of training and the weapons available for MOBA were found to be less than optimum. Many of the weapons that proved effective in urban fighting are no longer in the inventory; in many cases, no replacement weapons suitable for MOBA have been issued.

Most large and growing urban areas are found within ten miles of a coastline. With this increasing coastal urban sprawl worldwide, even amphibious operations can no longer avoid combat in built-up areas. New attention is being given to tactical considerations for military operations in built-up areas but the major problems of logistics and combat service support in MOBA in an amphibious environment are only beginning to receive attention.

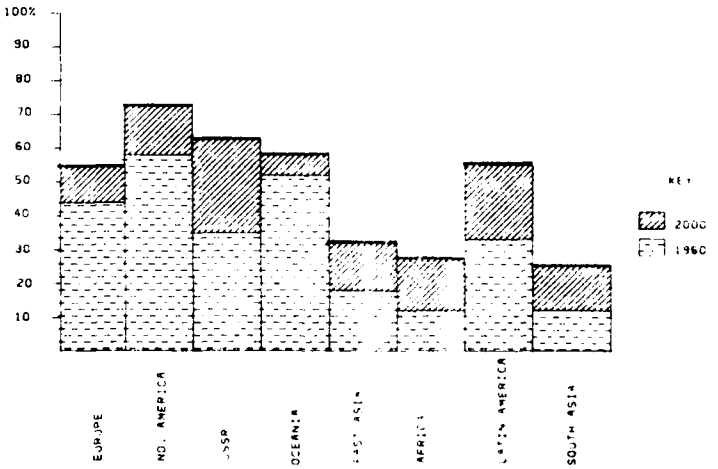
Several excellent sources deal with MOBA/MOUT tactics in varying degrees of depth and from both friendly and threat doctrinal view points. Some of these are identified in the bibliography. This chapter is intended only to present the highlights of urban warfare as a basis for the examination of general urban warfare amphibious logistics applications.

ESTIMATES AND ROUGH PROJECTIONS OF SELECTED URBAN AGGLOMERATIONS IN DEVELOPING COUNTRIES



SOURCE: THE GLOBAL 2000 REPORT TO THE PRESIDENT

PROJECTED INCREASE IN PERCENTAGE OF POPULATIONS LIVING IN CITIES OF 20,000 OR MORE.



SOURCE: JOSEPH SPENGLER, POPULATION CHANGE, MODERNIZATION AND WELFARE

Figure II-1. Urban Population Trends

DOCTRINAL IMPLICATIONS

COMBAT IN BUILTUP AREAS IS FRAGMENTED, GENERALLY SLOW IN DEVELOPING, AND TIME CONSUMING IN EXECUTION; IT USUALLY PRODUCES HEAVIER-THAN-NORMAL CASUALTIES AND IT DEMANDS CAREFUL, DETAILED AND INTELLIGENT LOGISTICAL AND COMBAT SERVICE SUPPORT PLANNING. THE ADVANTAGE USUALLY LIES WITH THE DEFENDER.

MOBA is distinguished from other tactical forms in several key respects. The almost inevitable presence of a civilian populace imposes constraints and responsibilities on both protagonists. The population inhabits the urban battlefield, which, like any battlefield, is comprised of terrain features. Those features, however, have unique aspects that must be appreciated. The irregular natural features of the countryside are replaced by more regular manmade structures. The buildings have vertical walls instead of gradual slopes. Streets become avenues of approach as well as killing zones. Historically, attackers have caused the greatest damage to cities, and the resulting rubble usually has accrued to the defender's advantage. Subterranean lines of communication often exist, again benefiting the defender.

The defender is usually familiar with the urban layout and the structures that can best be defended. He has the advantage of preparing mutually supporting positions, reinforcing defensible structures, selecting fields of fire, stockpiling critical supplies, and establishing sheltered lines of communication between defensive positions. The proliferation of small, mobile, and sophisticated Threat weapon systems, such as the SA-7 GRAIL, new antitank rocket propelled grenades, and NBC weapons vest the defender with significant capabilities even if he is otherwise outnumbered. In particular, Threat use of chemical munitions must be considered a probability.

The attacker requires detailed intelligence concerning the technological development of the built-up objective area and of Threat force doctrine and organization for urban defense. Heavy use of firepower has to be weighed against the hazard to civilians and the creation of rubble that will aid the defender and pose engineering problems to the attacker. Artillery and armored tactics are altered appreciably. Attacking forces must be properly trained and equipped for assaulting a succession of heavily defended highrise buildings, and fighting floor-to-floor and room-to-room without needlessly injuring noncombatants. Tactics and techniques for entering or breaching urban structures, through the walls, roofs, or basements must be planned and rehearsed. Weapons and munitions that are effective in urban fighting must be supplied--and resupplied. Because command and control are essential to success in battle, and because urban combat quickly degenerates into platoon, squad, and fire team skirmishes, effective communications are essential.

The role of the aviation combat element (ACE) is altered considerably in urban combat. Greater reliance should be placed on precision guided munitions (PGM) and attack helicopters against targets inside the urban perimeter to minimize damage and optimize enemy military casualties. In addition, transport and utility helicopters provide a means for observing the situation, deploying troops within the urban environment, acting as airborne communications relays, and evacuating casualties. Concomitantly, Threat aviation capabilities must be appreciated and their innovative use of air power, particularly HIND-24 helicopters, must be anticipated. Aerial CW and AP/AT mine dispensers cannot be ignored.

Combat service support organizations and facilities will be influenced by the urban terrain. Instead of avoiding built-up areas, CSS commanders will have to seek out those facilities that accord them adequate covered storage space, reliable lines of communication, and reasonable security from air attack and indigenous sabotage.

The doctrine for urban warfare is still being formulated, and the techniques for providing combat service support to ground and aviation combat elements of a Landing Force in the assault of an urban area need to be assessed, evaluated and tested.

IMPORTANCE OF URBAN TERRAIN

OPERATIONS CONDUCTED ON URBAN TERRAIN ARE DESIGNED TO CAPITALIZE ON THE STRATEGIC OR TACTICAL ADVANTAGE AFFORDED BY CONTROL OF A PARTICULAR CITY, AND THUS DENY THESE ADVANTAGES TO THE ENEMY. HISTORICALLY, THE SIDE WHICH CONTROLS AN URBAN AREA HAS A DECISIVE ADVANTAGE THAT FREQUENTLY DETERMINES SUCCESS OR FAILURE OF LARGER CONFLICTS. (OH 8-7)

Urban Warfare

CITY PATTERNS

CITY PATTERNS EXERT A DIRECT AND IMPORTANT INFLUENCE ON THE TACTICS, TASK ORGANIZATIONS, AND WEAPONS USED IN MOBA.

When an urban area cannot be ignored, neutralized, or bypassed, offensive combat operations to seize all or part of the area or cut a corridor through it become necessary. The nature of the surrounding terrain and the spatial relationship of any suburban satellites are important considerations in determining courses of action. Isolation of the urban target is a key objective to prevent resupply or reinforcement, and the ability of the attacker to effect isolation will depend on several factors. The forces and weapons available, the size of the urban area and its surrounding environment, and the enemy situation all must be considered.

Modern cities often have suburban satellites developed around the main city, or hub. These satellites can provide logistic support and act as barriers to an enemy's attempt to bypass the hub. The defender will capitalize on this geographical aspect as well as on natural and man-made features such as rivers, canals, dikes, main roads, and railroads which segment the city and can become obstacles, canalizing the attacker into killing zones.

Building Patterns

In those regions of the world which have been subjected to European culture, the urban areas fall within five basic building patterns. Many cities, of which "SYN City" is a composite, contain a mix of these basic five patterns. On the other hand, villages and towns may be characterized by only one pattern. The building patterns are as follows:

- Dense, random construction
- Closed-orderly block
- Dispersed residential area
- High-rise area
- Industrial/transportation

The military implications of these different building patterns will be discussed in following sections.

Street Patterns

Street patterns of cities are generally classified as six types:

(1) Radial
(2) Radial ring
(3) Ray
(4) Grid or rectangular
(5) Combined
(6) Irregular

The grid or rectangular pattern occurs in planned, more-or-less modern cities. In older European cities, the physical layout of a village, town, or city is a composite of the progressive development over the centuries.

The combination of street patterns and building patterns impacts on military operations in several ways:

- Mobility
- Fields of fire
- Line of sight
- Cover, concealment, barriers
- Fire hazard
- Command and communications
- Weapon suitability

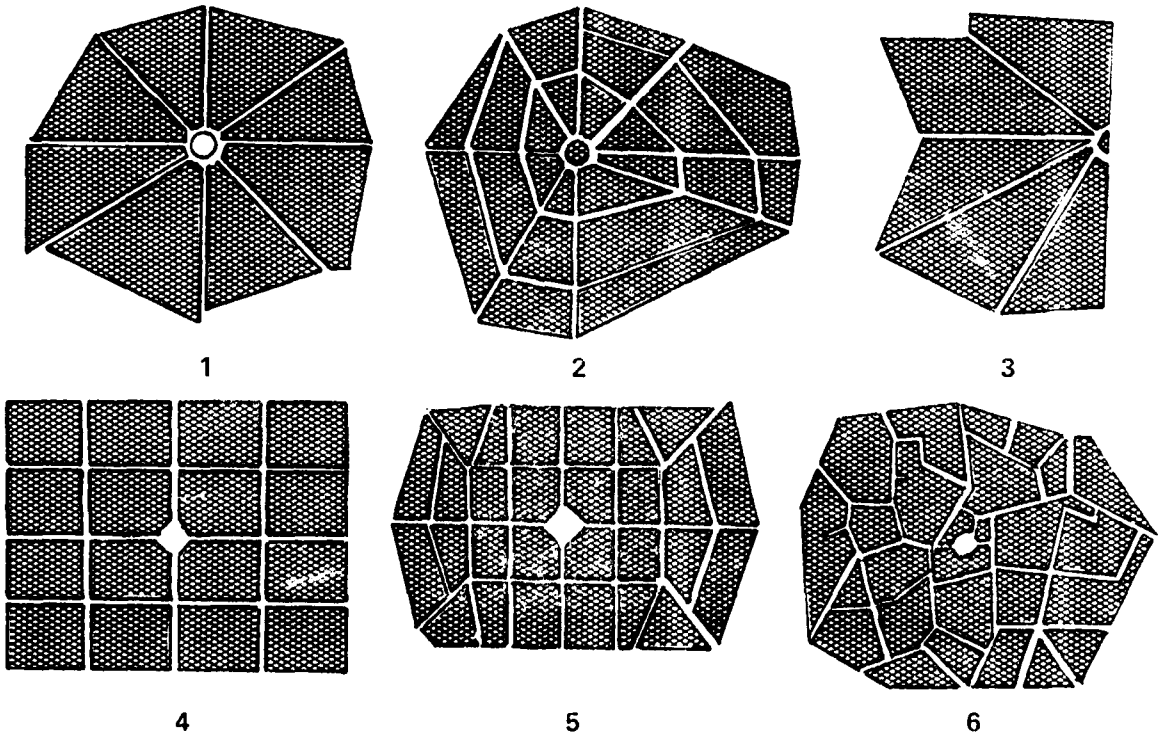


Figure II-2. Typical Street Patterns

DENSE, RANDOM BUILDING PATTERN IN CITIES

THE DENSE, RANDOM BUILDING PATTERN IN A CITY IS THE MOST DIFFICULT CONFRONTING MILITARY OPERATIONS BECAUSE IT INHIBITS MANEUVER AND SERIOUSLY LIMITS THE EMPLOYMENT OF SUPPORTING WEAPONS.

The dense, random building pattern is typical of old European villages and parts of the old cities. In SYN City this pattern is prevalent in the old city and can be found in the southern part of the new city. The pattern has an adverse impact on mobility, fields of fire, line of sight, communications and weapons effectiveness.

The disadvantages of this pattern to the offensive force are:

- Narrow, twisting streets limit the use of tanks, LVT's and direct fire artillery.
- Arming distances are generally insufficient for use of guided weapons such as TOW and DRAGON.
- Command and control is impeded due to radio communication line-of-sight restrictions.
- Fire is a great hazard because of age and construction of buildings. This subject will be discussed in a later section, as it directly impacts on CSS operations.
- Forming obstacles with rubble, vehicles, barbed wire, tetrahedrons, etc., is easy.

The advantages of this type of pattern are:

- Cover and concealment are excellent.
- Buildings are usually low and susceptible to rooftop entry by means of scaling ladders or grappling hooks.

Suitable weapons for fighting in an area of dense, random buildings are:

- Small arms, machine guns.
- Grenades (fragmentation, offensive, smoke, riot control).
- Selected light antitank weapons.
- Recoilless rifles (no longer in active inventories).
- Mortars (smoke and illumination rounds).
- Demolitions.

Typical old inner city construction with narrow, winding streets.

Figure II-3. Typical Old Inner City Construction

CLOSED, ORDERLY BLOCKS

CLOSED, ORDERLY BLOCKS PERMIT MODERATE MOBILITY, BUT THE USE OF SUPPORTING WEAPONS CONTINUES TO BE LIMITED.

This building pattern is found in residential and commercial areas. The buildings form a continuous front, often with rear courtyards; the streets are straight and wider than the dense, random pattern, and are in a grid pattern. The buildings are usually constructed of stone, brick, or concrete.

The disadvantages of this pattern for the offensive force are:

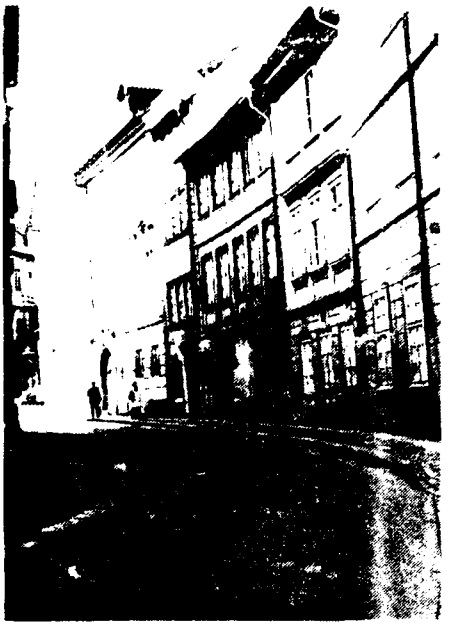
- Heavy construction of buildings requires heavy weapons and much demolition.
- Artillery fire may be difficult to adjust.
- Vehicular movement is possible but confined.
- Command and control is difficult; radio antennas must be extended from buildings into streets on the line of attack.
- Armor is limited to the direct infantry support role.
- Fire is a great hazard, and is hard to contain.
- Vertical entry into buildings is difficult and the use of helicopters may be required to gain access to rooftops.

The advantages of this type of pattern are:

- Fields of fire are longer than in the dense pattern, but still restricted.
- Street widths permit a greater range of mechanical movement.
- Rubble is less of an obstacle to the attacker than in a dense, random pattern.
- Infantry can often move through, over, or under connected buildings.

Suitable weapons are:

- Small arms, machine guns.
- Grenades, hand and rifle.
- 90mm and 106mm recoilless rifles (106mm with HEP) (no longer in active inventories).
- CEV with demolition gun (US Army system).
- 105mm tank firing HEP-T (HEP-T ammunition is in short supply).
- 155mm and 8" SP artillery.
- Demolitions - Pole and Satchel charges.
- Smoke pots.



Common to central areas of towns and cities, the streets are wider and the buildings form a continuous front.

Figure II-4. Closed, Orderly Blocks

DISPERSED RESIDENTIAL AREA

IN THIS BUILDING PATTERN, ARTILLERY PLAYS A GREATER ROLE; DISMOUNTED INFANTRY IS USED WITH ARMORED SUPPORT.

This pattern includes row houses and single family homes, which are close together, set back from the streets and with possible gardens and trees. The streets are straight or curving.

The disadvantages of this pattern to the offensive force are:

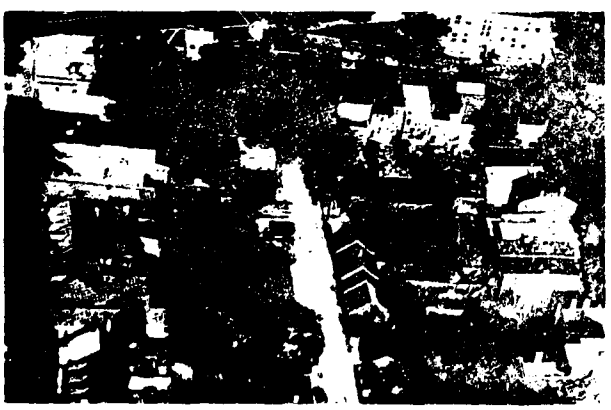
- Antitank missiles are restricted due to line of sight constraints.
- Fields of fire and observation are limited.
- The presence of civilians may require strict rules of engagement.

The advantages of this type of pattern are:

- Small dismounted unit concealment is provided by buildings and vegetation.
- Fires are easier to confine (due to greater bulding dispersion).
- Armored vehicle operations are less restricted.
- Individual buildings provide cover to armor.
- Communications are less restricted.
- Momentum of attack is increased.
- Combined arms firepower is more effective.
- Buildings are more easily breached due to lighter construction.
- Mortar and artillery are more effective.

Suitable weapons are:

- Small arms and machine guns.
- Grenades, hand and rifle.
- Tanks in direct support of infantry.
- LVTs, IFVs.
- Mortars and artillery.
- 90mm and 106mm recoilless rifles (no longer in active inventories).



Row houses and single family homes. Street pattern is rectangular or curving.

Figure II-5. Dispersed Residential Area

HIGH-RISE AREAS

BECAUSE OF THEIR CONSTRUCTION, HEIGHT, SUPERIOR OBSERVATION, AND COMMANDING POSITION, HIGH-RISE AREAS ARE EASY TO DEFEND AGAINST CONVENTIONAL ATTACK AND THEY PRESENT THE ATTACKER WITH SERIOUS OBSTACLES.

High-rise apartment buildings are often on the fringes of cities, and office buildings are in the newer sections of cities. They are separated by parking areas, parks, playground areas, and possibly shopping areas.

The disadvantages of this pattern to the offensive force are:

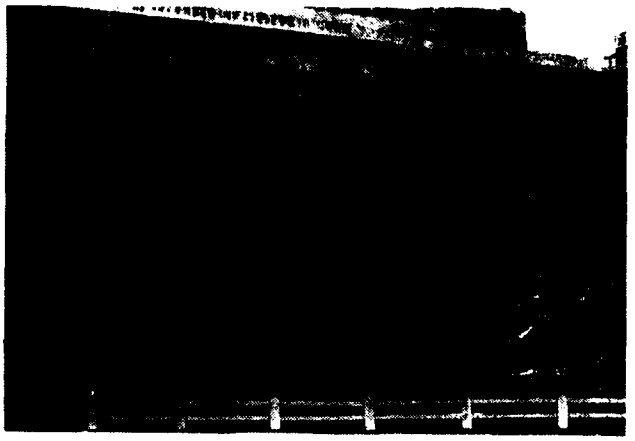
- High-rise buildings can be difficult to enter and time consuming to clear.
- Snipers can exert great influence and delay the attacker inordinately.
- Inside high-rise buildings the use of weapons is greatly restricted.
- The defender enjoys good observation and, being familiar with the structures, has internal mobility vertically and horizontally.
- Intracity communications is restricted by building heights, densities, and construction materials.

The advantages of this type of pattern are:

- Underground garages and storage areas are militarily useful.
- High-rise buildings provide good observation sites.
- The buildings are easy to breach unless made of reinforced concrete.
- Line of sight is long outside (but limited inside).
- Fires are easier to control, although smoke can be a problem.
- Helicopters can often land on the roofs to discharge or evacuate troops.

Suitable weapons are:

- Small arms, submachine guns, machine guns.
- Grenades, including CN.
- Tanks with HEP-T rounds (for breaching).
- Demolitions - satchel and pole charges.
- Artillery in direct fire role, mortars in indirect fire.



Typical of larger towns or cities are wide streets and spaces, and multistoried apartments and office buildings.

Figure II-6. Typical High-Rise Areas

INDUSTRIAL AND TRANSPORTATION AREAS

INDUSTRIAL AND TRANSPORTATION AREAS TEND TO BE MORE OPEN AND SPREAD OUT THAN OTHER URBAN CLUSTERS AND THUS FACILITATE THE USE OF ARMOR AND OTHER SUPPORTING WEAPONS, INCLUDING FIXED-WING AIR SUPPORT.

This type area includes ports (warehouses, container yards, cranes), rail facilities, POL tank farms and refineries, factories, air terminals and supporting facilities, power and water treatment plants, key bridges and dams.

These facilities are usually found in the older sections of the cities, on the fringes, and in the new industrial park areas beyond the suburbs. The buildings are low, large, and functionally designed; they include oil refineries, coke ovens, marshalling yards, oil and gas storage tanks, and press and drydocks. Buildings are laid out unevenly with considerable space between them and provide a multiplicity of vehicular routes.

The disadvantages of this pattern to the offensive force are:

- Local inflammable materials create a fire and explosive hazard.
- Mines and booby traps are effective defensive weapons.
- Stubborn defense can result in destruction of facilities that the attacker hopes to use.
- Hasty obstacles can be constructed with a minimum of effort.
- POL tanks can be rigged as an explosive/flame trap.

The advantages of this type of pattern are:

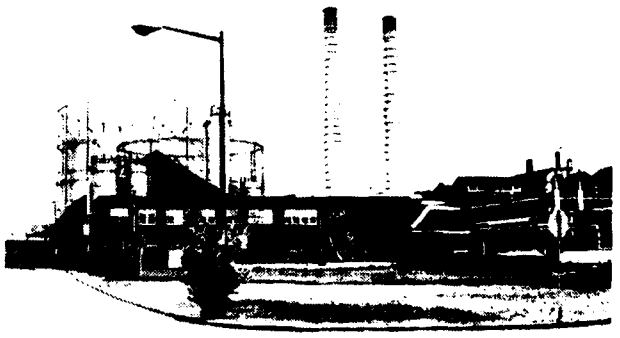
- Industrial parks provide excellent fields of fire.
- Buildings provide concealment to armored vehicles.
- Buildings provide fortifications and firing positions .
- Buildings can be breached with suitable weapons and ammunition.
- Communications are good with proper placement of antennas.

Suitable weapons are:

- Tanks.
- Mortars and artillery.
- LVTs with infantry troops.
- Destroyers and other types of naval gunfire support.
- Precision munitions launched from land, sea and air.

Generally, the MOBA battle within an industrial area is carried out by mounted infantry. Artillery must be used in a direct fire role; armor is basically in support of mounted infantry and its antitank role is minimal. When the battle moves into the suburbs, which is more trafficable and less susceptible to rubble obstacles, armor plays a bigger role.

Generally located along
major rail and highway
routes, the buildings
are low and flat-roofed.



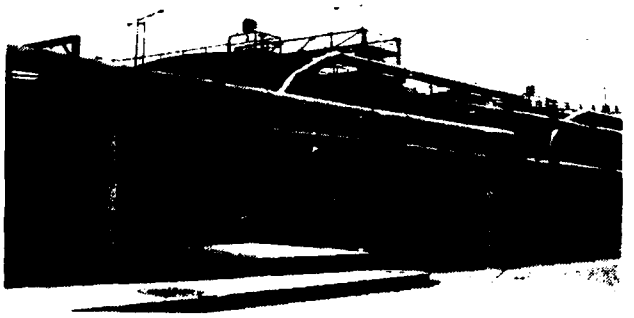


Figure II-7. Industrial and Transportation Areas

BUILDING CONSTRUCTION

THE TYPE OF BUILDING CONSTRUCTION WITHIN DIFFERENT PARTS OF A CITY VARIES ACCORDING TO FUNCTION AND IMPACTS SIGNIFICANTLY ON COMBAT OPERATIONS.

Like other terrain, cities and towns also have key features and avenues of approach. The difference is buildings. Commanders must analyze the construction, location, and height of the buildings if they are to understand their blocking, observation, and fire potential. Underground access to buildings can assist communications and mobility. Maps and diagrams of utilities and sewer systems should be obtained as soon as possible. In-country agents should be tasked to provide this information. With intelligent preparation of the urban battlefield, a commander can identify those positions that the enemy is likely to defend and determine the best course of action for defeating him.

The most suitable buildings for defense are steel-reinforced concrete structures. Special efforts, such as use of HEP or delay fuse ammunition, are required to breach the reinforced walls. Basements are readily converted into covered positions or bunkers from which the attacker can be prevented from entering on lower floors, forcing him to attempt entry on upper floors or through the roof. Rooftop entry by heliborne forces can be discouraged by emplacing wires, obstacles, command-detonated mines such as the OZM-3 bounding fragmentation AP mine, and/or portable air defense weapons such as machine guns or hand-held missile launchers. It should be noted, however, that unless these large buildings have functioning fire fighting systems, they can act like a large chimney once a fire is ignited. The fire problem will be addressed in a later section.

Brick and stone buildings, such as schools, apartment houses, old municipal structures, and factories are also well suited to the defense, but they may require considerable preparation. Sand bagging and shoring up overheads will improve resistance to direct and indirect fires.

Wooden structures such as houses and half-timbered buildings are generally not suitable for defense. They are combustible and easily breached. Within a suburban area, however, by carefully preparing such structures in advance, and by establishing mutually supporting positions and key sniper posts, a defender can delay the attacker for significant periods of time.

In either the defense or offense, commanders must analyze a city street by street, block by block, and house by house to select the appropriate tactics for accomplishing the mission. For details on preparing buildings for defense and for attacking and clearing buildings, see FM 90-10 and OH 8-7, both entitled, "Military Operations on Urbanized Terrain".

In MOBA, the defensive forces usually have the advantage. The defense uses buildings for concealment and protection, whereas the offensive forces are constrained and channelized by the streets and buildings. with limited lines of sight, restricted use of weapons, poor communications and, therefore, poor command and control.

Dismounted infantry, sometimes with direct fire support from tanks or artillery, carry the brunt. Extensive use of combat engineers is required.

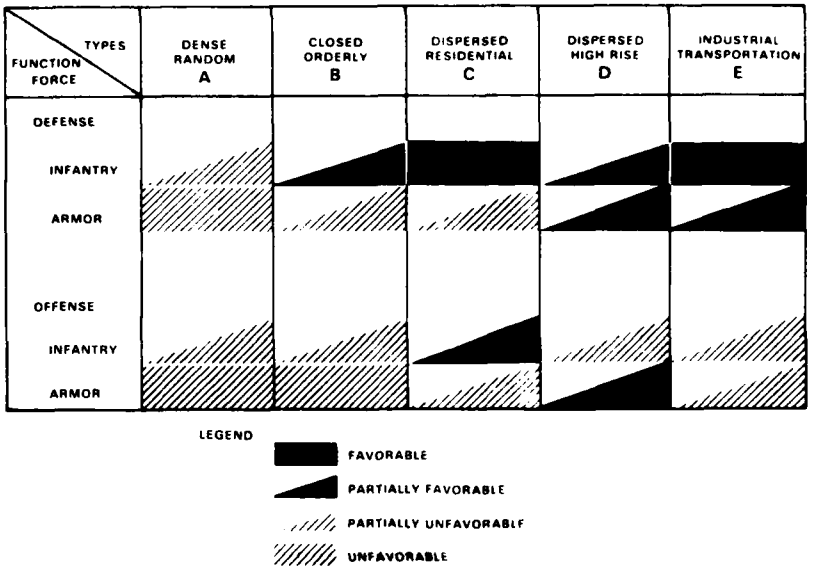


Figure II-8. The Influence of City and Building Patterns

Sources: Several sources were consulted to arrive at this graphic presentation including:

1) Federal Republic of Germany, General Army Office, Special Training Manual, "The Engagement of Combat Troops in Built-Up Areas", No. 3/76, 1976.

2) Department of Army FM 90-10, "Military Operations in Urbanized Terrain" 1979.

3) US Marine Corps Development and Education Command Operational Handbook OH 8-7, "Military Operations on Urbanized Terrain", November 1980.

Urban Warfare

THREAT DOCTRINE IN URBAN DEFENSIVE OPERATIONS

> THE MAIN BURDEN OF FIGHTING FOR A CITY LIES ON THE INFANTRY AND ENGINEER TROOPS, WHICH, IN CARRYING OUT THEIR MISSIONS WILL BE SUPPORTED BY TANKS, ARTILLERY, AIR STRIKES, AND OTHER MEANS. FLAME THROWERS, EXPLOSIVES, INCENDIARIES, AND SMOKE AGENTS WILL FIND EXTENSIVE EMPLOYMENT IN COMBAT WITHIN A CITY. (MG Shovkolovich et al., "Combat Action Of A Motorized Rifle Battalion In a City.")

General

In operating in a city the infantry enjoys greater mobility than any of the other branches. Troops can move through windows, holes in walls or rooftops, sewers and other underground passages, and over or around debris and other obstacles. For destruction of buildings, however, infantry troops need reinforcement from guns firing by direct lay such as tanks or large-caliber artillery weapons. High-angle-of-fire weapons such as mortars and howitzers are also needed. Support is essential from antitank weapons, flame throwers, and engineer and chemical units.

Threat forces may elect to locate their weapons in the mid-to-upper stories of buildings so that they can support the movement of attacking units to great depth, and keep under fire all detected embrasures, windows, and gaps in walls that might by used by the enemy.

Tanks are usually attached to motorized infantry companies and platoons to conduct joint combat action. Engineer troops conduct engineer reconnaissance of buildings, underground structures, and various obstacles, make passages in obstructions and barricades, destroy lightly constructed buildings between strongpoints to improve fields of fire, and adapt various buildings for the defense and protection of threat troops. The engineers play an important role in putting out fires, clearing away obstructions and debris caused by heavy conventional or nuclear strikes.

Conditions for Reverting to Defense of a City

When possible, Threat forces defend a city from beyond the outer traces of the city. The main defensive forces are established outside the city along the main avenues of approach and near any likely sites suitable for use by airlanded or heliborne forces. An ordinary field defense is conducted to destroy hostile forces on the approaches to the city. Normally a small part of the defensive force is used to set up defenses within the city itself.

In many cases it may be necessary for Threat forces to organize and conduct defensive action in the city itself. Examples of such a circumstance include cities having great political and economic importance. The

more obvious cases include naval bases, ports, and large cities on the shore of a sea, such as SYN City.

Threat forces tend to revert to defense within a city only when forced to do so by enemy action, except for those cases in which defense of a port or naval base is essential. Normally, they strive to revert to the defense on the approaches to a city, even if the temporary halt is for the purpose of drawing up reserves from the rear or replenishing supplies.

In any defensive situation, Threat forces prepare an antinuclear defense. The layout of the city, the type of structures, time of year and day, and climatic and meteorological conditions can have an important influence on the organization and conduct of defensive combat. All of these are taken into consideration by the defensive commander.

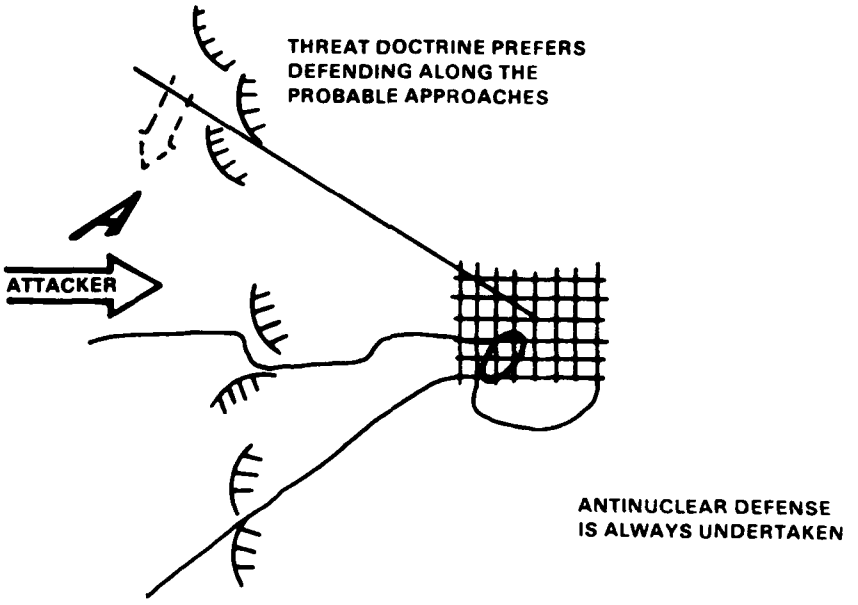


Figure II-9. Threat Defense of Urban Area

THREAT MOTORIZED RIFLE BATTALION IN URBAN DEFENSIVE COMBAT

AS A RULE, A MOTORIZED RIFLE BATTALION DEFENDS AS PART OF A REGIMENT. IN INDIVIDUAL CASES IN DEFENDING A SMALL CITY OR A LARGE LOCALITY ON A SEPARATE AXIS A BATTALION MAY DEFEND INDEPENDENTLY. (MG Shovkolovich, et al.).

Defensive Role of the MRB

The role of the MRB is determined by the mission assigned to it, its place in the regimental combat formation, the importance of the sites it defends, and the nature of the city. In the SYN City scenario, we are concerned with one MRB inside the city with the remainder of the Motorized Rifle Division at varying distances up to 80km from SYN City.

Several factors combine to influence the width and depth of an MRB defensive area within a city. These factors include:

- The MRB's combat mission
- The number of men and weapons in the MRB
- The expected strength of the enemy attack
- The anticipated location of the enemy attack
- The layout of the city
- The strength of the buildings and other structures
- The time and equipment available for preparing the defense
- The availability of reinforcements

Observation, fields of fire, maneuver, and coordination are restricted in a city. Therefore the frontage and depth of a battalion position may be less than that for a battalion in ordinary field conditions. Usually an MRB can defend several blocks within a city.

A battalion defensive area usually consists of the following elements:

- Company strong points prepared for perimeter defense
- Strongpoint of the reserve
- Locations for preparing ambushes
- Firing positions for mortars, artillery, and antitank weapons
- Control points for the battalion and rear service units
- Positions for defending entrances and exits of underground structures and routes of communication
- Possible dummy strongpoints
- Possible combat security positions prepared forward of the first echelon positions

A company may defend several buildings. A platoon defends one or two buildings within a company strongpoint. In some cases, a company may defend one large building with platoons assigned to specific floors or areas.

Threat forces avoid wooden or lightly constructed buildings whenever possible. Only the more solid structures are integrated into the defense, particularly those located at intersections of main arteries and at the entrances to squares, parks, bridges, and other important sites. Buildings are chosen for their ability to withstand effects of nuclear detonations, heavy artillery fires, and bombing, and to afford observation and fields of fire. Structures that hinder fields of fire are removed when time and circumstances permit.

Fires are coordinated between strongpoints. Communication trenches are excavated to provide a means for foot movements between strongpoints and to provide protection for troops infiltrating and exfiltrating supplies. Ambushes are set up in gaps between strongpoints and on the flanks of the various positions. All available underground routes of communication are exploited for movement of men and materiel, and troops are briefed on the existence and possible use of these routes. (SYN City is virtually devoid of underground routes that can accommodate personnel except for limited storm sewers from the new city to the dock area). Debris is cleared sufficiently to permit foot and vehicle movement within defensive positions and between mutually supporting positions. Multiple firing positions between company and platoon strong points are prepared for direct fire armored vehicles.

THE BATTALION COMBAT FORMATION

- DETERMINED BY THE CONCEPT OF THE COMING BATTLE
- MUST PROVIDE EFFECTIVE EMPLOYMENT OF ALL WEAPONS
- MUST INFLICT DECISIVE DAMAGE TO THE ENEMY
  - ON THE APPROACHES TO DEFENDED SITES
  - ON ENEMY FORCES THAT PENETRATE THE DEFENSE
- MUST BE ESTABLISHED TO PROVIDE THE LEAST VULNERABILITY TO:
  - ENEMY NUCLEAR STRIKES
  - ENEMY AIR STRIKES
  - ENEMY ARTILLERY FIRES AND OTHER SUPPORTING WEAPONS
- MUST TAKE MAXIMUM ADVANTAGE OF FEATURES FAVORING THE DEFENSE
- MUST FACILITATE A FIRM AND STABLE BATTALION DEFENSE
- MUST ENABLE A PERIMETER DEFENSE TO BE ESTABLISHED
- MUST PROVIDE OPPORTUNITIES FOR ENVELOPMENT AND COUNTERATTACK
- MUST OPTIMIZE CONTROL AND COORDINATION

THE MOTORIZED RIFLE BATTALION COMBAT FORMATION IN URBAN DEFENSE

> A BATTALION COMBAT FORMATION INCLUDES: THE COMBAT FORMATIONS OF COMPANIES IN THE FIRST ECHELON WITH THEIR REINFORCING UNITS, THE COMPANIES IN THE SECOND ECHELON OR BATTALION RESERVE, AND THE WEAPONS REMAINING UNDER THE DIRECT CONTROL OF THE BATTALION COMMANDER. (MG Shovkolovich et al.)

Tactical Considerations

An MRB defending a city may establish a defense consisting of one or two echelons. A reserve consisting of one or two platoons is established when only one echelon is assigned to the defense.

Disposition of the companies in an MRB may vary, depending on the commander's concept for the battle, the enemy's doctrine and tactics, and the physical characteristics of the urban battlefield. Companies may be offset to form a fire pocket or killing zone into which the attacker may be enticed.

The decision as to whether to defend in one echelon or two may be dictated by the nature and size or extent of the site to be defended. Otherwise, that decision may be based on forces available or other tactical considerations. Defending in two echelons provides greater depth to the position and affords the opportunity to build up strength during the battle. Further, this technique facilitates employment of the perimeter defense, which is often the preferred defensive posture. When this option is selected, the second echelon holds firmly to a defended site, usually a heavily constructed building overwatching a major intersection. Its mission is to inflict major damage to the attacker and prevent further penetration by him. In addition, the second echelon usually has a counterattack mission. It must be noted that "Conditions prevailing in a city contribute to the success of counterattacks launched by small [organic troop units] and even separate groups." (MG Shovkolovich et al.) Counterattacks by the MRB reserve or second echelon may be undertaken in conjunction with adjacent units or the regimental reserve.

The decision to defend in a single echelon permits making simultaneous use of the greatest number of weapons. This provides the greatest possible density of fire in front of the MRB's position. The decreased depth and increased lateral dispersion of the MRB's defensive position makes it less vulnerable to NBC fires.

In either the single or double echelon defense, the system of fire is based on a combination of flanking and interlocking fire of all types to cover the approaches, flanks and rear. The fire plan is tied in with the natural and artificial obstacles that figure in the defense.

Threat forces anticipate the need to be capable of carrying out their defensive plans during all conditions of visibility and at any time of day or night. Weapons are prepared for delivering fire under any conditions. Weapons are concealed behind strong walls or reinforced positions from which they can deliver the necessary fires. The density of fires is increased by placing weapons on several floors, recognizing that the upper floors may be destroyed by the enemy's fires. Lower floors and upper basements also make excellent gun positions and often provide better natural protection for gun crews. Supporting gun positions should also be located in prepared positions in open areas such as parks, gardens, public squares, etc., so that their fires will interlock with those of the weapons inside buildings.

Tanks, antitank guns, armored personnel carriers, and direct fire weapons are usually placed in corner buildings, in structures standing alone, and behind masonry fences. Guns may fire through door openings or windows, or through firing embrasures which have been blasted through the walls.

Ambushes are prepared along routes of probable enemy movement. Soldiers armed with grenades, AT grenade launchers, and field expedient Molotov cocktails can inflict significant losses on enemy tanks and tracked landing vehicles which are moving along city streets.

Buildings are carefully prepared for the defense. Windows and doors are barricaded or filled in with sandbags, leaving firing embrasures where required. Grenade sumps are prepared defensively. Internal fortifications are prepared in key rooms and basements, and routes are prepared for movement between rooms and between floors to accommodate internal maneuver and provide means for egress if that becomes necessary. Demolitions are prepared. Obstacles are erected or improved. Land mines are laid on important approaches. Bridges, overpasses, culverts, separate buildings, and key underground structures are prepared for demolition. Ammunition, food, medicine, drinking water, and other supplies are stocked in key defensive positions. Control points are located in basements or lower floors; observation posts are established on upper floors and rooftops. Preparations are made to contend with fires set by incendiaries or other means.

FIRE FIGHTING IS OF GREAT IMPORTANCE

- All inflammable objects should be removed from defended buildings.
- Wooden floors should be sprinkled with sand.
- Extensive water supplies should be provided.
- Openings should be covered with grills or fire-resistant plates.
- Entrances to basements/dugouts should be covered against napalm, etc.
- Fire lanes 50-70 meters wide are prepared in streets to prevent the spread of fire over the city.

Source: MG Shovkolovich

COMBAT SUPPORT FOR THE THREAT MRB IN URBAN DEFENSE

> A MOTORIZED RIFLE BATTALION IN DEFENSIVE COMBAT IN A CITY COORDINATES CLOSELY WITH [UNITS] OF DIFFERENT BRANCHES AND WITH DIFFERENT WEAPONS, SOME OF WHICH ARE ATTACHED FOR REINFORCEMENT AND SOME OF WHICH SUPPORT OR PROVIDE SECURITY FOR THE BATTALION IN ACCORDANCE WITH THE DECISION OF THE NEXT HIGHER COMMANDER. THESE [UNITS] AND WEAPONS ARE USED IN LIGHT OF THEIR COMBAT CAPABILITIES AND THE CONDITIONS PREVAILING IN THE CITY IN CLOSE COORDINATION WITH THE [UNITS] OF THE BATTALION AND WITH ONE ANOTHER. (MG Shovkolovich et al.).

Threat View of Urban Combat

The MRB is more effective in urban defense than other branches because they can penetrate everywhere and can adapt buildings and other structures for defense more readily. Further, they can prepare structures for defense against nuclear and chemical weapons easier than the other branches can.

In a city, combat usually occurs at close range. The weapons organic to the MRB, such as machine guns, submachine guns, grenade launchers, and hand grenades, are especially important in urban combat. Maneuver and fire from tanks and artillery are severely limited in urban terrain, and the infantry skills become increasingly important to the outcome of the battle. Combat breaks down quickly into small-unit fighting. In this process, the role of the subordinate units of the MRB, and their capability for independent action, grows in importance. A synergistic relationship occurs when they are reinforced properly with combat support and combat service support units.

Reinforcing the MRB

The nature of urban combat often imposes modifications in the use of units and equipment that support the combatant forces. The following must be considered with respect to the various CS and CSS forces that interface with the MRB:

- Communications: Threat forces make maximum use of signal systems and of municipal underground cable networks for wire communications and other means of communications that exist within the city. In all cases, however, it is necessary to take measures to prevent the possibility of enemy intercept of conversations.

- Tanks: When attached to MR units, tanks are used for reinforcing the antitank defense; when employed by the battalion, they are usually used in ambush positions or in the counterattack force. In strongpoints, tanks act as mobile or immobile weapons. One primary and one or more reserve positions and routes for movement are prepared for every tank.

- Artillery: Within a city, most missions are carried out by direct lay. Attachment of artillery to platoons and companies is, therefore, fairly common. Each artillery piece should have two or three positions and as many routes between them as can conveniently be prepared.

- Mortars and howitzers: Indirect-fire weapons are extremely valuable in urban warfare. They can deliver fire from concealed positions. Their fires can strike at enemy forces in defilade behind cover, stone fences, buildings, and walls. Further, they can punch holes in rooftops and attack enemy within buildings.

- Antitank units: These units are usually reserved for direct fire against tank forces along wide and long streets, main arteries, outskirts of cities, and other anticipated routes of attack by enemy forces.

- Smoke: Smoke is usually used only at the discretion of the battalion commander when conditions are favorable and to cover the movement of men and weapons between strongpoints or into or from underground positions or routes of communications.

- Sappers (Engineers): Sappers in the defense set out obstacles, mines, barricades, and other impediments to enemy movement, and they lay routes for movement of counterattack units. They also perform emergency rescue work in the face of mass destruction. Engineers are extremely important in fighting and preventing fires in the city. Sapper units are usually kept under the operational control of the MRB battalion commander.

- Aviation: Frontal aviation units deliver strikes against the main forces attacking the city, particularly at his nuclear attack weapons and other weapons of mass destruction. Particular attention is paid to enemy artillery and forces that attempt to encircle the city or to bypass it. Aviation is also used in the counterair mission to prevent the enemy from gaining air superiority. Helicopters can be used in the defense of a city for delivering supplies, deploying troop units, in counterhelicopter operations, and attack missions within assigned areas of operations. (A strong argument exists regarding the role of the Mi-24 HIND Gunship as opposed to its Marine and US Army counterparts. Marine and US Army helicopter gunships, AH-1 COBRA and YAH-64 AAH, are routinely employed forward of the FEBA and seek concealed firing positions. Their mission is antiarmor oriented. The HIND is normally employed at the FEBA or in close proximity to it. Its mission is that of Close Air Fire Support (CAFS). The HIND's mission and battlefield deployment suggest a more aggressive area type role as opposed to the COBRA and AAH role which will be less aggressive, stationary and limited to single-target engagement.)

Urban Warfare

MRB DEPLOYMENT IN SYN CITY

> "THE [AGGRESSOR] FORCE LOCATED IN THE AREA DEPICTED ON THE SYNTHETIC (SYN) CITY BASE MAP IS ONE MOTORIZED RIFLE BATTALION (MRB) REINFORCED WITH ONE TANK COMPANY. AGGRESSOR'S MORALE IS GOOD, HE HAS A 100% EFFICIENCY FACTOR." (OIC Contracts, CEL, NCBC, Port Hueneme Letter dated October 20, 1980)

General

The Aggressor force located within the metropolitan area is obviously limited in size to facilitate development of the tactical scheme of maneuver as a basis for the logistical analysis. The immediate defense of a city of 250,000, like SYN City, would normally consist of at least an MRR reinforced with tanks, artillery, engineers, air defense units, chemical specialists, and combat service support detachments. In addition, a special security police detachment (KGB-type) of about 1,000 personnel and a counterintelligence detachment (OGU-type) of perhaps 100 personnel would likely be assigned to a large city. These special units are not specifically addressed in this analysis, but, if they were available, their presence would be a significant factor with respect to civilian attitudes and resistance.

The deployment of the Aggressor MRD in southern Aggressorland is similar to that depicted in the MARCORPS 1 study. The reinforced MRB within the city was deployed by the analysts, applying Threat antilanding and urban defense doctrine in the SYN City environs.

SYN City Deployment

In accordance with Threat antilanding doctrine, major elements of the MRB were deployed well forward to bring maximum direct firepower to bear in defense of key port areas. Positions were not selected in old city because one of the two existing Army garrisons already has a defensive role there. Further, the layout of old city does not favor employment of armor, nor does it facilitate withdrawal of any forces committed.

By placing two Motorized Rifle Companies in the port area, each reinforced with a platoon of tanks, the defenders can fire tank guns and ATGM to 3,000 meters along the only deep-channel entry to the port. Primary, secondary, and alternate positions are prepared for tanks and BMPs inside reinforced buildings and warehouses. The third MRC, less one platoon, occupies second echelon or overwatch positions. The overwatch positions were selected to take advantage of the natural obstacle formed by the two small lakes which restrict access on three sides. This MRC is in prepared positions inside the houses at the edge of the suburban area. It can support the forward-deployed MRC's, cover their withdrawal into the new

city if necessary, and fight a delaying action in the associated suburban area. In accordance with threat doctrine, trenches and positions with overhead cover connect the defensive positions.

The tank company attached to this MRB is believed to have 13 medium tanks. Two 4-tank platoons appear to be attached to the two forward MRCs. The tank company (minus), consisting of the company command group and one tank platoon (5 tanks total), are available as the nucleus of a reserve and/or counterattack force. One MR platoon from the supporting MRC is believed to be attached to the tank company (-). That tank-infantry force has established a number of defensive positions in the vicinity of Airfield 1. The airfield, nearby landing sites, and avenues of approach can be covered by fire from the various defensive positions,

Positions for the organic mortar platoon of the MRB have been identified in a soccer field. Alternate mortar positions are not known. The nine organic SA-7 man-portable air defense weapons have not been located, but it must be assumed that they are located to cover the port and Airfield 1 areas. No additional air defense weapons or artillery have been detected. The existence and possible extent of any minefields in the beach areas will be determined by UDT reconnaissance during Advance Force operations.

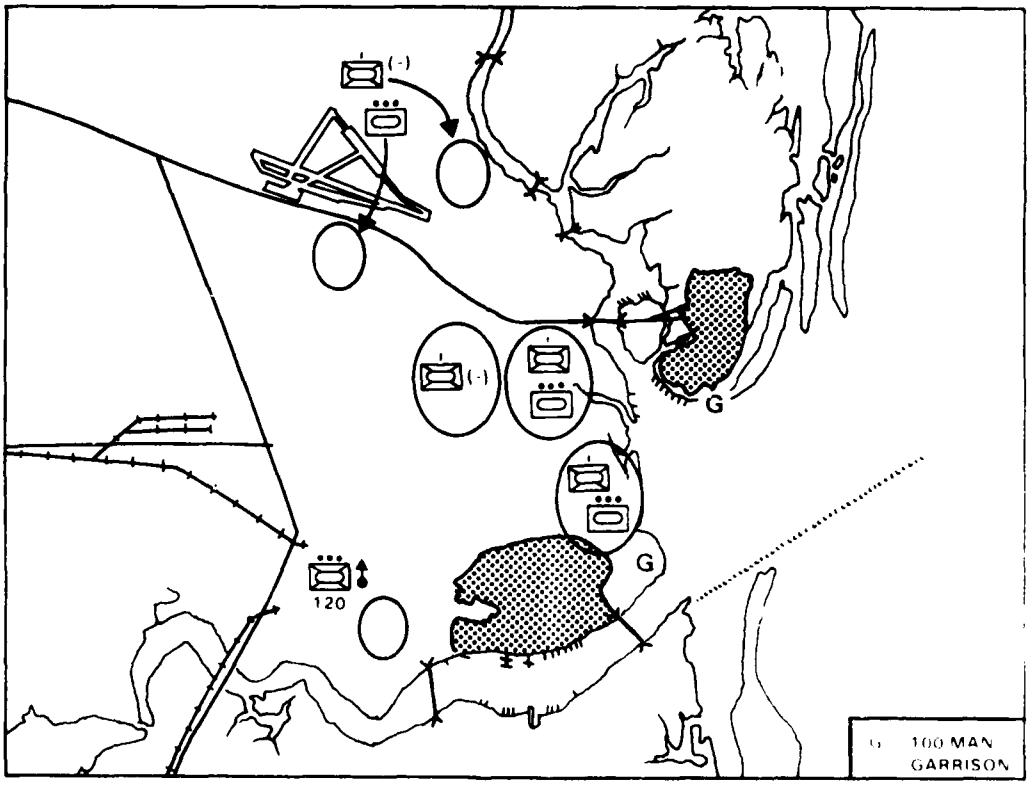


Figure II-10. Threat Disposition Within SYN City

CHAPTER III

CONCEPT OF OPERATIONS - CURRENT TIME FRAME

Concept of Operations-Current Time Frame

THE REQUIREMENT

> NO LESS THAN FIVE OFFENSIVE SCHEMES OF MANEUVER WILL BE USED AS PROVIDED IN MCDEC STUDY 30-77-01, "CONCEPTS OF OPERATIONS FOR LANDING FORCES IN URBAN ENVIRONMENTS DURING THE MID-RANGE." ...DEVELOP A CONCEPT STATEMENT WHICH SHALL REPRESENT... THE BEST ESTIMATE AS TO ENABLE A SUCCESSFUL MISSION COMPLETION FOR EACH SCHEME OF MANEUVER. (Statement of Work 80-0015)

METHODOLOGY

The following concepts of operations were developed in accordance with the statement of work, which requires that at least five such concepts for offensive operations be prepared. Each concept was developed in the same manner. The Threat, which was designated by the government, consists of a Motorized Rifle Battalion (MRB) reinforced with a company of tanks located within SYN City. The parent division of that MRB is disposed within about 80 km of the city. Deployment of the MRD was similar to that depicted in the Marine Corps study MARCORS-1. Deployment of the MRB (Rein) within SYN City was determined by the analysts, and it was based on known Soviet doctrine for defense against amphibious landings and defensive combat in urbanized terrain. The threat remains the same for each mission assigned by the government.

The government then assigned five separate missions, broadly described as follows:

- Deliberate Assault
- Seize Key Objectives
- Isolate and Contain
- Seize Corridor
- Reduce Defenses

In addition, a number of objectives were designated, with Amphibious Task Force objectives specified as Airfield 1, the Port Facility, and the Naval Station.

The analysts then studied the missions, Threat courses of action, and historical examples of amphibious operations as well as military operations in built-up areas (MOBA). Concept statements were then prepared, describing how each of the missions would be accomplished in an assault into SYN City. It should be noted that the analysts were limited to the SYN City model area and were prohibited from landing elsewhere along the coast with the view of enveloping the city. This restriction was imposed to assure that a MOBA operation resulted and the service support element of the Landing Force was properly exercised and evaluated in a MOBA environment.

Concept statements were then evaluated against Marine Corps doctrine, training and development, resources, and capabilities and constraints. These concepts then served as the basis for developing the basic operation plan, including the logistic and combat service support annexes, and the outline or concept plans contained in Volume II, "Offensive Operation Plans-SYN City".

The concepts delineated in this chapter relate to the current time frame. Concepts for the mid-range period are in Chapter IV.

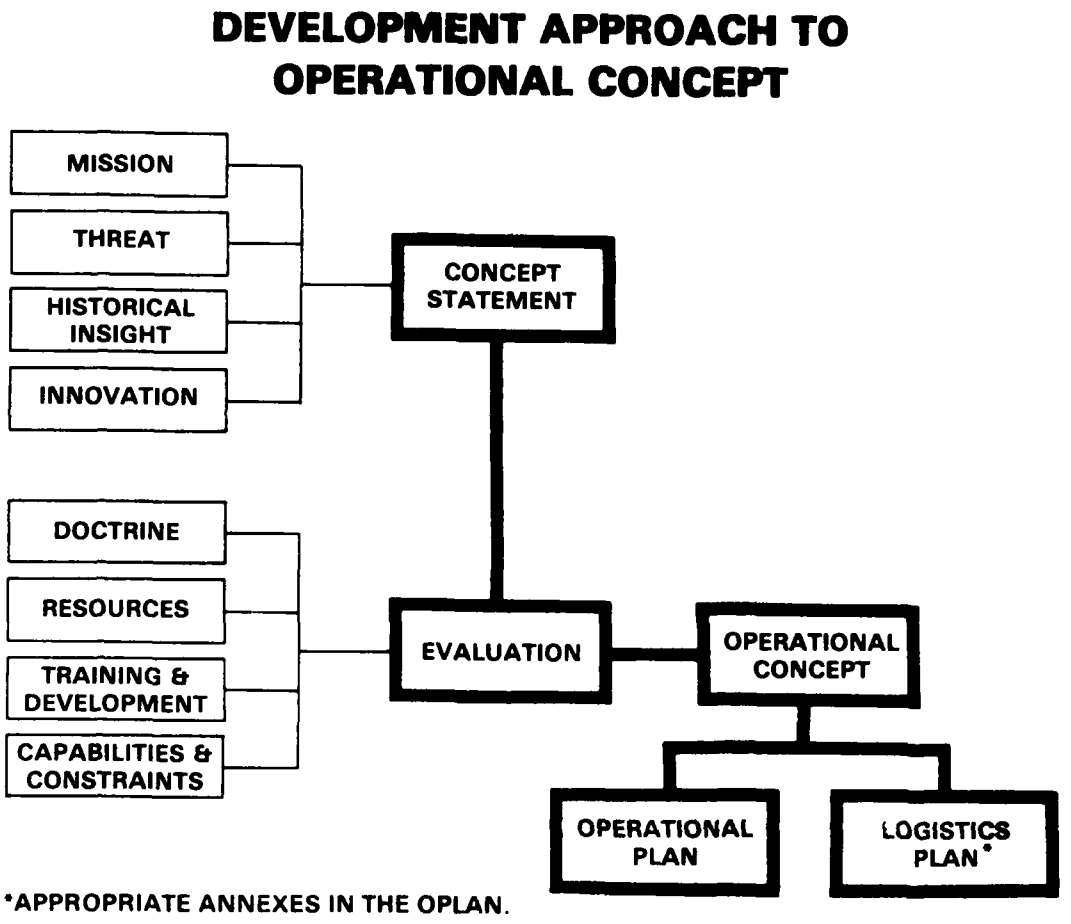


Figure III-1. Developmental Approach to Operational Concept

Concept of Operations - Current Time Frame

GENERAL SITUATION

THE GENERAL AND SPECIAL SITUATIONS SET FORTH HERE APPLY TO EACH OF THE FIVE OFFENSIVE MISSIONS ASSIGNED TO THE LANDING FORCE. THE LANDING FORCE MISSIONS DIFFER IN VARYING DEGREES AS DO THE CONCEPTS OF OPERATIONS.

A state of hostilities has existed between the United States and the Aggressor nation for a period of several weeks. A number of indecisive air and naval skirmishes have been fought, and now a US amphibious task force (ATF) is preparing to assault a key area in the southern part of Aggressorland in conjunction with offensives by other US and allied forces elsewhere in Aggressorland. Naval airpower is embarked in carrier strike groups and Marine land-based squadrons are at theater airfields within striking range of Aggressorland. These combined assets have the capability of achieving air superiority in the amphibious objective area (AOA) during the assault and until about D+5. Thereafter, air superiority can be attained only on a surge basis, and the enemy can be expected to mount extensive Frontal Aviation operations in direct support of his ground combat forces. Neither side has yet employed nuclear, biological, or chemical warfare, but the Aggressor forces are known to have significant offensive and defensive capabilities in these areas, and they have used NBC warfare in previous hostilities.

The Aggressor civilian population is supportive of their armed forces, which appear to be deployed to control key communications centers and defend against amphibious and airborne attacks. Aggressor military doctrine calls for maximum efforts against enemy amphibious and airborne landings to contain and defeat them. If initial efforts to repel such landings are unsuccessful, Aggressor units doctrinally occupy and defend key terrain, including key buildings and facilities in urban areas, to delay and disorganize the attacker and gain time for reserve or second echelon forces to launch counterattacks.

SPECIAL SITUATION

An Aggressor motorized rifle division (MRD) is deployed in southern Aggressorland with the apparent mission of defending ports and landing beaches, lines of communications, and key urban areas. One motorized rifle regiment (MRR) of this division is located near SYN City, which is a major through-port for commerce. One motorized rifle battalion (MRB) of this MRR and a company of tanks are located within the metropolitan area of SYN City. The division reconnaissance battalion and an independent tank

battalion assigned to this MRD are located near the coast about 30 km south of SYN City. A second MRR and the divisional command post are about 60 km to the south of SYN City, overwatching the coast and landing beaches in that area; the third MRR of this division is in mobile reserve some 40 km north of SYN City.

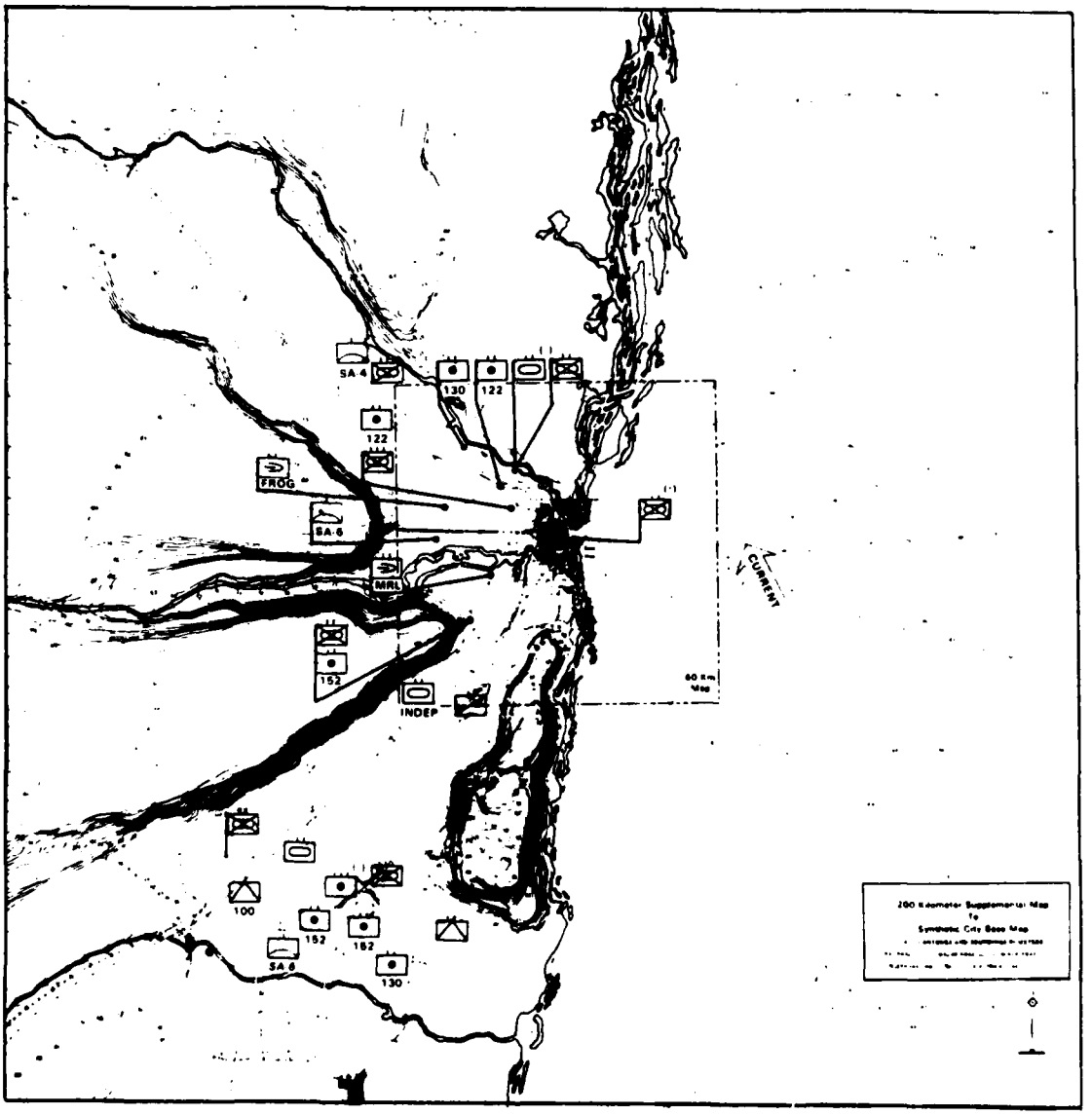


Figure III-2. Threat Dispositions In or Near SYN City

Concept of Operations-Current Time Frame

BACKGROUND

THE AMPHIBIOUS TASK FORCE WILL BE TASKED TO SEIZE PORT AND AIRFIELD FACILITIES IN AGGRESSORLAND FOR USE BY FOLLOW-ON FORCES WHICH WILL ENTER THE COUNTRY TO DESTROY ENEMY FORCES.

Actions of U.S. National Command Authorities

Upon the outbreak of hostilities, and after coordinating with appropriate allies, the U.S. National Command Authorities (NCA) directed that preparations be made for forcible entry into Aggressorland. In turn the Joint Chiefs of Staff directed the cognizant unified commander to undertake the operations contemplated.

Initiating Directive

The unified commander issued a letter of instruction (initiating directive) establishing an Amphibious Task Force (ATF) and designating its commander (CATF). The initiating directive assigned the mission, allocated the forces, and named the commander of the Landing Force (CLF). The Landing Force is a composite Marine Amphibious Force (MAF), designated the VII MAF. The MAF command element is drawn from the MAF structures in the Fleet Marine Forces and their major subordinate commands. The ground combat element (GCE) is a composite force, designated the 7th Marine Division (7th MarDiv). Each of the three existing MAFs provides one RLT and other designated combat and combat support units. In addition, each MAF provides sufficient combat service support units and personnel to form the required VII MAF Force Service Support Group (FSSG). The aviation combat element (ACE), or Landing Force Aviation, is drawn from the three Marine Aircraft Wings and designated the 7th MAW. Landing Force Aviation is comprised of two echelons, Embarked Aviation (7th MAW Forward), mainly rotary-wing and VSTOL aircraft, and Theater-Based Aviation (7th MAW Rear). The latter consists of the remainder of the 7th MAW which will be deployed to theater airfields within range of Aggressorland from which they will provide air support to the Landing Force and deploy ashore in Aggressorland incrementally when suitable air facilities are available. The initiating directive provided special instructions on command relations and on the possible use of special weapons. Responsibility for supporting operations was assigned, and the amphibious objective area (AOA) was defined. Command authority within the objective area was prescribed. The code name "BREAKER" was assigned, and the target date for D-Day was set between 11-21 May 1981, both dates inclusive.

Amphibious Task Force Mission

ATF 51 will conduct an amphibious operation in southern Aggressorland for the purpose of seizing the FHBL and port and airfield facilities contained therein for use by follow-on forces which will enter the country to destroy enemy forces. LF objectives include industrial areas, high density metropolitan areas, bridges 1 and 3, Airfield 2, and telecommunication facilities.

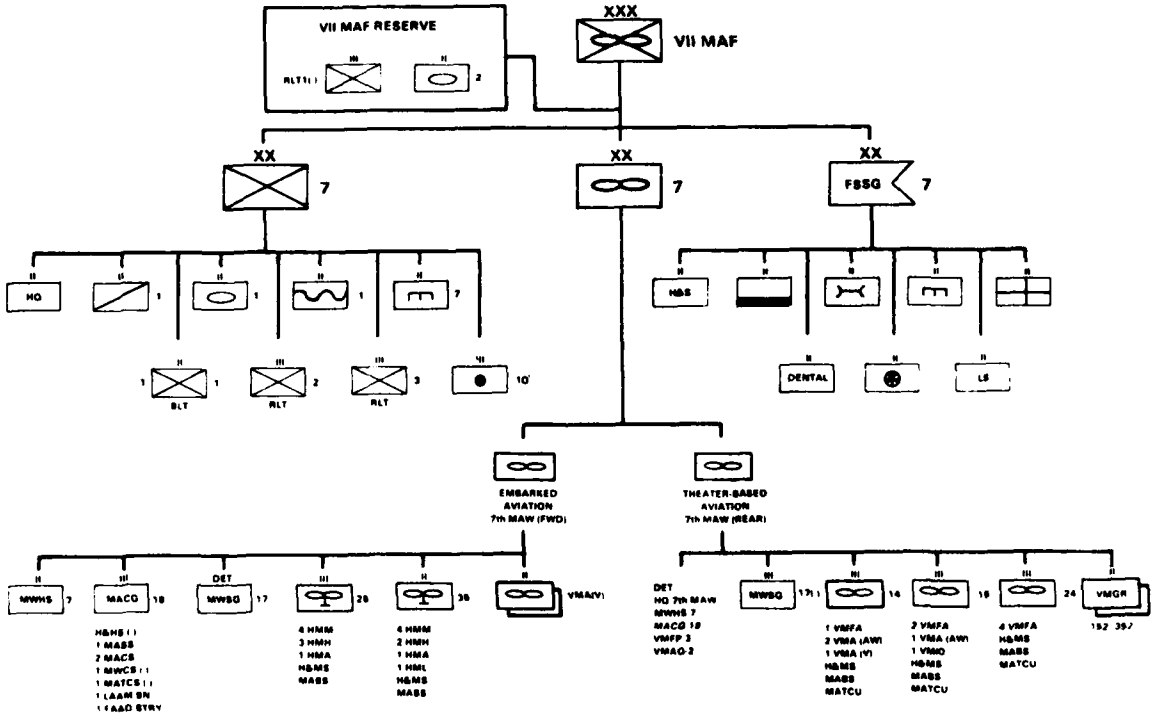


Figure III-3. The VII Composite Marine Amphibious Force (VII MAF)

Concept of Operations - Current Time Frame

DEMONSTRATION OPERATIONS

A CARDINAL PRINCIPLE OF DECEPTION IS TO CONCEAL THE REAL WHILE REVEALING THE FALSE. IN OPERATION BREAKER, THE ARMORED REINFORCEMENTS TO THE NORTH AND SOUTH OF SYN CITY POSE THE GREATEST THREAT TO THE LANDING FORCE, AND THEY MUST BE PREVENTED FROM MOVING ON SYN CITY, AT LEAST UNTIL LANDING FORCE IS ESTABLISHED ASHORE. A COMBINATION OF DECEPTION AND INTERDICTION IS REQUIRED.

Concept

The disposition of enemy forces, the amphibious tactical assault plan in the SYN City AOA, and the general geographical coastline configuration of Aggressorland indicate that a demonstration or simulated assault operation would be effective (even necessary) in confusing the enemy's defensive reactions against an amphibious attack on SYN City. Although there is no definitive information available on the hydrographic or topographic features of the coastline between SYN City and the southern Aggressorland border, it appears reasonable that some portion would be equally suitable or acceptable for an amphibious landing as the SYN City objective area. The tradition of amphibious operations over such remote beaches, vis-à-vis an urban area, lends further credence to the feint.

Composition of Demonstration Group

The Demonstration Group will consist generally of those units of the Amphibious Task Force that are transporting reserve or follow-on forces and equipment not involved with either advance force operations or the initial assault. They will also contain those units necessary to constitute and demonstrate a viable threat such as advance force elements (UDT, mine sweeping, and Naval gunfire support) as well as skeletonized landing forces and electronic deception assets.

Objectives

The basic objective of the demonstration operation will be to divert the attention of the enemy defending forces, specifically the MRD deployed in southern Aggressorland, and draw those forces farther southward away from SYN City. Other objectives include: 1) flushing enemy naval surface units from their bases (SYN City Naval Base or elsewhere) in order that they can be destroyed by carrier aircraft or friendly surface forces; 2) exposing enemy missile and coastal artillery positions for counterattack; and 3) obtaining intelligence on land-based military forces (MRD) and naval surface units, especially sortie routes (mine-free channels) in SYN City seaward approaches.

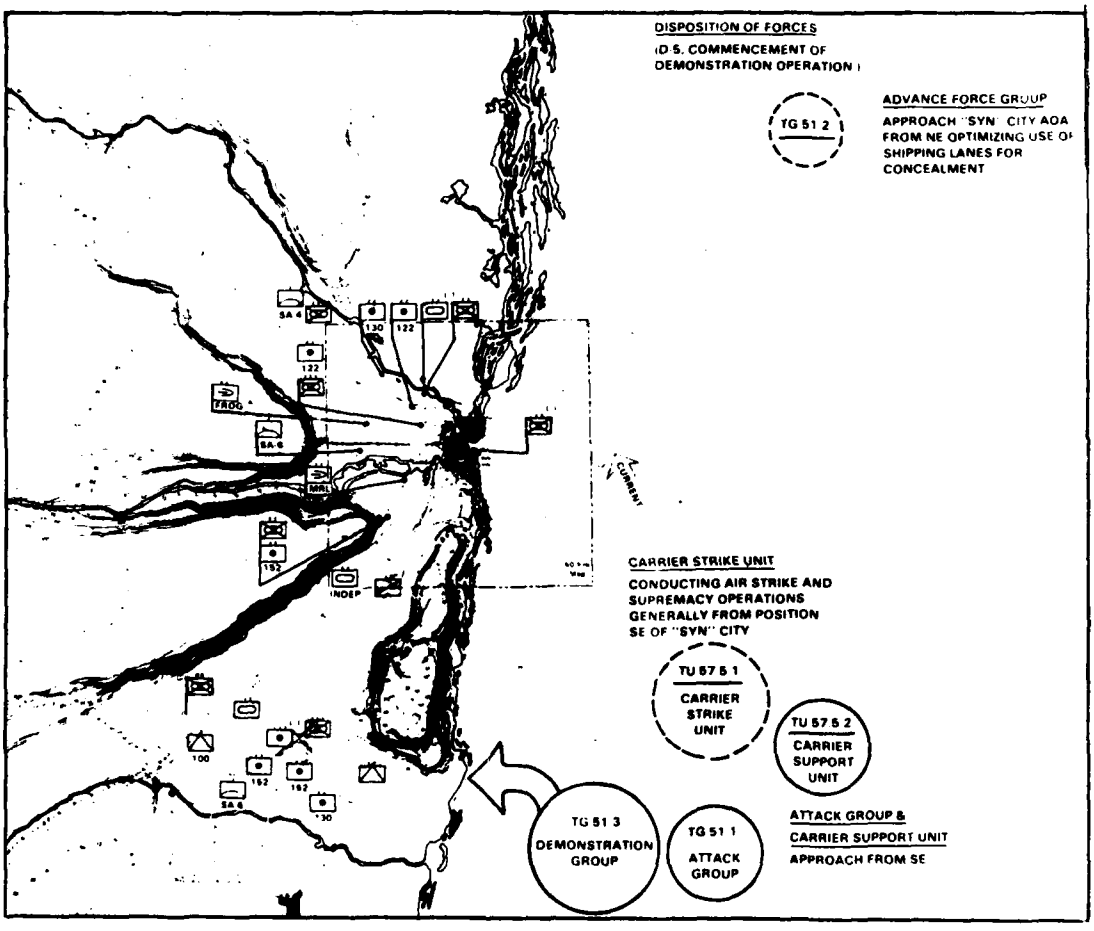


Figure III-4. Demonstration Group Operations

Concept of Operations - Current Time Frame

DEMONSTRATION OPERATIONS - EXECUTION

TO BE EFFECTIVE, THE DEMONSTRATION OPERATIONS MUST FIX THE REINFORCING THREAT FORCES IN PLACE OR DRAW THEM AWAY FROM THE ACTUAL OBJECTIVE UNTIL THE LANDING FORCE HAS BEEN ESTABLISHED ASHORE.

Forces/Units Assigned

The following forces/units will be assigned to the Demonstration Group:

1	LPH	(RH53D minesweeping detachment embarked)
1	LPD	(Tactical Deception Detachment embarked)
1	LSD	(UDT Detachment embarked)
2	LST	
2	LKA	
2	DD	

Missions/Tasks

The missions and tasks required for the success of the demonstration operation are identical to those associated with an actual assault including:

- Minesweeping (actual and simulated) - RH53D.
- Hydrographic surveys, beach reconnaissance and obstacle clearance - UDT.
- Ship-to-shore movement (both surface and airborne) - Transport units with embarked landing craft and helicopters.
- Naval gunfire support and screening - DD's.
- Electronic deception - Tactical Deception Detachment.

Location

The exact site for the Demonstration Operation will be dependent on the distance between SYN City and the Aggressorland southern border and location of a suitable landing beach area along this coastline. For maximum effect the operation will be conducted south of the known positions of the enemy MRD forces in southern Aggressorland, approximately 100-120 km scuth of SYN City.

Schedule

The operation will commence prior to the arrival of the Advance Force in the SYN City AOA and no later than D-6. The duration will depend upon mission accomplishment but must terminate in sufficient time for units

involved to carry out their priority assignments supporting the main assault. Depending upon the tactical situation and progress of the demonstration operation, units may be detached singly or in groups to proceed seaward and rejoin the Attack Group prior to D-day.

Execution

The Demonstration Group will proceed toward southern Aggressorland in advance of the movement group until D-7, at which time the Demonstration Group will be detached from the Movement Group and sail toward the demonstration objective area. The Movement Group will arrive in the Demonstration Objective Area after Demonstration Operations have begun, adding to the realism and effectiveness of these operations. Operations will commence with a helicopterborne UDT insertion into the target beach area after appropriate air reconnaissance. Thereafter, and depending upon the tactical situation both on-shore and off-shore, there will be a gradual buildup of demonstration forces in the area conducting actual and simulated advance force tasks, such as minesweeping by RH53D operating temporarily from an LPH. Close air and naval gunfire support operations will initially be concerned with protection of friendly forces; however, targets of opportunity consistent with the objective of destroying or neutralizing enemy military forces will be attacked. The demonstration operation will culminate in simulated vertical and surface assaults. The scope, nature and duration of these operations will be planned with maximum flexibility to be responsive to enemy reaction and mission accomplishment. Protection and preservation of the participating forces will be paramount. Defense against enemy air and surface attack will be provided by carrier support and screening units. The demonstration force units will be alert to shore-based missile threat and retire to seaward depending upon the intensity of this or other threats. To enhance the effectiveness of the demonstration operation, the main Amphibious Task Force and supporting carrier battle group will be approaching from and operating southeast of the demonstration area of operations.

D-6: Demonstration Group arrival in Demonstration Operation Area

D-5: Reconnaissance Opns, Mine Clearance/Sweeping Opns, Obstacle Clearance Opns, Air Attacks

D-4: Beach Preparation and Pre-Assault Landing Opns, Simulated Assault Landings, Air Attacks

D-3: Contact broken with enemy forces, Detachment of elements of Demonstration Forces to the Objective Area, Air Attacks

D-2: Extraction of Simulation Forces, Air Attacks, Demonstration Group proceeds to AOA

Figure III-5. Schedule of Demonstration Operations

Concept of Operations - Current Time Frame

ADVANCE FORCE OPERATIONS

THE DECISION TO EMPLOY AN ADVANCE FORCE FOR PRE-D-DAY OPERATIONS IS MADE BY THE CATF AFTER CONSULTATION WITH THE CLF, WEIGHING THE RELATIVE ADVANTAGES OF STRATEGIC AND/OR TACTICAL SURPRISE AND THE REQUIREMENTS FOR PREPARATION OF THE OBJECTIVE AREA.

Concept

The Advance Force Group will approach the SYN City objective area in a random formation utilizing normal shipping lanes for maximum concealment. The initial reconnaissance and hydrographic survey operations by SEAL/UDT elements will commence during early A.M. darkness on D-5. Insertion will be by helicopter unless intelligence information indicates more likelihood of unobserved insertion by small boat. These operations will be coordinated with those of IUWG utilizing swimmer delivery vehicles. Primary attention will be directed toward determination of the extent, type, and location of mines and other obstacles threatening the entry of advance force surface units (LSD and MSO) into the AOA. Advance Force surface units will remain at maximum allowable operational distance offshore to minimize detection and conceal the nature of operations, as well as to reduce vulnerability to enemy attack. Mine sweeping will commence during darkness (P.M.) on D-5 utilizing RH53D helicopters operating from CV while staging through LPH and in coordination with MSO countermeasures. Minesweeping operations will cease at daylight unless positively identified by enemy forces (Naval/air/coastal). If identified, minesweeping operations will continue uninterrupted with increased cover/protection by air and surface (DD) units. The minesweeping effort will be governed by factors such as intelligence, notices to mariners, and observed commercial/enemy naval unit movements in and out of SYN City harbor. The extent of initial pre-D-day minesweeping operations is shown in the Sea Echelon Plan. Commensurate with the progress of mine countermeasures, other offshore obstacle clearance, and enemy reactions, LSD with Seal/UDT/IUWG will close objective area during darkness (P.M.) D-2 following swept channel to a position approximately 5 NM off Beach BLUE 2. Coordinated mine clearance operations by UDT, MSO and RH53D (as required) will be conducted to clear boat lanes to RED and BLUE Beaches. Hydrographic and beach surveys will continue in order to confirm suitability of assault beaches, obstacles and initial surf observations. Particular emphasis will be directed to a detailed survey of back waters between offshore islands and the mainland to determine the suitability and optimum location of beach and back water bottoms for tank crossing (fording/snorkeling). Also a survey will be made of the GREEN Beach area. The result of this survey will be reported to CATF for final decision on the Assault Landing Plan. A final survey of boat lanes and landing beaches will be made prior to H-hour.

AD-A133 162 GENERAL URBAN WARFARE AMPHIBIOUS LOGISTICS APPLICATIONS 2/7
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AND EDUCATION COMMAND QUANTICO VA DE.. R J YEOMAN
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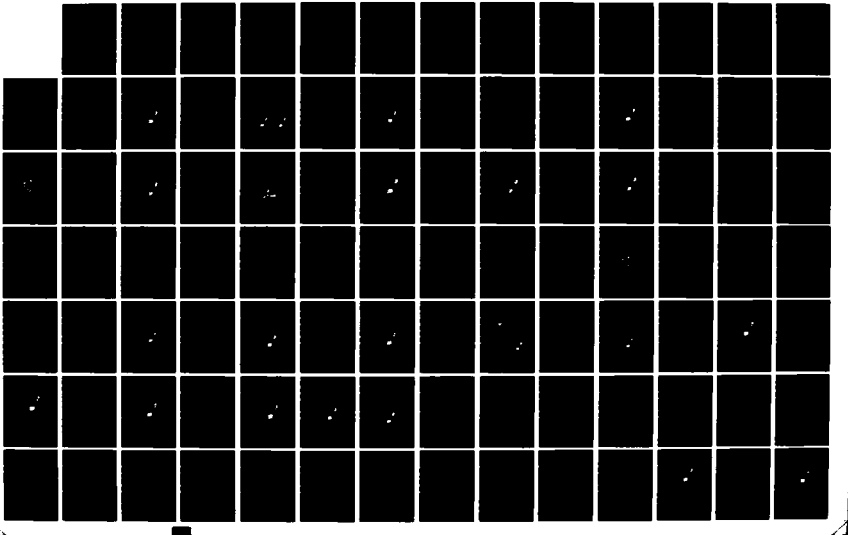
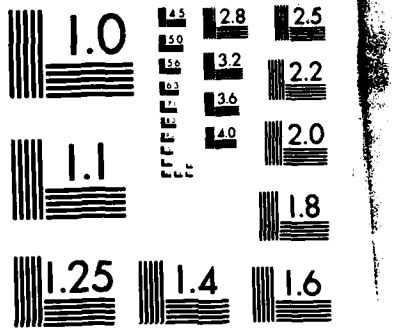




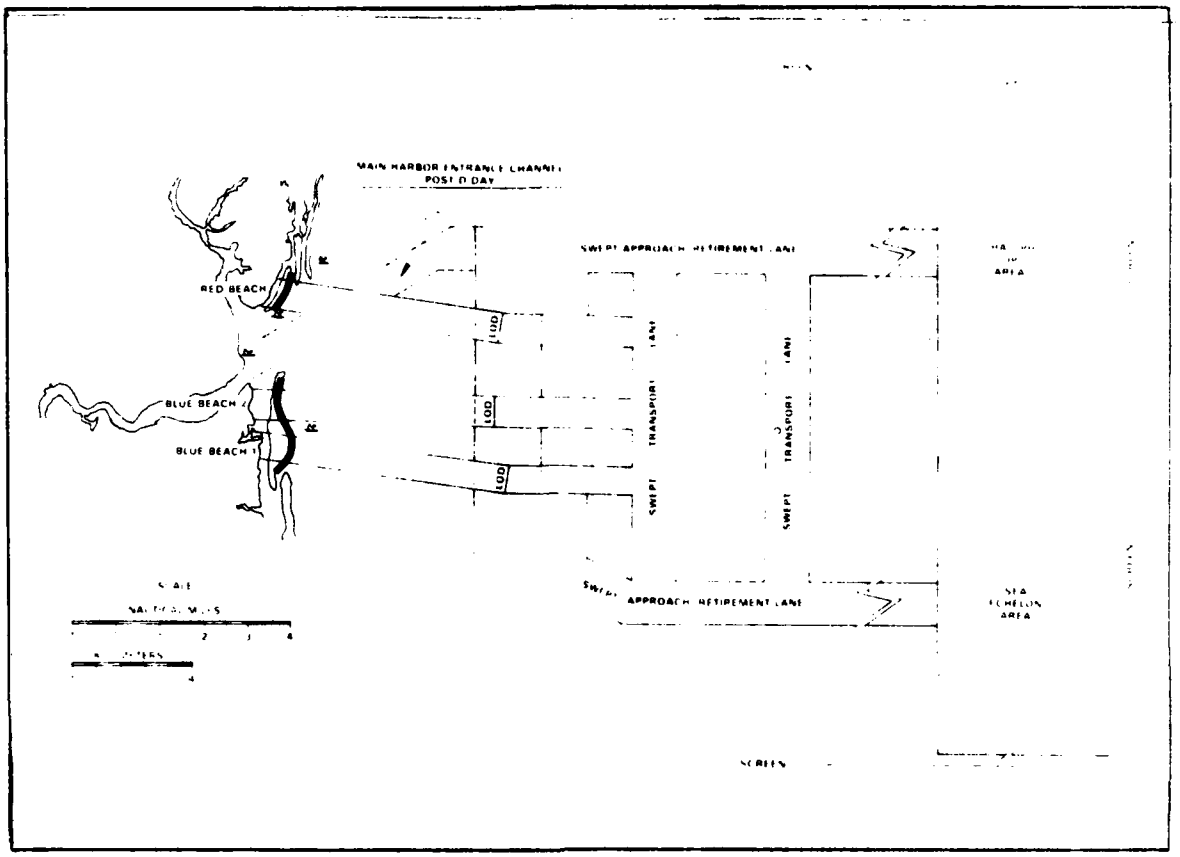


Figure III-6. Sea Echelon Plan

Concept of Operations - Current Time Frame

ADVANCE FORCE COMPOSITION AND TASKS

THE ADVANCE FORCE WILL ATTACK AND INTERDICT THREAT FORCES AND LOCs WITHIN THE AOA TO INFLICT MAXIMUM ATTRITION BUT WILL MINIMIZE DAMAGE TO FACILITIES WITHIN SYN CITY.

Composition of Advance Force Group

The composition of the Advance Force Group will be kept to the minimum necessary to accomplish operational requirements including reconnaissance, minesweeping, obstacle clearance, beach preparation and pre-D-day bombardment (Air and NGF). Sufficient redundancy is included to offset combat losses.

Objectives

The objective of the Advance Force Group is to prepare the objective area for the amphibious assault. The urban environment adds new dimensions and complications to achieving this objective. For example, the scope of the reconnaissance operations is greatly expanded to encompass not only the normal natural (hydrographic and topographic) features but concentrated man-made facilities as well. Pre-assault aerial and naval gunfire bombardment is inhibited by the presence of large numbers of civilians and installations which should be spared for future use by follow-on logistic support operations. Additionally, secrecy and security are more difficult to maintain and interference by non-military elements must be expected. Unconventional measures will be employed to minimize these impacts such as over-the-horizon (stand-off) launches of reconnaissance elements and random, dispersed formation for major surface units commensurate with enemy submarine threat.

Forces/Units Assigned

The following forces/units will be assigned to the Advance Force Group:

1	LPH	(TACRON/Tactical Deception Detachment Embarked)
3	LSD	(Naval Beach Group/BMU/ACU/ACB/UDT/SEAL/MIUW units embarked)
3	MSO	(minesweeping)
2	DD	(gunfire support)

MISSIONS/TASKS

THE FOLLOWING TASKS ARE ASSIGNED FOR THE SUCCESSFUL ACCOMPLISHMENT OF THE ADVANCE FORCE MISSION:

- RECONNAISSANCE - SEAL, IUWG AND UDT ELEMENTS
- HYDROGRAPHIC/BEACH SURVEYS - SEAL AND UDT ELEMENTS
- OBSTACLE CLEARANCE - UDT ELEMENTS
- MINE CLEARANCE/SWEEPING - MSO, RH53D AND UDT ELEMENTS
- AIR OPERATIONS - TACRON DETACHMENT UTILIZING CV/CVN A/C
- TACTICAL DECEPTION - TACTICAL DECEPTION DETACHMENT

REFERENCES: NWP 22/LFM 01, NWIP 22-1, NWP 22-3, NWP 22-4, NWP 22-5, NWIP 29-1, NWP 40

Figure III-7. Advance Force Mission

Concept of Operations - Current Time Frame

AMPHIBIOUS ASSAULT (SURFACE OPERATIONS) - ATF CONSIDERATIONS

THE URBAN ENVIRONMENT NECESSITATES A DEVIATION FROM THE TRADITIONAL AMPHIBIOUS ASSAULT TACTICS AND PROCEDURES.

The particular hydrographic and topographic characteristics of the SYN City objective area (shallow water, off-shore islands, limited suitable landing beaches, and river currents), plus the likely heavy mine threat, complicate the surface landing operations. In view of the latter consideration, the SEA ECHELON PLAN will be utilized for the assault phase. Emphasis will be placed on over-the-horizon and stand-off launching tactics such as underway launching (from LSTs) of initial LVT assault waves. The LHAs will predominately carry self-sustaining LCUs which will be launched well off shore with their preboated on-call serials (tanks/artillery). This will allow the LHAs maximum mobility for their vertical assault role and reduce vulnerability to mines and other shore based/inshore enemy threats. A concentration of amphibious shipping in the transport area will be avoided with units cycling in for discharging cargo then retiring to seaward. This procedure will remain flexible to accommodate a compromise depending upon the relative threats from enemy close-in forces and submarines to seaward. Mine sweeping and harbor clearance operations will be continued as necessary to provide additional areas for follow-on logistic operations both off-shore and inside the harbor. Advantage will be taken of the potential for psychological warfare associated with the urban environment. Other embarkation considerations which impact on the assault landing include:

- Utilization of ATF ships wet well capacity for maximum landing craft availability (see Landing Craft Embarkation Plan).
- Reduction of intership transfers in AOA to minimum.
- Combat/spread loading while retaining unit integrity to the maximum extent.
- Pre-boated serials whenever possible.

Attack Group Composition and Organization

The scope and complexity of the amphibious attack in the SYN City AOA requires the majority of the amphibious lift capability of both Atlantic and Pacific Fleets. The total spectrum of conventional and specialized forces available, such as Tactical Air Control Group, Naval Beach Group, Construction Battalions, Mine Countermeasure, Special Warfare Group and Deception Units, and Cargo Handling and Port Group, will be included in numbers appropriate to support the size of the Landing Force (MAF), initial assault, scheme of maneuver ashore, and follow-on logistic support operations.

The organization of the Attack Group is shown in the Amphibious Task Force Organization.

Command and Control

There are no significant command and control problems which are unique to the urban environment for the naval surface attack forces operating off-shore. Therefore conventional command and control procedures applicable to the normal Sea Echelon concept will be employed. The Landing Party ashore, however will encounter serious command and control problems due primarily to the physical characteristics of and separation between the landing beaches. The mutual support between RED and BLUE Beach elements will be practically non-existent, requiring reserve assets afloat to accommodate combat losses within either of these elements. The proximity to potentially large numbers of indigenous civilians will impact adversely on the control of landing beach operations.

FORCES/UNITS AVAILABLE

The forces available to the Amphibious Attack Group include the following surface ships and specialized units

1	LCC	4	LKA
5	LHA	16	LST
6	LPH	11	DD
9	LPD	3	MSC
4	LSD		

1 Mine Countermeasures Squadron including 21 RH 53D helicopters

2 Tactical Air Control Squadrons

1 Naval Beach Group including Beach Master Unit, Assault Craft Unit (2), Amphibious Construction Battalion

1 Naval Special Warfare Group including SEAL Team, Underwater Demolition Team, Mobile Inshore Undersea Warfare Teams, Deception Unit

1 Regiment - Mobile Construction Battalions (3)

1 Naval Cargo Handling and Port Group

Other naval units directly supporting the Amphibious Task Force are

Carrier Battle Force

2 CV/CVN - with Carrier Air Wing embarked, primarily strike oriented.

2 CV/CVN - with Carrier Air Wing embarked, primarily extended ASW oriented

Anti-Submarine Force.

(CG, DDG, DD, FF as assigned)

Mobile Logistic Support Force

(AO, AOE, AE, AF as assigned)

Figure III-8. The Amphibious Attack Group

Concept of Operations - Current Time Frame

ASSAULT PLAN - ATF CONSIDERATIONS

THE AMPHIBIOUS ASSAULT PLAN IS DEVELOPED FROM THE REQUIREMENTS OF THE LANDING PLAN, SCHEME OF MANEUVER ASHORE, HYDROGRAPHIC AND TOPOGRAPHIC FEATURES BOTH IN SHORE AND OFFSHORE, ENEMY THREAT, SELECTED OPERATIONAL TACTICS, AND ATF FORCES ASSIGNED. MODIFICATIONS TO OR CONFIRMATION OF SOME OF THE DETAILS OF THE DIAGRAM WILL BE BASED ON PRE-D-DAY RECONNAISSANCE AND ON-SITE SURVEYS.

Ship-to-Shore Movement Plan Initial Assault Elements (H-hour)

The initial assault elements for RED Beach (located at E12.5-N11.5 to E12-N10) will be embarked in ATF shipping as follows:

8 LST-1179	-	RLT 2 (-) Hq Co
		BLT 2/2
		BLT 3/2
		Assault Amphib Co A
		Assault Amphib Co B
		TOW Section
		ACB Causeway Teams (one each LST)
2 LHA-1	-	Tank Co (17 Tanks pre-boated in 6 LCUs)
2 LSD	-	Engineer Plt
		Shore Party
		Naval Beach Party

The LCUs with pre-boated tanks will be launched from the LHAs in the LHA operating area in sufficient time to arrive at the LOD in accordance with the Assault Schedule. The rifle companies, weapons companies, and command and control personnel embarked in LVTs will be launched from LSTs while underway at the LODs. TOW and REDEYE vehicles will land by LCM on RED Beach (island) where they will cover the landing until LVTs are available to ferry them to the mainland. The causeway sections to be used to bridge the backwater between RED Beach offshore island and the mainland will be splashed from LSTs and assembled prior to H-hour ready for insertion when enemy fire near RED Beach has been neutralized. The causeway will be in operation to accommodate some on-call serials and subsequent unscheduled serials.

NOTE: The embarkation plan and ship-to-shore movement for initial assault elements of RLT 3 on BLUE Beach (E12.7-N7.8 to E12.5-N2) is similar to that for RLT 2 described above except that causeways are not planned for BLUE Beach due to shallow water depths between the offshore islands and the mainland. Pre-assembled M4T6 rafting sections will be towed into position by LVTs.

On-Call Serials

The On-Call Serials will be pre-boated to the maximum extent possible. Those boated in self-sufficient LCUs carried by LHAs will be launched in the LHA Operating Area and dispatched to holding zones near the LODs. Other on-call serials, pre-boated in LCM-8s carried by LPDs, will be launched from anchor in the transport lane or while underway in vicinity of LODs.

Unscheduled Serials

Unscheduled serials will be discharged from ships utilizing organic landing craft when available (LCM-6 and LCM-8 in LKA) or in landing craft designated by Primary Control Ship.

General Unloading

Plans will be formulated for conducting general unloading from ships at anchor offshore utilizing landing craft, including causeway barge ferries and amphibious vehicles as available. However, the tactical situation permitting, and depending on the availability of port facilities in SYN City harbor, unloading will be accomplished directly onto shore where practical.

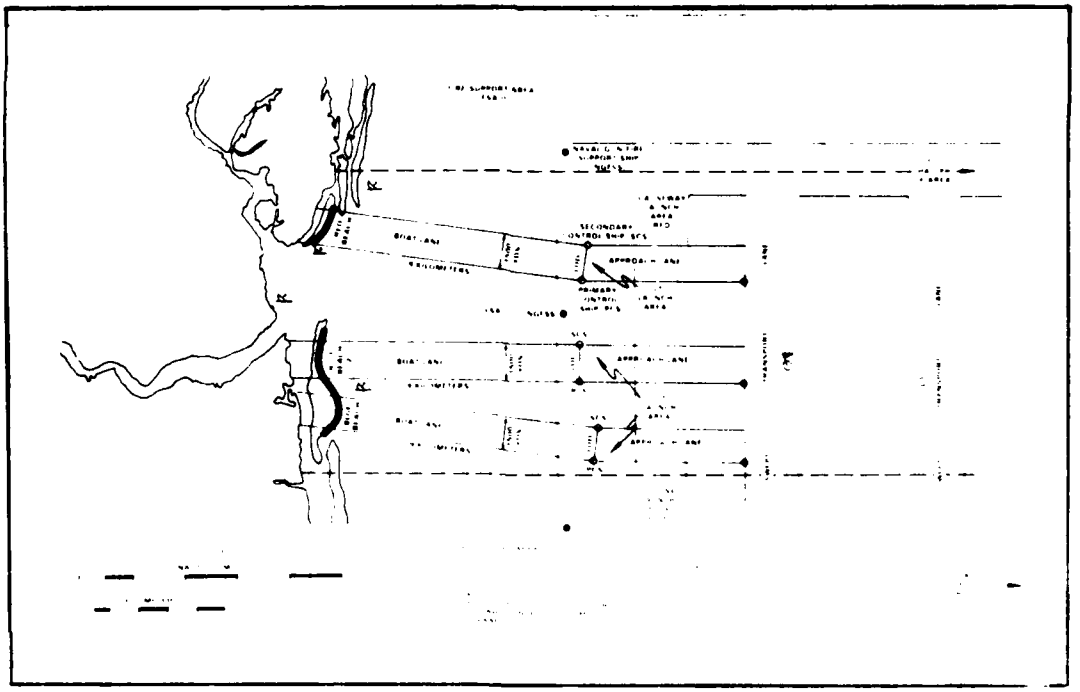


Figure III-9. Assault Area Diagram

Concept of Operations - Current Time Frame

NAVAL BEACH GROUP OPERATIONS

THE CHARACTERISTICS OF THE LANDING BEACHES AT SYN CITY ARE MARGINAL AT BEST FOR AN AMPHIBIOUS ASSAULT OF THIS MAGNITUDE.

Under normal circumstances a very careful analysis of the shoreline north and south of SYN City would be conducted to ascertain the presence of more suitable alternate landing sites. One of the most serious problems for Naval Beach Group Operations, other than the command and control and security problems, is the limited area for the heavy across-the-beach traffic required for the landing forces involved. This is particularly acute in the RED Beach area. The threat to the offshore islands by spring and flood tides will prevent the beach party from permanently "digging in" and force certain operations to move farther from the beach line on the outer islands to positions on the mainland. Additional numbers of LARC Vs will be required to assist beach party personnel movement across the backwaters separating the offshore islands and the mainland and between the colored beaches. LVTs, if available, will be used to augment LARCs, particularly if the enemy threat demands this added protection.

Beach Master Unit (BMU)

In addition to the problems mentioned above, the BMU will be faced with a severe challenge in controlling the boat traffic arriving and departing from RED Beach. The shallow water to the north of the boat lane and the wreck plus the breakwater to the south will confuse the traffic pattern for empty boats returning to seaward. This problem will be less at BLUE Beaches; however, the wreck between the boat lanes will definitely present a hazard.

Amphibious Construction Battalion (ACB)

The necessity for moving tanks and other wheeled vehicles from the offshore islands across the backwaters to the mainland requires the installation of causeway bridging at RED Beach. A similar application of M4T6 bridging at BLUE Beach may be required if the alternate landing site inside the breakwater (GREEN Beach) proves infeasible. The relatively shallow water depths off BLUE Beach and the distance from the mainland across the offshore islands and backwaters result in marginal conditions for installation of a bulk fuel system in this area. Such a system (bottom laid) is scheduled for installation, however, off the southern flank of BLUE Beach. Maximum utilization will be made of causeways in all applications from bridging, mentioned above, to causeway ferry operations for offshore unloading of ATF and follow-on shipping, as well as replacements for damaged pier facilities inside the harbor. Therefore all LSTs will be loaded with causeway sections.

AOA Defense for the ATF

Normal defense tactics and procedures will be employed against enemy air and surface attacks. Utilization of the Sea Echelon Plan will reduce the numbers of ships exposed to swimmer and shore-based missile and coastal artillery batteries. The swimmer attack threat to those ships in the assault area will be increased due to the difficulty in observing swimmers entering the water in the urban environment. Therefore, defenses against this threat will be emphasized employing small boat patrols, random detonation of grenades underwater, activation of underwater acoustic systems, turning of propulsion screws, and utilizing counter-swimmers (SEAL/UDT). The normal dispersal of naval forces inherent in the Sea Echelon Plan also reduces the threat from NBC attacks; however, plans will be made for further dispersal and withdrawal by ships from the assault area in event of NBC attack.

REFERENCES: NWP 22/LFM 01, NWIP 22-1, NWP 22-2, NWP 22-3, NWP 22-5

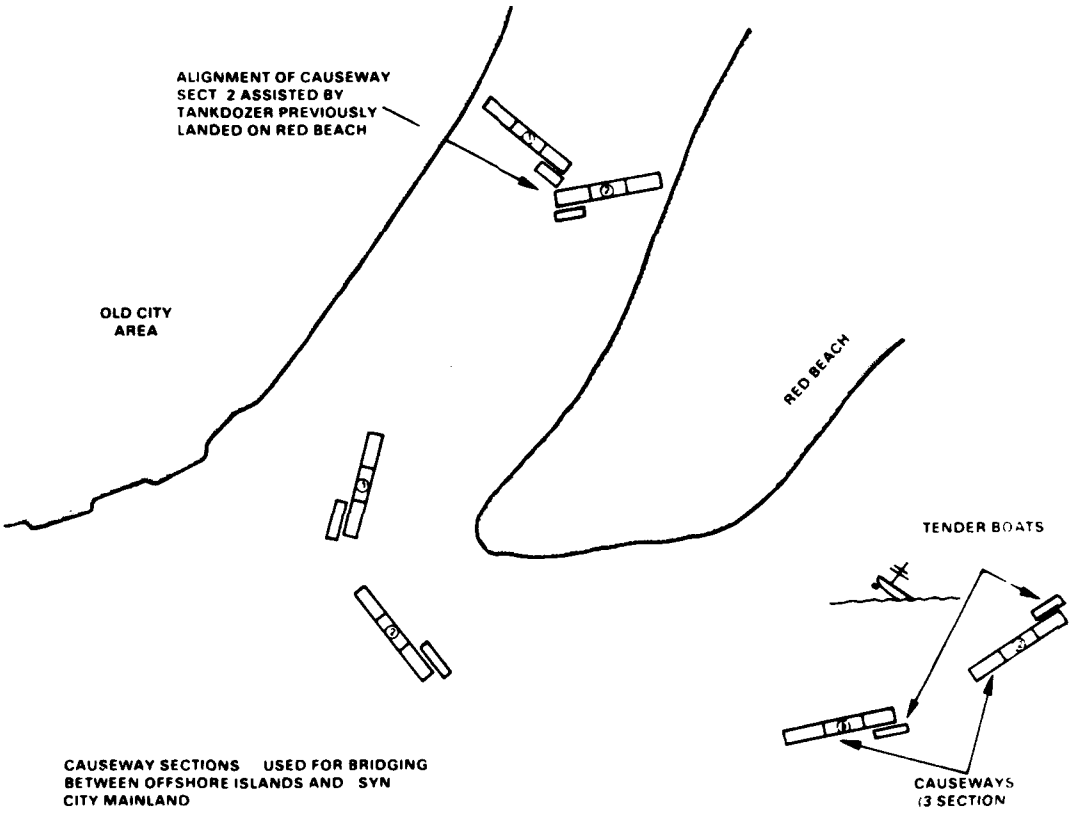


Figure III-10. Pontoon Causeway Operations at RED Beach

Concept of Operations - Current Time Frame

FOLLOW-ON LOGISTIC SUPPORT (SURFACE)

SEIZURE OF A PORT CITY BY AMPHIBIOUS ASSAULT OFFERS CHALLENGES AND OPPORTUNITIES TO LOGISTIC PLANNERS; THE NATURE AND EXTENT OF ENEMY DENIAL EFFORTS MUST BE ESTIMATED AND PROVISIONS MADE TO ASSURE SUPPLY SUPPORT ASHORE UNDER ANY POSSIBLE CIRCUMSTANCES.

The amphibious assault into a major port city environment, although fraught with tactical problems, could well prove advantageous from a logistical viewpoint. The existence of improved port facilities within the AOA is a definite plus factor in follow-on logistic planning. The capture or control of these facilities intact, or nearly so, will be a primary military objective. However, logistic support planning will accommodate a range of possibilities from total denial of port facilities (for whatever reason) to various degrees of availability of these facilities for friendly use. Appropriate forces and operating procedures must be provided for to accomplish the logistic support mission under these various eventualities, including the capability for repairing, rebuilding, and operating damaged facilities and conducting harbor and port control functions.

Organization

The Naval Beach Group Commander will be responsible for the initial and continuing follow-on movement of supplies over-the-beach. Offshore unloading of cargos into landing craft for ship-to-shore movement will be performed by ships' crews assisted by Naval Cargo Handling and Port Group personnel. As port facilities become available for discharging landing craft or direct unloading on-shore from cargo ships entering the harbor, the Amphibious Task Force Administration Group (TG 51.7) will assume control and will perform the following functions:

- Initial Harbor Development and Control
- Senior Officer Present Afloat (Administration Ashore)
- Anchorage Assignments
- Tug and Pilot Service
- Boat Pool and Lighterage Operation
- Repair/Salvage
- Harbor Defense
- Navigation Aids & Charts (Nets, buoys, and beacons)

At a later time and depending upon the scope of follow-on logistic support operations, the ATF Administration Group will be relieved of its Advance Base functions by personnel designated by the appropriate area Unified Commander.

NAVAL FORCES

Military (naval) forces available to conduct or support follow-on logistic operations include:

Amphibious Task Force Administration Group

Naval Beach Group:
- Beach Master Unit
  (Control Personnel)
- Assault Craft Unit
  (Landing Craft)
- Amphibious Construction Battalion
  (Causeways/Bulk Fuel Systems)
- Naval Cargo Handling and Port Group
  (Stevedoring/Supervisory Personnel)

Mobile Construction Regiment
- Mobile Construction Battalions (3)
  (Airfield Rehabilitation)

COMMERCIAL SEALIFT

Commercial sealift will be required for follow-on logistic support. The following is a list of typical commercial ships which will be available/required for this function:

- SEABEE (Sea Barge)
- LASH (Lighter Aboard Ship)
- Roll-on/Roll-off
- Breakbulk (Heavy-lift and standard)
- Container Ships (Self-sustaining and Non-Self-sustaining)
- Tankers (Petroleum)

Figure III-11. Available Resources for Supporting Follow-on Logistic Operations

Concept of Operations - Current Time Frame

METHODS OF SHIP DISCHARGE

SYN CITY PORT FACILITIES ARE NOT LIKELY TO BE AVAILABLE FOR USE BY THE ATF/LF UNTIL SOMETIME AFTER D+4 WHEN LIMITED BUT INCREASING USE MAY BE POSSIBLE.

Initially and until such time that the tactical situation permits, all shipping will be offloaded at anchor. Naval (ATF) shipping will be offloaded using optimum procedures for the type, e.g. LSD/LPD using wet-well, LST causeway ferry.

As the tactical situation permits, and depending upon harbor access and conditions of port facilities, cargo will be offloaded from lighters or directly from ships moored alongside piers and docks. Those ships, both military and commercial, with organic cargo handling equipment, will require an adequate pier or dockside berth for offloading regardless of operability of indigenous SYN City cargo handling equipment. The Temporary Container Discharge Facility (TCDF) will be moored in port to continue unloading non-selfsustaining containerships, SEABEE or LASH barges, etc. Other options for unloading inside the harbor include: LSD/LPD ballasting down for well deck operations alongside pier (water depth permitting); mediterranean mooring for stern ramp discharge to dockside (LSD/LPD/LST/Ro-Ro); and rapid construction of temporary LST beaching ramp.

Types of Supplies

The handling of certain types of supplies and cargo (breakbulk/containerized) or vehicular equipment , was discussed above in general terms. Adequate forces, equipment, and handling procedures or systems appear available to meet the throughput demands. To overcome this problem and reduce reliance on the capture of enemy petroleum assets in SYN City for sustaining operations, a minimum of three (3) YO/YOGs (Yard Oilers/Gasoline), other small shallow draft tankers, or DRACONES will be required to support Class III logistic requirements. With these units, the installation of a bulk fuel system at Beach BLUE 2 is feasible. Shallow draft tankers would be utilized to shuttle fuel initially from ATF shipping anchored in the assault transport area to the seaward end of the bulk fuel pipeline. These YO/YOGs would later be used to shuttle petroleum from commercial tankers at anchor (if unable to discharge ashore), serve as mobile refueling stations for lighterage, and generally provide flexibility for other fuel distribution requirements such as possible river transport to the vicinity of Airfield 1 and the naval station on South River.

Regardless of the existence of enemy "tug boat" assets (generally of marginal adequacy in most foreign ports) which may be "captured" for use by friendly forces, a minimum of two (2) YTL/YTB (Yard Tugs) are required to support ship berthing operations in SYN City harbor. It is recommended that these craft, as well as the aforementioned YO/YOGs, be staged through a third country and not transit with the ATF. The CATF will be responsible for making such arrangements.

COMMERCIAL SHIP CARGO DISCHARGE OFFSHORE

SHIP TYPE	UNLOADING SYSTEM	LIGHTERAGE				DISCHARGE ASHORE		
		LCM	LCM-8	CAUSEWAY / FERRY	OTHER	BEACH	CAUSEWAY FLOATING / ELEVATOR	OFFSHORE TRANSFER
SEABEE *	ELEVATOR (ORGANIC)				SEABEE BARGE		x	x
LASH *	GANTRY CRANE (ORGANIC)				LASH BARGE		x	x
RO/RO	RAMP			x		x		
BREAKBULK	BOOMS (ORGANIC)	x	x	x		x	x	
CONTAINERSHIP † (SELF-SUSTAINING)	CRANES (ORGANIC)	x	x	x		x	x	
CONTAINERSHIP † (NON-SELF-SUSTAINING)	TCDF (TEMPORARY CONTAINER DISCHARGE FACILITY) OR COD (CRANE OF DECK)	x	x	x		x	x	

* OFFSHORE TRANSFER OF BREAKBULK CARGO USING CRANE ON CAUSEWAY
† UNLOADING LIGHTERS DIRECTLY ONTO BEACH REQUIRES RTCH (ROUGH TERRAIN CONTAINER HANDLER) OR LACH (LIGHTWEIGHT AMPHIBIOUS CONTAINER HANDLER)

Figure III-12. Commercial Ship Cargo Discharge Methods

Concept of Operations - Current Time Frame

MISSION 1 - DELIBERATE ASSAULT

> THE DELIBERATE ASSAULT IS USED ... WHEN THE MISSION REQUIRES THAT AN URBAN AREA OR SECTOR(S) BE CLEARED OF THE HOSTILE FORCE AND THE LOCAL POPULATION IS UNCOOPERATIVE. (USMC STUDY SCN 30-77-01)

LANDING FORCE MISSION

Commencing on D-day and no later than D+10, seize and occupy the city of SYN City; on order, be prepared to defend the city or to continue the attack to the northwest.

General Concept of Operations

Advance Force operations and strikes by friendly theater-based aircraft will be conducted throughout Aggressorland for five days prior to D-day with no special focus on the SYN City area. On D-day, prior to BMNT, and in conjunction with deception operations conducted elsewhere along the coast, heliborne forces will land at L-hour to seize the main airfield and isolate SYN City by cutting or blocking LOCs leading into the city. No preparatory fires are planned, but attack helicopters will provide escort and fixed-wing aircraft will be on station to provide fire support as required. At H-hour (BMNT), under cover of air and naval gunfire support, a heliborne force will land north of the port area to seize the northern part of the port. Simultaneously, surface forces will land over the beaches at the old city to eliminate the army garrison, isolate the old city, and consolidate that portion of the port area, while a second force lands over the beaches to the south near the breakwater to seize the beach area and the naval station. One tank battalion with an infantry battalion attached will land on about D+1, over beaches to be designated, and deploy to the western metropolitan limits of SYN City to establish defensive positions and deny the city to enemy reinforcing units. When the port area has been neutralized, the remainder of the Landing Force will land over the piers and deploy to the northwest to assist in isolating or defending the city, prepared to continue the attack to the northwest.

Advance Force Operations

Theater-based US and allied air forces will conduct air strikes throughout Aggressorland during the five-day period prior to D-day, primarily to gain air superiority by attacking enemy airfields and aircraft. Collaterally, friendly air will locate and attack enemy troop units with priority to enemy air defense, NBC-capable units, artillery, and motorized/mechanized units. In order not to disclose the objective for Operation BREAKER, no special attention will be paid to the SYN City area.

Naval Special Warfare personnel will conduct a surreptitious reconnaissance of the offshore area at SYN City to determine whether or not mine countermeasures will be required prior to D-day and whether or not bottom conditions between RED and BLUE Beaches and the mainland will support snorkeling tanks. GREEN Beach in the mouth of South River between Bridge 1 and the breakwater will also be reconnoitered. Any mine countermeasures that may be required will be accomplished prior to H-hour.

Force Reconnaissance Company Teams, wearing NBC protective clothing and masks and carrying NBC detection equipment, parachute into primary and alternate landing zones prepared to provide immediate alert of possible unfavorable NBC conditions in LZs and function as terminal guidance/ pathfinder teams. In addition, teams also parachute into the vicinity of the Aggressor MRRs, tank regiment, and independent tank battalion of the MRD deployed in the general area of SYN City (within approximately 80 km) to observe and report on all enemy activity.

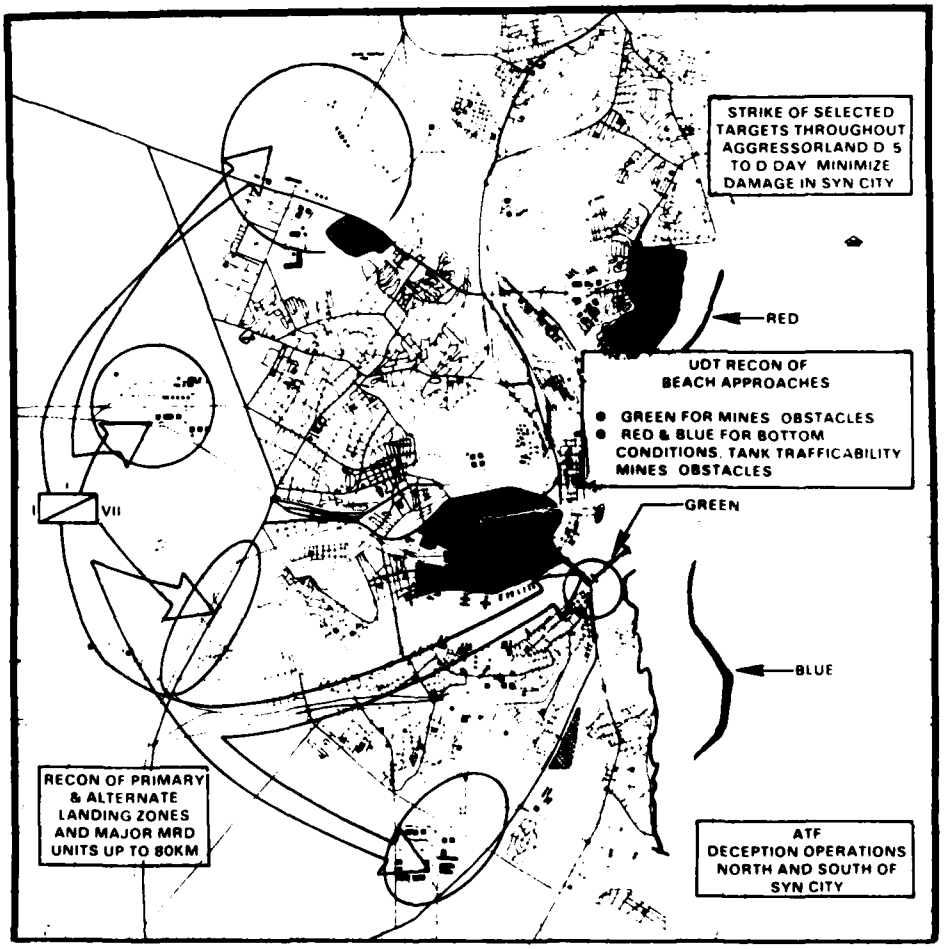


Figure III-13. Advance Force Operations - Deliberate Assault

Concept of Operations - Current Time Frame

Mission 1 - Deliberate Assault (Continued)

Detailed Concept of Operations

Phase I - D-Day

- Commencing at L-hour, 90 minutes prior to BMNT:

  - One BLT lands by helicopter at Airfield 1, seizes the airfield and bridge 6, consolidates its TAOR, eliminates enemy forces within the TAOR, and establishes blocking positions and minefields on the LOC leading into the TAOR from the west.

  - One BLT lands by helicopter in landing zones south of South River to isolate SYN City from the south, with companies seizing bridge 1, Airfield 2 and the nearby industrial area, and bridge 3 and the nearby dam and plant facilities; establishes minefields and blocking positions.

  - The Reconnaissance Battalion (-) lands by helicopter in a landing zone in the western industrial area to screen the Landing Force western flank.

- Commencing at H-30, air and naval gunfire attacks are directed at known and suspected enemy positions, and specifically at the two known army garrisons in the port area, the naval station, and the main dock area. These preparatory fires continue until H-hour.

- Commencing at H-hour, BMNT:

  - One RLT lands by helicopter and surface means to seize the port area, key bridges, and piers and destroy the enemy in its TAOR:

    - One BLT lands by helicopter north of the port area, attacks south to seize pier 29 and bridge 5, establishes blocking positions on the peninsula at the eastern end of bridge 5, and attacks enemy in TAOR.

    - One BLT lands with tanks and LVTs over RED Beach, isolates the old city on the north and west, links up with the heliborne BLT at bridge 5, and prepares to support the attack into the main port area.

- One BLT lands by LVT over RED Beach, attacks enemy army garrison, seizes the port area south of the old city, and the radio station in old city.

- One RLT (-) lands with LVTs and tanks over BLUE Beach, establishes blocking positions and expedient strongpoints in the suburban area east of the naval station to provide security for movement through the suburban area, isolates the naval station and seizes bridge 2 and the radio station (E8.3-N4.2), and commences the attack of the naval station.

- One artillery battalion (Rein) lands by helicopter north of the old city (E11.1-N13.9) on call and establishes positions to fire in support of the Landing Force.

- The LAAM battalion lands by helicopter, on call, with two batteries in the vicinty of Airfield 1 and one battery in the vicinity of Airfield 2.

- Landing Force Reserve, initially comprised of two BLTs and one tank battalion, is prepared to land one BLT by helicopter to reinforce units ashore if required, and to land the tank battalion over beaches to be designated if the situation requires them ashore.

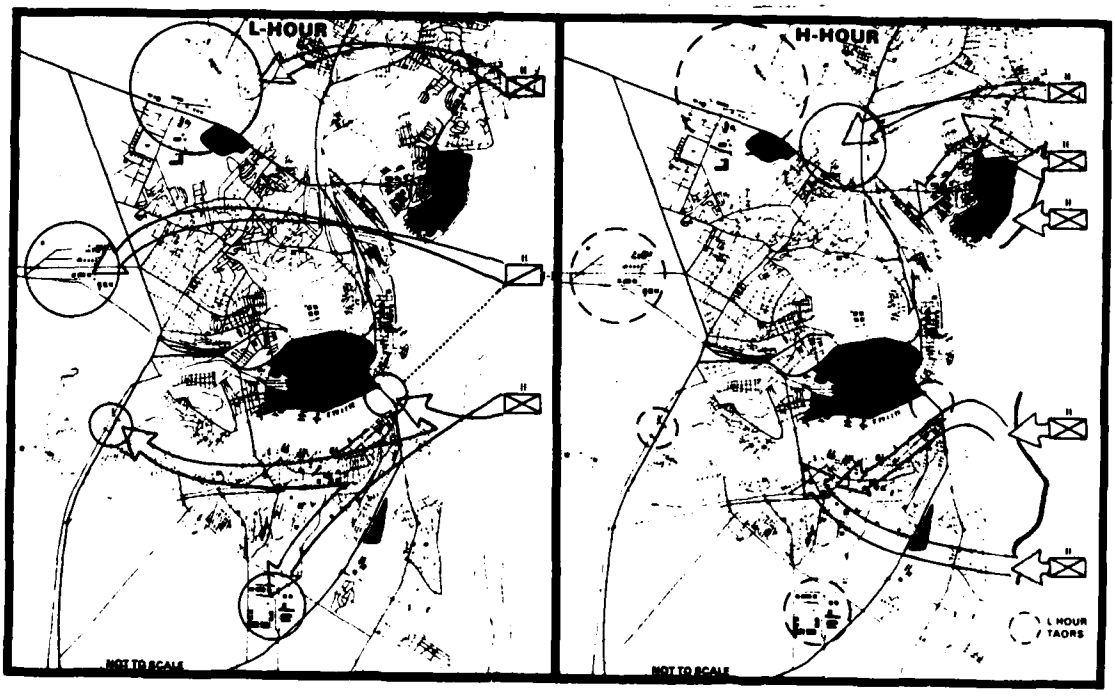


Figure III-14. L-hour and H-hour Landings

Concept of Operations - Current Time Frame

Mission 1 - Deliberate Assault (Continued)

Phase II - Maneuvers Ashore D+1 Through D+3

- Unless previously committed, the LF Reserve tank battalion lands over beaches to be designated, deploys to the western municipal boundary of SYN City over routes to be designated, establishes defensive positions between South River and Airfield 1 in conjunction with a helicopter-landed BLT from LF Reserve to be attached to the tank battalion upon landing, and prevents enemy reinforcements from entering SYN City.

- BLT at Airfield 1 continues to defend the airfield and bridge 6 and to implement the barrier plan.

- RLT 2 completes seizure and occupation of the port area and eliminates enemy forces therein, clears the old city of enemy military forces, occupies municipal buildings, and prepares to clear the new city and seize the municipal buildings and facilities therein.

- RLT 3 clears the suburban area off Beach BLUE 2 and commences attacking and clearing the naval station.

- Reconnaissance Battalion continues to screen the west flank of the Landing Force and, with engineer support, reconnoiters the terrain to the northwest of SYN City.

- Division Artillery Regiment (-) lands over the landing beaches on call and establishes firing positions in areas to be designated.

- Landing Force Reserve, now comprised of one BLT, remains afloat until required ashore.

Phase III - Maneuvers Ashore D+4 Through D+6

- RLT 2 completes the seizure and occupation of the new city and prepares to occupy the western suburbs.

- RLT 3 completes the destruction of enemy forces within the naval station and prepares to clear and occupy the remaining suburban areas south of South River.

- Reconnaissance Battalion reconnoiters to the maximum depth possible to the west and northwest of SYN City.

- 2nd Tank Battalion (Rein) maintains and improves defensive positions along the western trace of VII MAF and continues to defend the western flank of the LF.

Phase IV - Maneuvers Ashore D+7 Through D+10

The Landing Force consolidates its position in the SYN City area, completes destruction of the enemy forces within the city and those attempting to reinforce, defends the Force Beachhead, and begins the logistical build-up preparatory to continuing the attack to the northwest. Follow-on forces are expected to arrive prior to D+30, after which time the Landing Force, VII MAF, will be in a position to continue the attack.

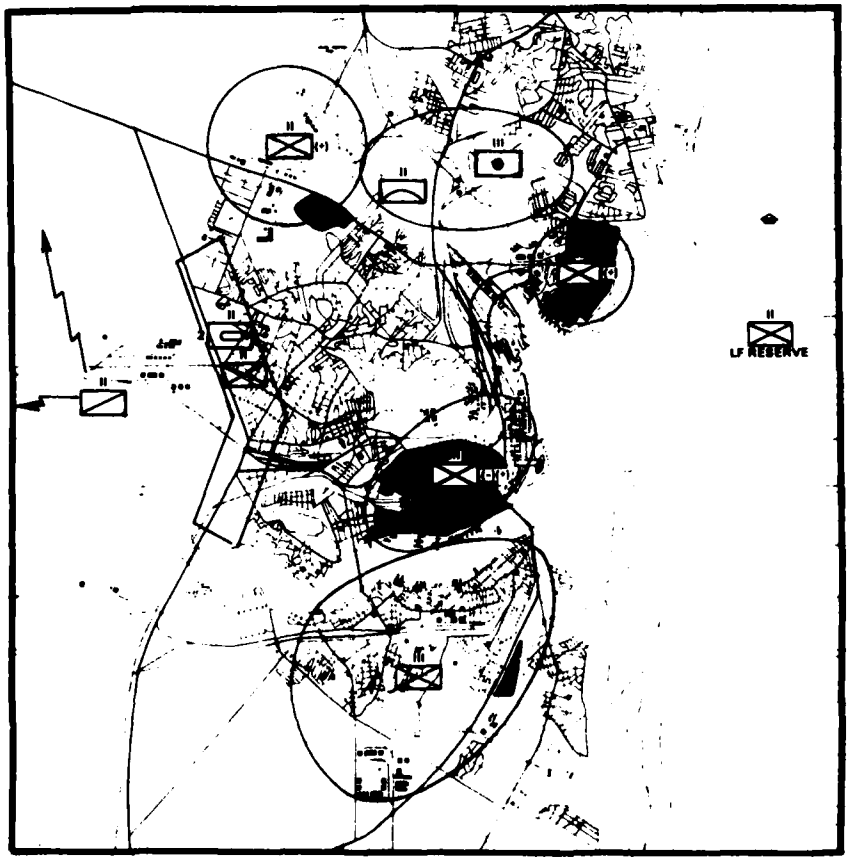


Figure III-15. Projected SYN City Situation D+6

Air Support Concept of Operations

Landing Force Aviation is comprised of Embarked Aviation and Theater-Based Aviation. Embarked Aviation includes essential 7th MAW command and control agencies, helicopter MAGs/Squadrons, two of the three V/STOL (Harrier) squadrons, six OV-10 aircraft from VMO, the 2nd LAAM Bn., and the 1st FAAD Btry. These units will support the assault landing and deploy ashore between D-day and D+4. Theater-Based Aviation includes the remainder of 7th MAW, predeployed to airfields within 170NM of SYN City, and will support the amphibious landing from those airfields. One VMA and one VMA(AW) plus designated supporting units will deploy from Theater airfields to Airfield 1 on about D+3 when a 5,000-foot minimum operating strip is operable and a rearming and refueling capability exists.

The remainder of the squadrons will continue to provide support from the Theater airfields until such time as Airfield 1 and an EAF at Airfield 2 are capable of accepting additional aircraft, or until the Landing Force has extended the FBH to encompass additional sites suitable for EAFs. Enemy air and ground capabilities and the constricted facilities within the FBH militate against basing most of the MAW ashore until after the attack has carried more than 30 km beyond SYN City.

Helicopter and AV-8 attack squadrons will provide air support from ships of the amphibious task force until suitable facilities are available ashore. Personnel of the MACS will assist naval command and control elements afloat until control of air operations is passed ashore in accordance with doctrine.

Air defense will be provided initially by Navy carrier-based fighters and MAF fighter aircraft based at theater airfields. Navy barrier combat air patrols (CAP) will operate 50 to 100 nautical miles from the carriers, which will also provide deck-launched interceptors and escort for deep strikes. MAF fighter aircraft will provide air defense CAPs over land and will provide offensive air support missions for the landing force. Additional aircraft will be on strip alert at theater airfields.

Close air support will be provided by carrier-based attack aircraft and AV-8 VSTOL attack aircraft which will function primarily in a deck-alert close-air-support mode throughout D-day. The AV-8 aircraft will displace ashore as soon as refueling facilities are available, either from local sources, a MAF tactical airfield fuel dispensing system (TAFDS), or other expeditionary means. Maintenance will continue to be performed aboard ship until about D+5. Attack helicopters will be tasked for helicopter escort, landing zone fire suppression, and close-in antimechanized defense, and they will operate from shipboard throughout D-day, after which they will deploy ashore.

Air reconnaissance will be performed by theater aircraft in support of the ATF and by Navy and MAF assets. Priority will be accorded to enemy NBC-delivery capabilities, offensive air and air defense capabilities, and tank and motorized rifle units. Reconnaissance will also be directed at enemy troops, terrain, lines of communications, and other essential elements of information. The VMO detachment will deploy ashore to Airfields 1 and 2 on D+1.

Medium and heavy helicopter transport squadrons will land assault troops and on-call serials and will support general unloading. One HMM will deploy ashore on D-day at Airfields 1 and 2 to clear an LPH deck for AV-8 operations. The majority of the transport helicopters remain ship-based until about D+4. All major maintenance will be accomplished aboard ship through D+4.

Light helicopters will be used for airborne command and control during the assault. During the buildup and operations ashore, they will be used for airborne FACs, liaison, courier, communications retransmission, and casualty evacuation missions. In addition, light helicopters will provide lift for assault units requiring lift to building roofs or other promontories. In these cases, supported units will prepare adequate fire suppression plans to protect the helicopters from enemy small arms, automatic weapon, and SAM fires. The HML will deploy ashore on D-day, but will refuel at sea whenever possible.

Medium helicopter squadrons (HMM) will be tasked to disperse or redeploy combat troops and their weapons, equipment and supplies day and night throughout operations ashore. When required, they will be used to transport supplies from ship to shore to augment the heavy helicopter squadrons (HMH), which will be tasked mainly to lift heavy equipment and supplies from ship to shore and within the force beachhead.

The VMGR squadron, initially operating from theater bases, will provide combat air refueling, air delivery, and transport of combat cargo to landing force elements.

EMBARKED AVIATION	THEATER-BASED AVIATION
Wing C^3 (-)	Remaining C^3
2 MAG (VH)	MWSG (-)
2 VMA (V)	VMGR
DET. VMO	3 MAG (VF/VA)
	DET. VMFP
	DET. VMAQ

See Annex A (Task Organization) to VII MAF Oplan 1-81, for detailed task organization.

Figure III-16. Landing Force Aviation

Combat Service Support Concept of Operations

Logistic support of Operation BREAKER will be influenced by the availability of service and support facilities, material, equipment, and supplies in SYN City that prove suitable for use by the Landing Force. MAF units will be tasked to report the status and condition of these categories throughout the operation to assure that optimum use can be made of them, thereby reducing the amounts of supplies and equipment that will have to be used or stocked ashore. The MAF will retain the flexibility to land all of the supplies and equipment necessary to support the Landing Force in the event that all or most of the indigenous material has been destroyed or rendered temporarily inoperable.

VII MAF arrives in the AOA with Landing Force supplies spread-loaded in the assault echelon to minimize risk of catastrophic loss of material due to enemy action. Prior to H-hour on D-day at a time to be announced, individual prescribed loads will be issued and emergency supplies will be prepositioned for helicopter delivery. LFSP elements will land over RED and BLUE Beaches and in designated Landing Zones to establish prescribed BSAs and HSTs and maintain required dump levels. Helicopter-landed units will be resupplied by helicopter until surface-landed forces have linked up and opened surface LOCs. BSAs at RED and BLUE beaches will support the surface-landed forces. Because of the difficulty in transiting the inland waterways between the islands and the mainland, LVTs will be assigned as floating dumps as soon as released by assault units, and they will be kept in mobile-loaded status for as long as possible.

LFSP will provide for necessary CSS in accordance with the Oplan. Assault elements will receive unit distribution to the maximum extent possible throughout Phases II and III (D-day, D+1 to D+3). All other units will have supply point distribution. On order, FSSG will land, relieve LFSP, and assume control of CSS elements of VII MAF. As the tactical situation permits, FSSG establishes CSSA 1 and 2, maintains specified dump levels, and performs other CSS functions as required. FSSG will provide support of civil affairs actions as required on order of VII MAF. In the event the enemy employs nuclear and/or chemical weapons which disrupt the ship-to-shore movement, Landing Force will issue specific instructions to effect recovery.

In the event NBC weapons are employed after assault elements are established ashore, affected units will implement emergency protective procedures and use expedient decontamination measures to reduce casualties in accordance with SOPs. Such expedient protective measures in the event of nuclear attack would include: donning masks and protective clothing; seeking or developing hasty shelters with available engineering equipment and/or demolitions or occupying basements of reinforced concrete or steel

framed buildings; dispersing equipment and supplies; and burying food and water as well as other combat essential supplies. Individual protective measures taken in the event of a biological or chemical attack include: donning masks and protective clothing; self-immunization; consuming only rations and water that have been subjected to other protective measures; resting when time is allotted for that purpose; adhering to field sanitation measures in accordance with unit SOP. Field expedient decontamination measures include establishing improvised decontamination stations; quarantine contaminated structures and areas, spraying or dusting equipment with reagents; washing, flushing, scraping, grading, and/or dusting equipment according to type of agent; burying contaminated areas under additional layers of earth; and burning building structures or terrain.

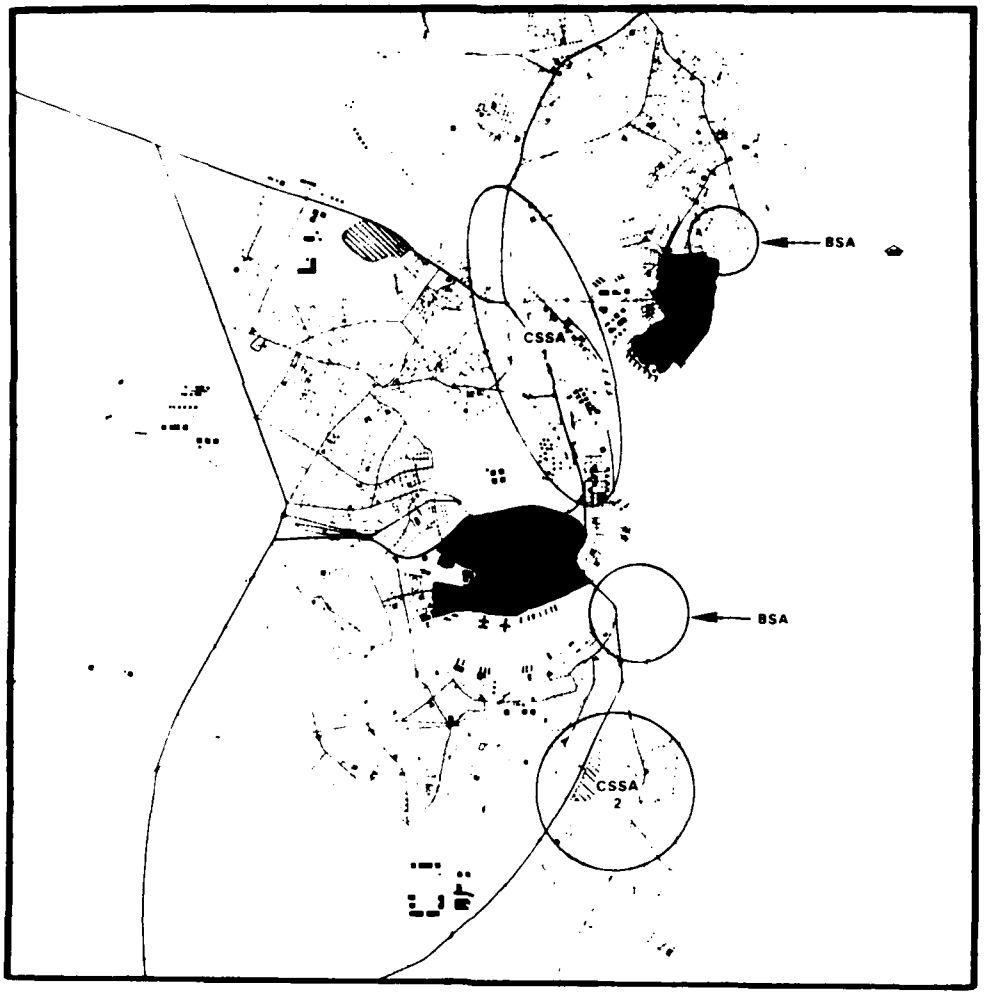


Figure III-17. Initial Combat Service Support Areas

Concept of Operations - Current Time Frame

Mission 1 - Deliberate Assault (Continued)

CSS Operations Within SYN City

Combat service support operations within SYN City will make maximum use of indigenous supplies and equipment. Local POL in gasoline stations, fuel storage areas, refineries, etc., will be seized, tested for quality, and when applicable will be used to supply the Landing Force. Captured medical supplies and facilities will be reported through channels to VII MAF for instructions concerning their use for civil support or for support of the Landing Force. Captured food supplies, except those in the hands of private citizens, will be secured for controlled issue to civilian distribution agencies. Vehicles of tactical, engineering, or of useful transportation value; construction equipment, materials handling equipment, etc., will be reported to the nearest element of the FSSG which will convert them to Landing Force use as required.

To achieve maximum security against enemy air attack and to minimize the amount of tentage, camouflage netting, and overhead construction required of Landing Force CSS units, maximum use will be made of existing structures in the suburban and urban areas of SYN City. Priority will be accorded to use of municipal buildings that are well constructed, offer protection against air and artillery fire, and which have sufficient floor space to accommodate substantial amounts of Landing Force supplies. Second priority will be to garages, business buildings, schools, factories, and other public or private structures. Private homes will generally not be so employed, but they will be used for troop billeting and messing in addition to providing head/latrine facilities. Supplies stored in open spaces, such as between houses or buildings or in empty lots or soccer fields, will be camouflaged against air and ground observation and provided with appropriate security. Supplies stored in areas with natural ground cover can be camouflaged with netting of the appropriate color scheme. When there is no natural ground cover between buildings or houses, stocks could embrace the structures and be configured to resemble building appendages using similar construction materials supplied by rubble, borrow pits, or Class IV storage areas. Little camouflage can be provided for material located in open lots with no natural cover. Such supplies would require dispersion, and hardening if feasible. Ammunition will be stored in reinforced, multi-story public garages, soccer fields, and open areas along existing roads, cul de sacs, etc., which provide separate entry/exit. Sufficient space will be provided between stacks to prevent sympathetic detonation, and all such stacks will be camouflaged. Nearby civilians will be evacuated to prevent hazarding them and to safeguard the ammunition against pilferage or sabotage.

Initially two CSSAs will be established, one in the main port area to support all forces north of South River, and one east and south of the naval station to support all forces south of South River. As soon as the

tactical/logistical situation permits, the northernmost CSSA will be built up to support operations to the northwest. CSSA installations within the suburban areas will be kept in operation until follow-on forces begin to arrive and the FBH is extended to a degree which permits CSS units, supplies and equipment to move to CSSAs established northwest of SYN City.

USE OF INDIGENOUS SUPPLIES, EQUIPMENT, & FACILITIES

TO BE CONVERTED TO LANDING FORCE USE AS REQUIRED

- MATERIALS HANDLING EQUIPMENT
- AVIATION GROUND EQUIPMENT
- CONSTRUCTION EQUIPMENT
- CONSTRUCTION MATERIALS
  - CRUSHED STONE
  - SAND/GRAVEL/CEMENT
  - LUMBER
  - ASPHALT
  - BARBED WIRE
- MOTOR TRANSPORT EQUIPMENT (INCLUDING RAIL)
- POL SUPPLIES
- PUBLIC AND DESIGNATED PRIVATE VEHICLES
- PUBLIC BUILDINGS
- DESIGNATED PRIVATE HOMES (BILLETING ONLY)

TO BE REPORTED & CONTROLLED FOR POSSIBLE CIVIL USE

- FOOD SUPPLIES IN FARMS, MARKETS, STORES, ETC.
- MEDICAL SUPPLIES IN HOSPITALS, DISPENSARIES
- BANKING RECORDS AND ASSETS
- INDIGENOUS MOTOR TRANSPORT (INCLUDING RAIL)

NOT TO BE COMMANDEERED

- PRIVATE FOOD STOCKS IN PRIVATE HOMES
- INVENTORIES IN DEPARTMENT STORES AND OTHER NON-GOVERNMENTAL INSTITUTIONS
- PRIVATE PROPERTY OF ANY DESCRIPTION EXCEPT WEAPONS

Figure III-18. Utilization of Indigenous Materials

Concept of Operations - Current Time Frame

MISSION 2 - SEIZE KEY OBJECTIVES

SEIZURE OF KEY OBJECTIVES IS CONTEMPLATED IN SITUATIONS THAT REQUIRE QUICK CONTROL OF AN URBAN AREA (USMC STUDY SCN 30-77-01)

Landing Force Mission

Commencing on D-day and no later than D+10, seize and control the city of SYN City; on order, be prepared to defend the city or to continue the attack to the northwest.

General Comments

This mission statement differs from that of the "Deliberate Assault" mission in only one respect: it requires the Landing Force to "seize and control" rather than "seize and occupy" the city.

In both missions an early consideration is to isolate the city to prevent reinforcement. The objectives selected for this purpose are the same: the main LOCs to the north, west and south. Seizure of these objectives prevents the enemy from moving troops into the city, but it does not necessarily close off all avenues of withdrawal for the reinforced MRB within the city, thereby giving the enemy an opportunity to exfiltrate. Should the committed enemy force do so, the Landing Force could easily accomplish its mission without seriously damaging the urban area or hazarding the civilian population. In this situation the enemy is expected to revert to urban warfare.

Tactical Considerations

The Amphibious Task Force and Landing Force objectives are the same as for the deliberate assault. To put substantial combat power ashore quickly requires maximum use of helicopters and LVTs. In deference to the threat capability to acquire and hit targets, and recognizing the availability of reinforcements and supporting fires, the landing plan will be the same as for the deliberate assault; this capitalizes on the enemy's confusion resulting from scattered advance force operations, deception operations to coincide with the actual assault, landing the initial heliborne assault waves at L-hour, 90 minutes before BMNT, and striking with the surface assault forces at H-hour, BMNT. This combination of features takes advantage of a silent night landing, minimizes the threat ECM and ESM capabilities, reduces the chances of facing a chemical warfare environment at the outset, and is likely to fix the threat reinforcements in place during the crucial assault phase. Thereafter, Landing Force Aviation, in conjunction with the attack carrier striking groups, will attack, attrite, and interdict threat reinforcing forces to prevent their closing on SYN City.

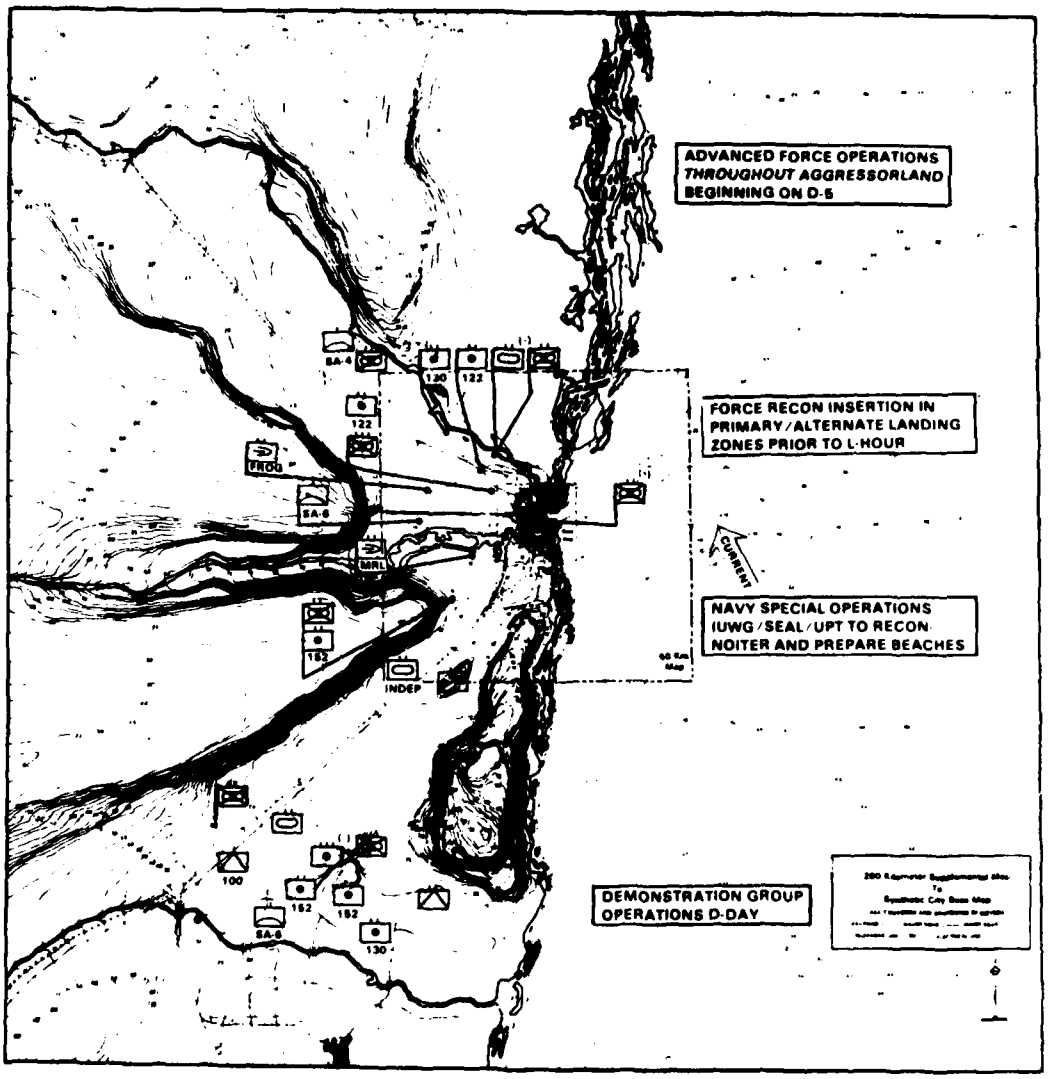


Figure III-19. Advance Force and Demonstration Operations

Concept of Operations - Current Time Frame

MISSION 2 - SEIZE KEY OBJECTIVES

Concept of Operations

> A LANDING FORCE CHARGED WITH SEIZING QUICK CONTROL OF AN URBAN AREA WOULD LIKELY INCLUDE AS KEY OBJECTIVES CRITICAL PUBLIC UTILITIES AND COMMUNICATIONS ... AN ENTIRE SECTION OF A CITY OR AN AIRFIELD, RAILROAD CENTER, A REFINERY ... AN EMBASSY (ETC). (USMC STUDY SCN 30-77-01, p. 5-8)

General Concept

The ATF objectives for this mission would be the same as for the deliberate assault: the main port area and Airfield 1. Landing Force objectives would also be the same: the naval station, bridge 1, Airfield 2, bridge 3, and the nearby dam and power station, and the western industrial area. Their seizure would be accomplished in the same fashion and in the same period as for the deliberate assault. Assignment of 7th Mar Div objectives would differ only slightly by emphasizing the early capture or control of public utilities and communications facilities. Police stations will be seized so that auxiliary communications, cell blocks, and paramilitary elements may be placed under VII MAF control.

Detailed Concept of Operations

BLT 1/1, which seizes Airfield 1, will be required specifically to control the road junctions at E 7.5-N 15.9 and E 11.2-N 16.2 which will be designated as Division Objectives. It is possible that the initial threat reaction at Airfield 1 and subsequent Aggressor operations north of SYN City will make it difficult for BLT 1/1 to accomplish these tasks, and it could become necessary to land part of the Landing Force Reserve, probably one BLT (2/1), to assure control of the northern extension of Phase Line TIGER (which extends beyond the SYN City map edge). Therefore, BLT 2/1 will be prepared to land on D-day either by helicopter or over RED Beach causeway to seize and control the area from the coast to North River along Phase Line TIGER. Seizure of the two police stations in that TAOR would be required.

The mission and objectives for RLT 2 will be the same as in the deliberate assault. BLT 3/2, however, will probably be directed by RLT 2 to seize and control additional Division Objectives to include the radio station (E 12-N 11.1) and the three police stations within the city.

From VII MAF viewpoint, the only impact on RLT 3 would be the need to specify early seizure or control of the two radio stations (E 7.7-N 7.2) and (E 8.4-N 4.3) and the railway station. BLT 3/3, in a MCATF configuration, would likely be directed by RLT 3 to seize those objectives in conjunction with its seizure of Bridge 2.

Missions and objectives for the Division Reconnaissance Battalion and the 2nd Tank Battalion would be the same. No changes would be necessary in the aviation concept, and only minor increases would be necessary for combat service support. The additional forces that might be landed early, BLT 2/1 in the north, would have its prescribed load. Supply levels for Class I in RED BSA would have to be increased to accommodate the requirements of BLT 2/1 for the 3 days or more that the unit would be ashore earlier than programmed. It should be noted, however, that as part of the Landing Force Reserve, provisions for landing and supporting BLT 2/1 at any time during the assault phase are implicit in amphibious planning.

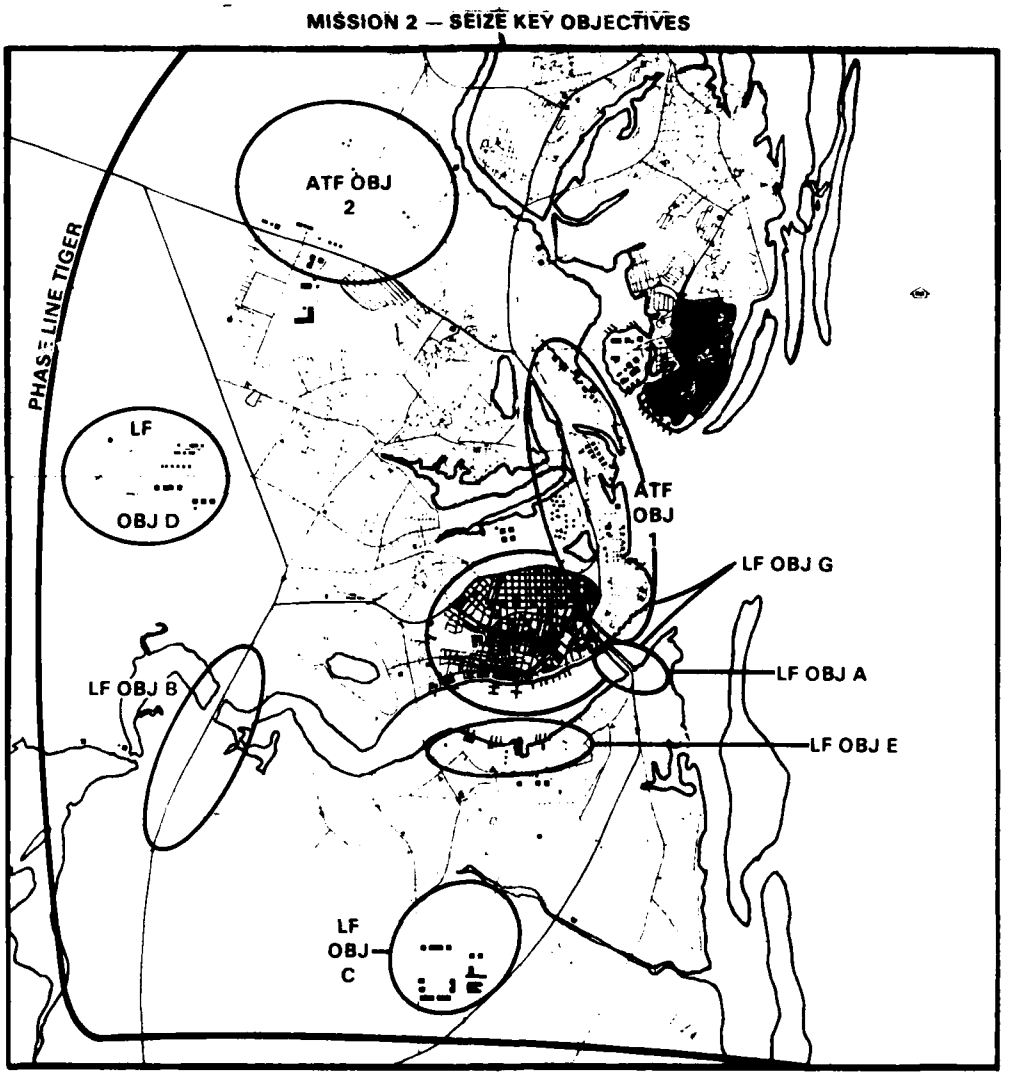


Figure III-20. ATF and LF Objectives - Mission 2

Concept of Operations - Current Time Frame

MISSION 3 - ISOLATE AND CONTAIN

THIS IS A CONCEPT FREQUENTLY EMPLOYED IN PAST CONFLICTS WHEN A FORCE OCCUPYING AN URBAN AREA IS BYPASSED BY ATTACKING FORCES WHICH LEAVE SUFFICIENT TROOPS BEHIND TO CONTAIN OR "BOTTLE UP" THE OCCUPYING FORCE, PERMITTING THE ASSAULT FORCES TO CONTINUE THE OFFENSIVE ATTACK ON OBJECTIVES BEYOND THE OCCUPIED CITY. THIS CONTAINMENT CONCEPT COULD BE EMPLOYED AS PART OF THE LANDING FORCE CONCEPT OF OPERATIONS ASHORE WHEN A LANDING FORCE OBJECTIVE LIES WELL BEYOND A CITY CONTAINING FORCES WHICH MAY BE CAPABLE OF INTERRUPTING THE LF LOCs. (USMC STUDY SCN 30-77-01)

LANDING FORCE MISSION

Commencing on D-Day and no later than D+2, seize and isolate the city of SYN City; contain the enemy within the city; on order, be prepared to continue the attack to the northwest.

General Comments

Within the context of the statement of work, this mission statement poses two significant issues. The purpose of this investigation is mainly to assess the logistic implications implicit in urban warfare in an amphibious environment. The analysis was deliberately confined to the limits of the SYN City map product supplemented by other map products at smaller scales. As the analysis progressed, it became evident that to "isolate and contain" the military forces within SYN City while still continuing to conduct military operations to the northwest was not practical unless suitable port or landing beach facilities were available outside but proximate to the SYN City (map) area. Otherwise, the military garrisons and the reinforced MRB would have to be neutralized or destroyed to permit the establishment of a logistic support base in the port area. The latter does not appear to be feasible within the D+2 period.

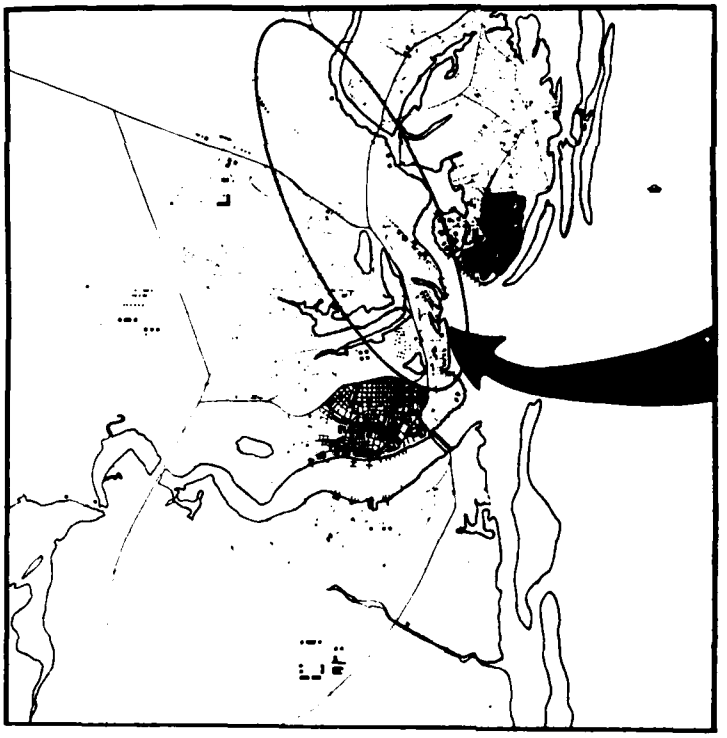
Tactical Considerations

Logistic support of Marine Corps forces attacking inland to the northwest from SYN City is not possible without the use of the major port area, ATF Objective 1, and Airfield 1, ATF Objective 2. Otherwise, substantial port or LOTS throughput areas would be required near SYN City. Should such facilities be available, the military effort against the area south of South River would differ materially from that elected for the deliberate assault and seizure of key objectives. Blocking positions would be established south of the river, two of the three bridges would be destroyed as would the 3,000-foot sod airfield (Airfield 2), and the radio station south of the river. In the northern sector, key LOCs would be blocked to the west and north. Airfield 1 would be seized and occupied,

since it would have to serve immediately (but subject to possible severe harassment and interdiction at the outset) or at some time in the future after the fate of the SYN City garrisons had been sealed by follow-on forces. In this situation the only ATF objective common to the earlier missions would be Airfield 1. The port area would be ignored except for attacks by air and naval gunfire against the military and naval garrisons.

In the event that nearby port or LOTS facilities were not available (and this is an assumption that must be made based on a terrain analysis of the SYN City supplemental map products), seizure of the port and Airfield 1 are essential if the attack is to be pursued to the northwest. A MAF, or even lesser forces, could not be supported logistically without use of these vital facilities.

ISOLATING AND CONTAINING THE AGGRESSOR FORCES WITHIN SYN CITY WILL BE ADDRESSED, FROM THE CONCEPTUAL STANDPOINT ONLY, ASSUMING THAT NO SUCH NEARBY LOGISTIC FACILITIES ARE AVAILABLE, WHICH THEREFORE REQUIRES SEIZURE OF SELECTED SYN CITY LOGISTIC FACILITIES TO SUPPORT FURTHER OPERATIONS WHILE SEEKING TO ISOLATE AND CONTAIN THOSE AGGRESSOR FORCES THAT DO NOT HAVE TO BE CONFRONTED DIRECTLY.



THE AVAILABILITY OF PORTS OR LOTS BEACHES IMMEDIATELY NORTH OF SYN CITY WOULD MAKE *IT POSSIBLE TO* "ISOLATE AND CONTAIN" THE ENEMY.

LACK OF PORTS OR LOTS BEACHES NORTH OF SYN CITY WOULD MAKE IT NECESSARY TO SEIZE A LOGISTIC SUPPORT BASE BEFORE CONTINUING THE ATTACK TO THE NORTHWEST.

Figure III-21. Logistic Ports or Logistics Over the Shore (LOTS)

LACK OF PORTS OR LANDING BEACHES NORTH OF SYN CITY WOULD MAKE IT NECESSARY FOR THE LANDING FORCE, VII MAF, TO SEIZE AND ESTABLISH A LOGISTIC SUPPORT BASE IN THE CITY AS A BASIS FOR SUPPORTING A CONTINUATION OF THE ATTACK TO THE NORTHWEST.

General Concept

The mission to seize, isolate, and contain the city of SYN City by D+2 will require that more combat power be placed against the port area than was contemplated for the deliberate assault or seizure of key objectives. Lack of landing beaches or landing zones outside the area depicted as the SYN City map product force the VII MAF to seize areas from which logistic support of the MAF can be accomplished. Clearly the areas south of South River are too vulnerable to attack by the major Aggressor threat from the south and they are too far from the axis of attack to the northwest. Reliance on RED Beach to sustain the MAF would be too great a risk. A single causeway, or even a number of causeways, from the island to the mainland could not sustain the volume of traffic necessary. An MSR passing from RED beach through an urban/suburban area and over one of the two highway bridges or two railroad bridges over North River is too subject to sabotage or interdiction. This combination of circumstances makes it imperative that the main port area be seized, in addition to Airfield 1, to provide the logistic base for continuing the attack. The Aggressor forces in the port area will have to be destroyed or driven out. Containing them in place would defeat the basic MAF objective of seizing a base. The naval station would not necessarily have to be seized; it could be contained, and in this situation it will be attacked by fire but no attempt will be made to seize or occupy it.

Detailed Concept of Operations

At L-hour, 90 minutes before BMNT, one BLT (1/1) will land by helicopter to seize Airfield 1 while company-sized units (BLT 2/1) seize road junctions and bridges north of old city. Simultaneously, company-sized forces (RLT 3) will land by helicopter to seize bridge 3 and the associated dam and power plant and the western industrial area. One BLT (3/1) will land in LVTs over RED Beach (marked by 7th Mar Div Recon Bn) to destroy the enemy army garrison in old city. Navy Special Warfare teams will destroy bridges 1 and 2. These operations will effectively isolate SYN City.

Commencing at H-hour, BMNT, one BLT (1/2) will land by helicopter north of the port area. Simultaneously, two BLTs (2/2 and 3/2) will land by LVT, accompanied by snorkeling tanks, over RED Beach. In accomplishing this mission, both BLTs will deploy north of SYN City and then west across bridges to be designated to link up with BLT 1/2, where upon RLT 2 will

conduct a deliberate assault on the Aggressor MRB units in the port area. The full combat power of an RLT with a battalion (-) of tanks should be sufficient to destroy or dislodge the MRB by D+2.

On D+1 RLT 3(-) (minus one BLT held as Landing Forces Reserve) and the 2nd Tank Battalion will land over RED Beach and deploy between the western edge of SYN City and Phase Line TIGER prepared to continue the attack to seize the FBHL.

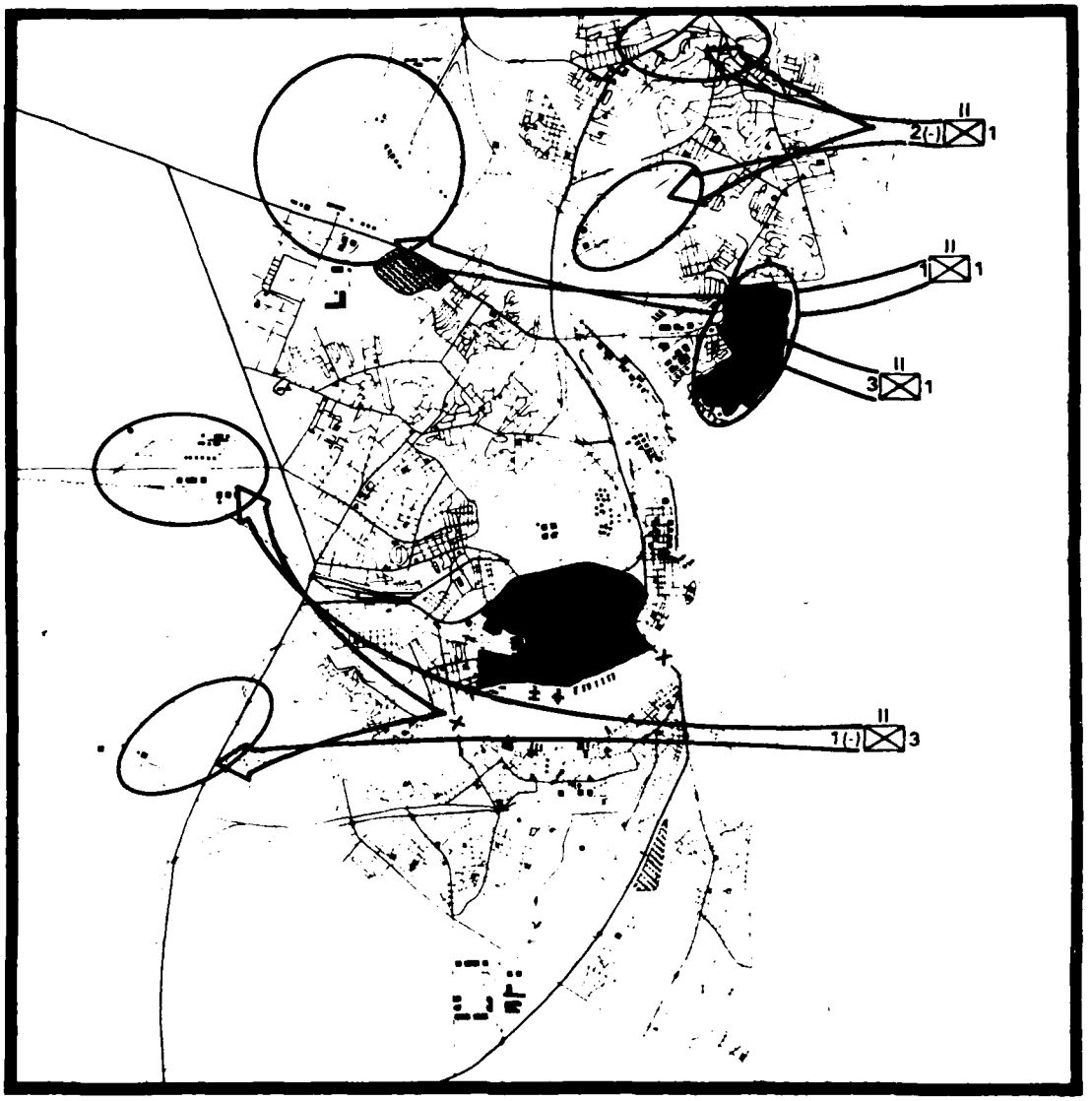


Figure III-22. Mission 3 - "Isolate and Contain" L-hour Operations

Mission 3 - Isolate and Contain (Continued)

Air and Combat Service Support Concepts

THE LACK OF FACILITIES SOUTH OF SOUTH RIVER SUITABLE FOR USE BY LANDING FORCE AVIATION AND THE FORCE SERVICE SUPPORT GROUP WILL IMPOSE SIGNIFICANT CHANGES IN MAF OPERATIONAL AND LOGISTICAL CONCEPTS.

Air Support Concept of Operations

The density of troops and extensive requirements by combat and support units for square footage north of South River will prevent the early deployment ashore of helicopters and VTOL aircraft. It will be necessary for the Navy's LHAs and LPHs to support most of the helicopter/VTOL operations and maintenance until sufficient hardstand landing sites are available and a rearming and refueling capability exists. At least twice as much time will be required, probably until at least D+8, before the bulk of the helicopters and VTOL can be phased ashore. That time requirement will also be influenced by the availability of SATS/EAF or other airfield facilities in the area between PL TIGER and the FBHL.

Combat Service Support

The fundamental concept of CSS support will be similar to that in the deliberate assault, but only one CSSA will be established and sea-based logistic support will be needed for a longer period of time. A Beach Support Area (BSA) will be required at RED Beach in the same manner as in the deliberate assault. Establishment of the BSA will begin earlier, however, because a BLT lands over RED Beach at L-hour, 90 minutes earlier than in missions 1 and 2. The deliberate assault concept has four BLTs landing by LVT at H-hour, creating maximum demand for LVTs to the extent that LVT floating dumps cannot be used until two of the BLTs, one each at RED and BLUE Beaches, have released their LVTs. In this concept for mission 3 (Isolate and Contain), LVT floating dumps are available at L-hour and virtually the entire AA Bn is available to support the landing of two BLTs at H-hour to include sufficient floating dumps, evacuation, etc.

A causeway will be installed between RED Beach island and the mainland as soon as the H-hour BLTs have landed. Provisions will be made for installing a second causeway on D-day.

The reinforced companies from RLT 3 at bridge 3 and the western industrial area will be supported by helicopter throughout D-day. On D+1 overland support will be possible using LOCs, from RED Beach, to be designated as the tactical situation stabilizes.

Rehabilitation of Airfield 1 and the port area will be a priority matter as soon as the Aggressor MRB has been destroyed, anticipated to be on D+2. The Combat Service Support Area (CSSA) will encompass the port area but will include substantially more area to the northwest. In particular, the northern and western industrial areas will be evaluated for possible early use by units of the FSSG. Actual use will hinge on availability of space within the areas, existence of supplies needed for civilian consumption, local security considerations, and the relative position of MAF forces forward of PL TIGER and the location and activities of external threat forces.

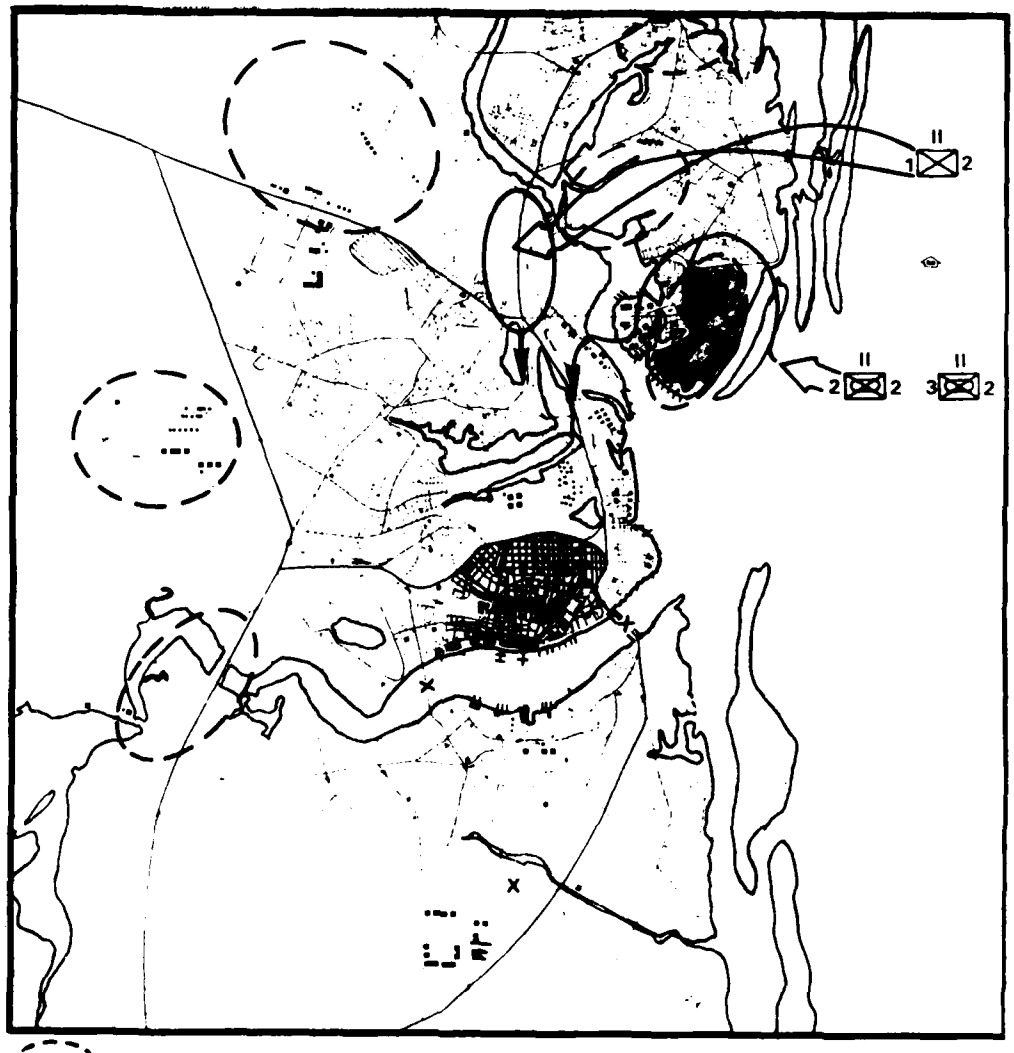


Figure III-23. Mission 3 - "Isolate and Contain" H-hour Operations

Concept of Operations - Current Time Frame

MISSION 4 - SEIZE A CORRIDOR

> THIS CONCEPT MAY BE PREFERRED WHEN THE CITY IS NOT AN OBJECTIVE BUT LIES ASTRIDE ROUTES TO LF OBJECTIVES (USMC STUDY SCN 30-77-01, p. 5-13).

Landing Force Mission

Commencing on D-day and no later than D+2, seize and secure a corridor through the city of SYN City and continue the attack to the northwest.

General Comments

This mission statement does not stipulate that SYN City be isolated and Aggressor forces contained therein, but the two missions are nearly indistinguishable because of the unique circumstances of the assigned analytical task. Due to the lack of suitable landing beaches in proximity to SYN City, it was not feasible to isolate and contain the MRB while concurrently landing the bulk of the MAF and its CSS element somewhere nearby. That Aggressor force had to be engaged and destroyed to secure a viable logistic base to support VII MAF operations to the northwest. As a consequence, "Mission 3 - Isolate and Contain" took on all of the characteristics of "Mission 4 - Seize a Corridor".

Tactical Considerations

In seizing a corridor, the Amphibious Task Force and Landing Force objectives are the same as for Mission 3. Both the port and Airfield 1 are crucial to VII MAF plans to continue the attack. The corridor to be seized can only be the LOCs from the port running northwest to and beyond Airfield 1. This corridor provides the only viable logistical base for major forces, and it includes the major airfield that will be essential for use by the Aviation Combat Element and for tactical and heavy airlift support and evacuation.

Concept of Operation - See Mission 3 "Isolate and Contain".

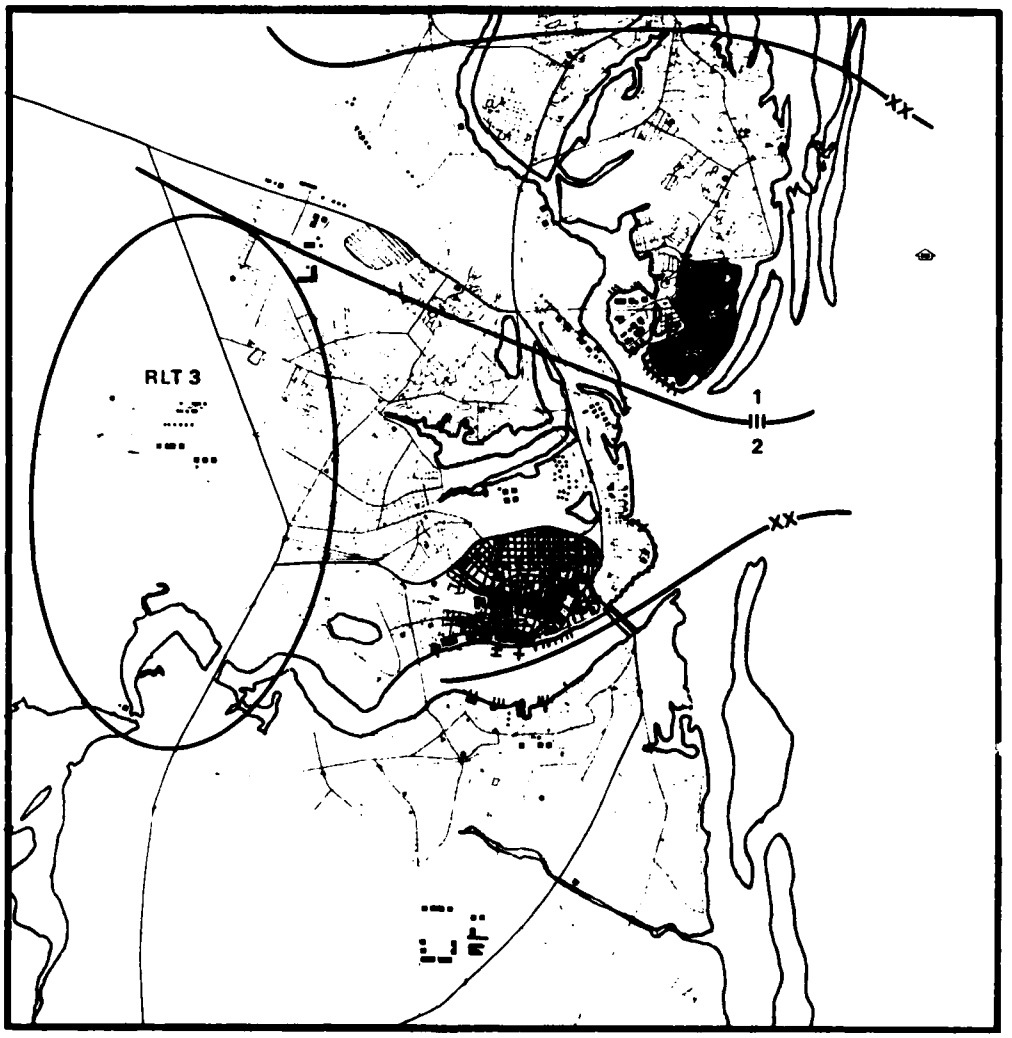


Figure III-24. Mission 4 - Seize a Corridor

Concept of Operations - Current Time Frame

MISSION 5 - REDUCE DEFENSES

> THIS CONCEPT IS LEAST LIKELY TO BE EMPLOYED DURING CONFLICT SITUATIONS. THIS CONCEPT CALLS FOR THE MAXIMUM APPLICATION OF MODERN FIRE POWER, TO INCLUDE UNCONVENTIONAL WEAPONS, UNTIL ORGANIZED RESISTANCE HAS ENDED. (USMC STUDY SCN 30-77-01 p. 5-14)

Landing Force Mission

Commencing on D-day until all resistance has ended or the enemy force surrenders, destroy all enemy forces located within SYN City.

General Comments

Marine Corps Study SCN 30-77-01 correctly points out that this concept is the least likely to be employed and that:

> "There are possible situations in which a Marine Corps LF with the mission of capturing or destroying a hostile force might isolate that force in an urban area and, if the force refused to surrender, resort to reduction of the area until resistance ended or the force surrendered. This concept would be adopted by an LF *should* all other means result in unacceptable Marine Corps LF casualties. The location and status of any nonhostile civilians would have to play a large part in the decision. During the midrange, a friendly innocent civilian population held captive by the hostile force would likely rule out use of this concept."

Heavy bombardment of SYN City would be authorized only as a last resort for two fundamental reasons:

- Despite the hostility of the population, heavy gunfire/bombing preparation of SYN City, however precise and discriminating it might be, would be perceived as inhumane and in violation of international humanitarian law applicable in armed conflicts. That international law, to which the US is an agreed party, is embodied in a series of Geneva Conventions and International Conferences of the Red Cross.

- Damage and rubble in the city would favor the defender, inhibit MAF mobility, restrict the use of facilities needed for CSS areas, and seriously impede combat and supporting operations.

In the context of the five offensive means to be investigated, the mission statement for reducing enemy defenses is based on the requirement for quick destruction of Aggressor forces in SYN City. Minimal damage to

civilians and civilian facilities must be assured. Under these circumstances, maximum use will be made of "discriminating" aerial and naval gunfire bombardment on D-day commencing at about BMNT when military targets can clearly be distinguished. Guided weapons will be used to the maximum degree possible, to include TOWs launched by attack helicopters. Conventional ordnance will be used when airborne FACs can observe and direct fire on military targets. Chemical weapons will be used, but only after wind direction in the target area has been determined and the SACC has approved each chemical attack. CS may be authorized in any area. Nonpersistent lethal agents will be restricted to military targets. These precautions are to minimize hazard to civilians and friendly forces and to maximize the impact on Aggressor forces. Targets within SYN City for VII MAF chemical attack are ATF Objectives 1 and 2 and the naval station. Targets outside the city include all Aggressor military forces.

Tactical Considerations

Unlike missions 1 through 4, the reduction of enemy defenses will be based on heavy, prolonged, daylight attack of known and suspected Aggressor positions. The comparatively massive firepower to be used will enable the Landing Force to strike more directly at the enemy forces using a smaller number of MAF ground combat forces. The probable use of chemical agents by VII MAF will likely result in retaliatory chemical or even nuclear attacks by the Aggressor within the FBHL ashore and at sea within the AOA. Protective equipment will be worn by all personnel ashore at all times, except that masks may be removed when conditions are clear and a detection and alarm capability is immediately available.

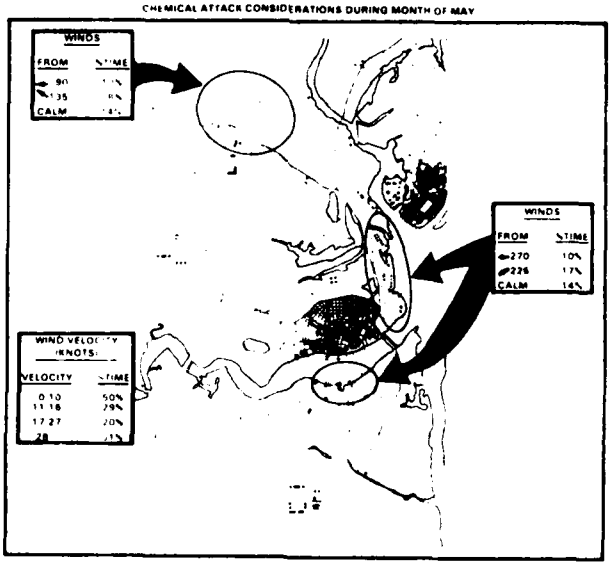


Figure III-25. Chemical Attack Considerations During Month of May

CHAPTER IV

CONCEPT OF OPERATIONS

MID-RANGE TIME FRAME

Concept of Operations - Mid-Range Time Frame

GENERAL SITUATION

THE GENERAL AND SPECIAL SITUATIONS SET FORTH IN CHAPTER III FOR THE CURRENT TIME FRAME REMAIN THE SAME AND APPLY TO EACH OF THE FIVE OFFENSIVE MISSIONS ASSIGNED TO THE LANDING FORCE IN THE MID-RANGE PERIOD. LANDING FORCE MISSIONS AND CONCEPTS OF OPERATIONS DIFFER IN VARYING DEGREES, HOWEVER, AND THE WEAPONS AND EQUIPMENT REFLECT ANTICIPATED CHANGES.

Threat forces in Southern Aggressorland and in SYN City are deployed in the same manner as in the current time frame. An MRD has the apparent mission of defending the southern part of the country to include the port of SYN City, landing beaches, lines of communications, and key urban areas. One motorized rifle regiment (MRR) of this division is located near SYN City with one of its battalions and a company of tanks in SYN City. Two 100-man Army garrisons and a 1,000-man force in the naval station are also available for the defense.

Aggressor Capabilities

NBC Warfare. The Aggressor forces are exceptionally well-trained and equipped for operating in an NBC environment. If chemical warfare is initiated, they can be expected to use chemicals to contaminate LF logistical complexes, MSRs, avenues of approach, and reserve formations. The ATF could also be attacked by chemical weapons. SCUD and FROG missiles with warheads containing persistent agents (to include VX, HD, BZ) can be fired on VII MAF airfields or command centers or used to seal off areas that Aggressor forces want to deny to US forces. Nonpersistent agents can be delivered by a variety of means to produce casualties, neutralize Aggressor objectives, or eliminate elements of the MAF antitank defense.

Armor. The Aggressor main battle tank in SYN City is either the T-72 or T-80. Both mount a 125mm main gun with an automatic loading system and both shoot on the move. The T-80 is believed to have composite armor and greatly improved range finding and target designation systems. Both MBTs have collective NBC defensive systems.

Night Operations. Aggressor forces are well-trained in night operations and are equipped with upgraded land navigation systems, night vision devices, and illumination. Their personnel within SYN City know the city layout and can also call upon local citizens to provide guides and other services needed in MOBA operations.

Radioelectronic Combat. Aggressor forces stress the use of REC to preserve and facilitate the use of their own command, control, and communications while denying the enemy the use of his. Aggressor REC capabilities, coupled with the constraining influences of urban combat in unfamiliar urbanized terrain will present significant problems for VII MAF commanders and staffs.

Logistics. Aggressor military forces in SYN City are well-supplied. They have well-dispersed, well-protected stockpiles of all essential classes of supply. Fortification material, wire, and mines of all types, including chemical mines, are available in major quantities within SYN City. There is virtually no intelligence information concerning amounts of food supplies in the hands of civilians or civilian retail or wholesale establishments.

Air Defense. The Aggressor forces within SYN City are believed to have at least nine man-portable air defense (MANPAD) systems of the SA-7 follow-on type similar to the US STINGER. The effective envelope of SA-4 and SA-6 SAM AD systems organic to or supporting the MRD include SYN City, and US aircraft will be subject to SAM attack when operating over the mainland.

Air Forces. Aggressor aircraft are not based at Airfield 1, but they can provide support in the SYN City area from airfields throughout Aggressorland. They can be expected to achieve local air parity or superiority on occasion. See ANNEX B (Intelligence) to Operation Plan 1-88 (Operation MID-BREAKER ONE).

Naval Forces. Aggressor surface naval forces are either at sea or in defended ports to the north and south of SYN City. They can harass but not seriously interfere with the ATF as long as the operation remains conventional. Their mining capability is impressive and could require a major mine sweeping effort to support conventional surface-landed operations. Aggressor air cushion vehicles are capable of delivering raiders or amphibious counterattack forces from the sea against the FBH.

Concept of Operations - Mid-Range Time Frame

INNOVATIVE TACTICS

TO GAIN THE MAXIMUM RETURN FROM THE INCREASED TACTICAL AVENUES OPENED BY THE LCAC, THE LAV, AND, TO A LESSER EXTENT, THE LVT-7A1 (OR LVTX), REALISTIC INNOVATION WILL BE REQUIRED OF COMMANDERS AND STAFFS.

Mobile Task Forces

- Cross-country mobility and protected firepower, substantial in both quantity and quality, will be required to intercept and defeat the enemy's armored/mechanized forces well outside SYN City, to keep Threat artillery out of effective range of key facilities in the FBH. The primary mobile unit will be a mixed battalion-sized task force (TF); if two or more such TF's are required, in a given sector, command and control could be exercised by a Regimental, Brigade or even MAF headquarters. Following are some illustrative mobile TF's:

Tank Bn TF	Inf Bn TF	Div Recon Bn TF
1-2 med Tk Co	2-3 Rifle Co	2-4 Recon Co
1-2 Rifle Co in LVTs	0-1 LAV or Tk Co	1-2 LAV Co
0-1 LAV Co	1 TOW Co	1 Arty Btry (Towed or SP)
1 Arty Btry (SP)	1 AAV Co	1 TOW Plt
1 TOW Det	1 Arty Btry	

Each type of organization would have different capabilities and limitations and should be employed accordingly. For example:

- The Recon TF should be employed in traditional cavalry roles such as scouting, screening, reconnaissance, flank and rear protection, delaying actions and raids. This TF can force an enemy column to deploy and mass, thus losing time and becoming more vulnerable to air and artillery strikes. When configured with towed artillery, all elements of a Recon TF can be transported by helicopter, thereby increasing both its range and flexibility.

- The Tank-Heavy TF provides the MAF (or MAB) Commander with a powerful mobile force. Properly employed with "Cavalry" and/or Infantry TF's and supported by Tac Air, attack helicopters, and artillery, a Tank TF should be able to stop and then defeat a larger enemy tank or mechanized force.

- The Infantry TF, even mounted in AAVs, will possess less battle field mobility and agility than the other illustrative TFs, except when helicopter (or LCAC) transported. It will act as the anchor or maneuver pivot for Cavalry and Tank TFs and as an antitank "shield" for the more mobile "sword". It can take and/or hold defiles/obstacles, as well as seize and hold airheads/bridgeheads until reinforced.

Task Force Type	Roles
Recon TF	Cavalry • Recon • Screen/Cover • Protect Flanks/Rear • Delay/Attrite/Deceive • Raid/Pursue
Tank-Heavy TF	"Sword" • Attack • Mobile defense • Counterattack • Breakthrough/linkup
Infantry-Heavy TF	"Shield" • Seize/hold obstacles and difficult terrain • Anchor and pivot for maneuver of Recon and Tank TFs • Antitank shield • Establish air/beachheads

Figure IV-1. Flexible Organizations/Innovative Tactics

Concept of Operations- Mid-Range Time Frame

1990 CAPABILITIES

THREAT FORCES WILL UNDERGO EVOLUTIONARY RATHER THAN REVOLUTIONARY IMPROVEMENTS OF MATERIEL AND EQUIPMENT BY THE MID-RANGE TIME FRAME; IN TWO KEY AREAS NEW US EQUIPMENT WILL CLOSE CAPABILITY GAPS WHICH CURRENTLY EXIST (ACCELERATED FUNDING COULD SIGNIFICANTLY ALTER/IMPROVE THE US POSTURE).

The Threat

By 1990 it is unlikely that the Threat forces will have made a quantum leap forward in conventional capabilities. The advances in armament, vehicles, target acquisition, and combat equipment will be roughly comparable with US product improvements. Both sides will possess the enhanced capability of moving and fighting more effectively at night and in poor weather.

As was the case in the scenarios "played" with 1981 doctrine and force structures, BDM analysts have concluded that the primary threat to US forces will be posed by local and general reserves located outside of SYN City. The more immediate threat is from the north and northwest while the greater, if more slowly developing, threat is from the south. The problems facing US forces will increase proportionally with the number of enemy reinforcements which are able to fight and/or infiltrate their way into SYN City. Enemy artillery (tube and rocket) is a threat to both air and sea bases in the city.

US Forces

The only projected equipment/weapons which will make possible a truly significant leap in US operational capabilities are limited to two (2) in number; the Threat forces already possess these capabilities in 1981.

The first major asset will be the Landing Craft, Air Cushion (LCAC) which will more than quadruple the potential amphibious landing sites worldwide and can clear a four-foot obstacle at up to 50 kts. The LCAC can lift the largest US tank, the M-1 (Abrams).

The LAV, or light armored vehicle, will provide US Marine commanders with a much larger scope of tactical flexibility since it will be helicopter transportable, using an upgraded, heavy-lift helicopter. That capability will permit quicker amphibious assaults and other offensive operations and deeper mobile defense of airheads and beachheads as well as multiple small but hard-hitting airmobile raids. HQ USMC has not yet determined the operational role of the LAV or their mix with tanks (M60A3 and/or M-1) in mechanized task forces.

The LVT-7A program will carry that amphibious assault family into the 1990's. Concurrently a program has been proposed to design and test a vehicle that possesses both the favorable characteristics of the LVT-7 and ashore mobility and firepower capabilities, the Landing Vehicle Tracked Experimental (LVTX). If such a hybrid vehicle is developed and in the units by 1990, it is not likely that it will have the dramatic impact of the LCAC and the LAV on tactics. In order to fulfill both the amphibious assault and ground combat roles, the LVTX will probably be larger, heavier, less mobile and more vulnerable than either the Infantry or Cavalry Fighting Vehicles.

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*USMC, LFOSS, 1979 pp. 2-98 and 2-99.

US	EQUIPMENT	THREAT
• By mid-1980's 1st LCAC introduced to fleet • By 1990 LCAC could be available to all afloat units	Heavy Lift, Air Cushion Landing Craft (LCAC)	• Introduced operational Air Cushion Vehicles (ACVs) in 1969 • Currently has 3 classes of ACVs in fleet
• Mobile Protected Weapons System (MPWS) available to USMC Tank & Recon Units by 1990 • To be used as light tank and/or assault weapon	Light Armored Vehicles Transportable by Helicopters	• In early 1978 Threat helicopters lifted light tanks behind Somali positions in the Ogaden Mountains; won war quickly

Figure IV-2. 1990 Capabilities

Concept of Operations - Mid-Range Time Frame

ASSAULT TEAMS

DURING URBAN FIGHTING, SMALLER MIXED ASSAULT TEAMS MUST BE TASK ORGANIZED FOR EACH SPECIFIC SHORT-RANGE MISSION: IN MOST CASES THE NUCLEUS OF THE ASSAULT TEAM WILL BE A RIFLE COMPANY REINFORCED BY ENGINEERS, ARMOR, AND OTHER REQUIRED WEAPONS, EQUIPMENT AND SPECIALISTS.

It is unlikely that there will be any major changes in the tactics and techniques of urban warfare by 1990. Technological advances, on balance, are as likely to assist the defender as they are the attacker. Increased proficiency in military operations in built-up areas (MOBA) is possible, however, through refinement of current tactics and techniques, more realistic training, and more attention devoted to small unit deception.

In October 1973 the Israelis paid a heavy price, in Suez City, for poor intelligence and for lack of doctrine and experience in urban warfare. A mixed tank/paratroop force tried to capture the city by a coup de main and was cut to pieces. "Within minutes twenty of the twenty-four tank commanders... were killed or wounded...Suez was a grave error costing some eighty killed."*

House-to-house fighting requires very close coordination between infantry, engineers, tanks/assault weapons and other supporting arms. Depending on the circumstances, and on forces available, tanks or LAVs will be attached to or in direct support of infantry units with the higher priority missions/objectives; a section (2 to 3) or a platoon (5) of either will often be attached to an assault company, and other available direct fire weapons also will be attached, e.g., flamethrowers. In certain cases direct fire by armor-protected SP Artillery (155mm or 8") may be employed to destroy or neutralize difficult positions.

The US military should analyze carefully, and possibly adopt, the venerable German concept of "Schwerpunkt" - point of main effort;** in contrast, US units too often spread resources and effort more evenly across a unit sector. Even a narrow break-in permits a deeper exploitation and/or attacks on other strongpoints from the flanks or rear.

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* Herzog, Chaim, The War of Atonement, pp. 249-50; see pp. 4-16 RB100-2 Vol I USACGSC

** The Schwerpunkt concept is still used in the modern Bundeswehr and is one of their guiding principles in urban warfare.

Well thought-out deception plans should be employed down to battalion, and even company, level in order to deceive the enemy as to the time, location, and/or mode of assault. The proper use of smoke and supporting fires, as well as other sight and sound images, will permit the concealment of the chosen "Schwerpunkt" until the last possible moment.

During the 1968 "Tet Offensive" in Vietnam, helicopters were often quite helpful in Saigon, Hue, and other cities in both fire support and mobility roles. (It should be noted, however, that SA-7 antiair missiles were not employed by the NVA and VC, in significant numbers, until the 1972 "Easter Offensive".) Helicopters will still be useful in 1990 urban warfare, but their employment will have to be better planned and more tightly controlled. A sound tactician will retain a surprise vertical assault/raid in his "playbook."

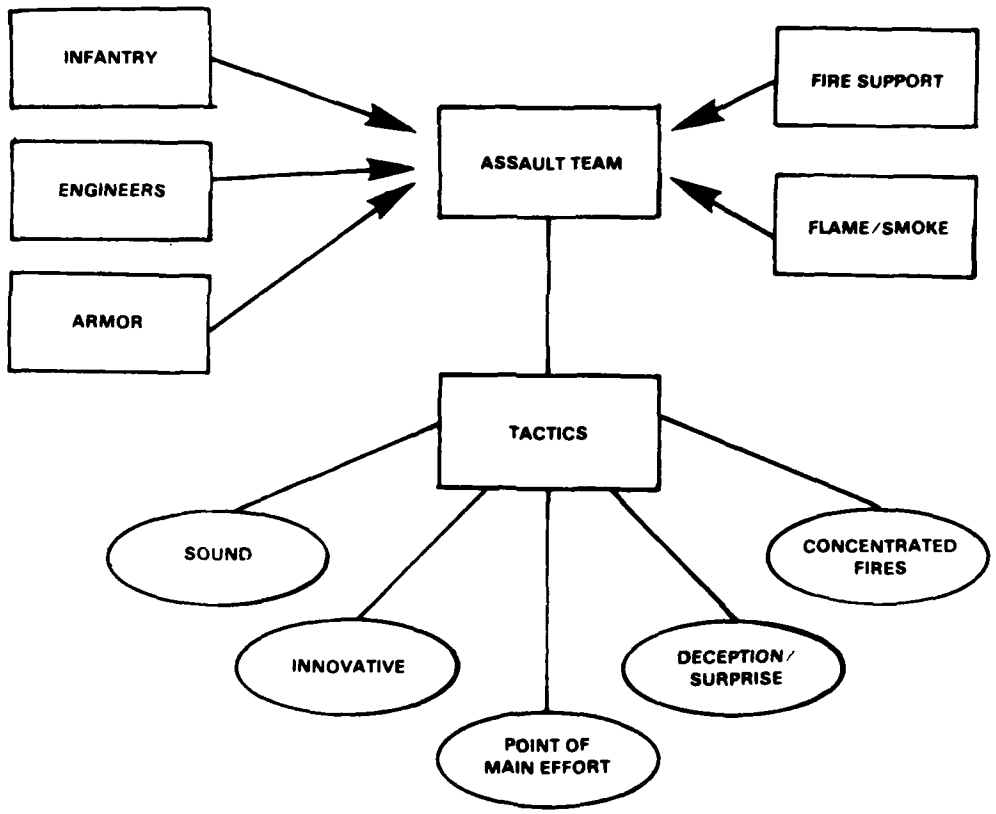


Figure IV-3. Urban Warfare

Concept of Operations - Mid-Range Time Frame

OTHER TACTICAL GAMBITS

PROJECTED WEAPONS/EQUIPMENT, SUCH AS THE LAV, WILL PERMIT US COMMANDERS TO CONDUCT DEEPER AND BOLDER ARMOR/ARTILLERY RAIDS; SUCH RAIDS, IN TURN, WILL COMPLEMENT AND SUPPLEMENT DECEPTION PLANS WHICH MAY WELL PROVIDE THE MARGIN BETWEEN VICTORY AND DEFEAT.

Raids

Properly planned and conducted raids can produce results well beyond those normally expected of small forces. Raids can be employed to achieve deception, delay, attrition, morale, and Psy War objectives. A helicopter transportable LAV will increase, significantly, the range and potential of even small raiding forces. For illustrative purposes, a raiding team could be built around two to five LAVs and include a squad or platoon of Division Recon troops or regular riflemen. For "artillery raids" a platoon (two to three pieces) of towed artillery could be included in the team. The raiders could be inserted by helicopter to attack by fire targets such as enemy reserves, headquarters, artillery, supplies, lines of communications, etc. The teams could create and/or defend obstacles to slow enemy reserves. A team of engineers would be useful in creating obstacles. When the mission is accomplished the team could be extracted by helicopter or exfiltrated on the ground with the LAV towing the artillery and/or riding the infantry. Three such raids will be conducted in the operation to seize SYN City.

Deception Operations

An intelligent and logical deception operation will be required about 60 km to the south of SYN City to pin down or delay reinforcement by the enemy Motorized Rifle Div (-) units in that vicinity for at least 24 hours. The tactics discussed in the preceding paragraphs will assist in "painting" the desired "picture" for the enemy commanders, as will sound EW and Psy War programs. Tac Air and NGF support must be employed on a significant and well-thought out scale. All or part of the floating reserve, and also empty amphibious craft, must be employed. It may be necessary to conduct an actual amphibious/helicopterborne assault to complete the deception, possibly towards dusk with apparent "reinforcement" (but actual evacuation) conducted during the night. Well-conceived and led helicopterborne and ground raids will assist in spreading confusion and alarm. A false airmobile and parachute assault will be conducted west-northwest of the main airfield. Dummy LAVs plus automatic sound and flash devices will be used to add to the confusion. The deception objectives will be achieved if the enemy reserves are delayed and then massed sufficiently to present good targets for Tac Air, attack helicopters, and NGF.

Feints at landings also will be made directly towards the SYN City waterfront and to the north of the city in order to divert attention, fire, and reserves from actual landings elsewhere.

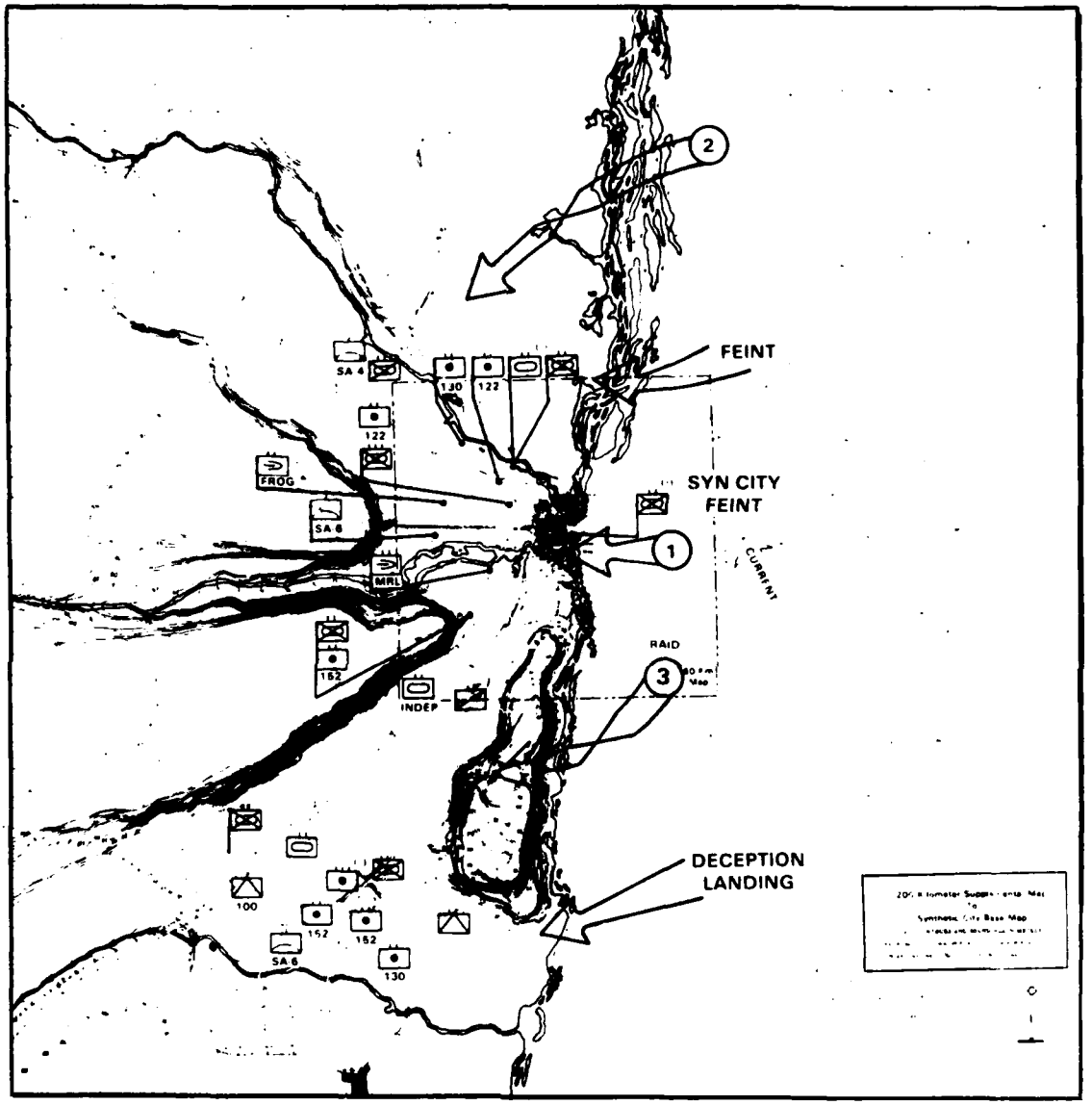


Figure IV-4. Mid-Range Deception Operations

Concept of Operations - Mid-Range Time Frame

ASSAULTING SYN CITY IN 1990

THE MAIN THREAT FACING AN AMPHIBIOUS ASSAULT AGAINST, OR NEAR, SYN CITY WILL COME FROM ENEMY TANK/MECH/ARTY UNITS WITHIN AN EIGHT HOUR MARCH OF THE CITY. BDM ANALYSTS HAVE CONCLUDED THAT THE CRITICAL AREA INITIALLY WILL BE IN THE NORTH/NORTHWEST, WHILE LATER A LARGER THREAT WILL DEVELOP IN THE SOUTH/SOUTHWEST.

The Problem

Of the 17 enemy Maneuver Battalions within an eight-hour march of SYN City, only one reinforced Motorized Rifle (Mechanized) Battalion is estimated to be in the city proper on D-day. The remaining 16 maneuver battalions and their supporting artillery are the primary ground threat to an assault on SYN City. This central fact must be recognized in planning operations to carry out all five of the possible missions.

Six of the reinforcing battalions (including two tank battalions) threaten the northern sector while ten (including five tank battalions) constitute the larger but later developing threat in the south.

These formidable reinforcements must be delayed, attrited, and finally defeated decisively, preferably outside of the city, before any of the major aims of the campaign can be achieved fully.

The Counters

In delaying and attriting the enemy reinforcements, a well-conceived and executed deception plan is essential. In addition to the maximum use of EW & Psy War, feints, demonstrations, airmobile raids and even a temporary diversionary landing (well to the south of SYN City) will be employed.

Attack aircraft and helicopters also will be employed to attrite and delay the enemy reserves. But enemy defensive weapons and tactics will reduce the effectiveness of attacks from the air as will his movement during night and bad weather. Closer to SYN City, artillery fire will be used to supplement air attacks; new munitions such as "Assault Breaker" and scatterable mines will assist in the delaying/attriting action.

Mobile armored ground forces also will be required in adequate quantity and quality to ensure that the enemy armored/mechanized forces are defeated before they seriously endanger the landings, buildup, and assault. LAV assault guns and other LAV variants (transportable by CH53E helicopter) will provide the US ground commander with additional flexibility and mobility. Such agile combat vehicles will complement (but not replace) the better protected and more powerful main battle tanks. Close-in defense

against the enemy armor will be provided by such antitank missiles as TOW and DRAGON (and/or their follow-ons) and by more conventionally emplaced antitank mines. All of these means must be employed based on accurate and timely intelligence and controlled by effective C^3.

THE MAJOR THREATS

NORTH	TIME	SOUTH
1 Tk + 2 Mech Bn	0 - 1 Hour	1 Mech Bn
	(Plus)	
1 Tk + 3 Mech Bn	4 Hours	1 Tk + 1 Recon Bn
	(Plus)	
0	8 Hours	4 Tk + 3 Mech Bn
2 Tk + 5 Mech Bn	(Total)	5 Tk, 4 Mech & 1 Recon Bn

Notes:
1. The reinforcement times given represent the worst case for US forces and do not consider delays caused by deception operations, raids, decision making, preparation of orders, obstacles, air/arty attacks, and so forth.
2. There also will exist a significant artillery threat to SYN City which will increase over time.

Figure IV-5. Aggressor Threat to SYN City Operations

Concept of Operations - Mid-Range Time Frame

MISSION 1 - DELIBERATE ASSAULT

> THE DELIBERATE ASSAULT IS USED...WHEN THE MISSION REQUIRES THAT AN URBAN AREA OR SECTOR(S) BE CLEARED OF THE HOSTILE FORCE AND THE LOCAL POPULATION IS UNCOOPERATIVE. (USMC Study SCN 30-77-01)

Landing Force Mission

Commencing on D-day and no later than D+10, seize and occupy the city of SYN City; on order, be prepared to defend the city or to continue the attack to the northwest.

The Concept Plan

In Volume II: Operation Plans, the deliberate assault mission was used as the basis for developing a complete operation plan. Four additional missions were addressed in outline plan format only. Because the mid-range family of Operation MID-BREAKER plans is influenced by some new organizations and equipment, a concept plan was developed for the deliberate assault mission. By its definition, a concept plan tends to include greater input from the general staff than does an outline plan. The DOD Dictionary, JCS Pub 1, describes an outline plan as a preliminary plan which outlines salient features of a course of action prior to initiation of detailed planning. JOPS Volume I describes a concept plan as an operation plan in abbreviated format i.e., the basic plan. Generally, an outline plan is prepared by the J-3/J-5 (G-3/G-5) whereas a concept plan has inputs from other staff agencies and, when required, other participants in the plan.

Concept Plan 1-88 (Operation MID-BREAKER ONE) constitutes VII Composite MAF planning guidance as the basis for staff action and concurrent planning by subordinate commands. It is a preliminary plan in abbreviated format which outlines salient features of the concept for an amphibious assault operation into the SYN City area of Aggressorland.

General Concept of Operations

Prior to D-day, Advance Force and Demonstration Group operations will be conducted to fix enemy forces in place in Southern Aggressorland. The Landing Force/VII MAF (TF 59) lands on D-day by helicopter and surface means in the SYN City area of Aggressorland; isolates the city and seizes beach, port and airfield facilities within the FBH; defends the FBH, and prepares to continue the attack to the northwest.

Advance Force Operations

Beginning on D-5, Advance Force operations will commence, directed against Southern Aggressorland. Theater-based Landing Force aviation and

Attack Carrier Striking Force (TF 57) will attack Aggressor forces, installations and facilities to destroy enemy forces and supplies, disrupt lines of communications, and prevent Aggressor reinforcement of the SYN City area. Air operations will be conducted to gain air superiority without revealing that the Landing Force Objective is SYN City. Damage to the city will be minimized to prevent creating obstacles that will interfere with Landing Force operations. The Advance Force will support essential UDT and MAF reconnaissance operations during this period.

Deception Operations

Helicopterborne artillery raids will be conducted approximately 40 km northwest and 40 km southwest of SYN City on D-1 to fix Aggressor forces in place and identify targets for attack by the Advance Force and supporting Theater-Based Aviation. A demonstration landing is planned for D-1 by elements of the VII MAF Reserve, to be coordinated with the raid operations taking place at about the same time. On D-day, additional deception operations are scheduled. A dummy parachute drop is planned northwest of SYN City prior to H-hour supported by Military Airlift Command. A company-sized raid is planned approximately 20 km north of SYN City beginning six to eight hours prior to H-hour. Terrain selected for this raid must be such that a company can be expected to defend it successfully throughout D-day, and sufficient air and naval gunfire assets will have to be provided together with the requisite fire support personnel and communications. Additional feints will be executed by CATF, if desired, using ships of the ATF that are not committed to the immediate assault landings.

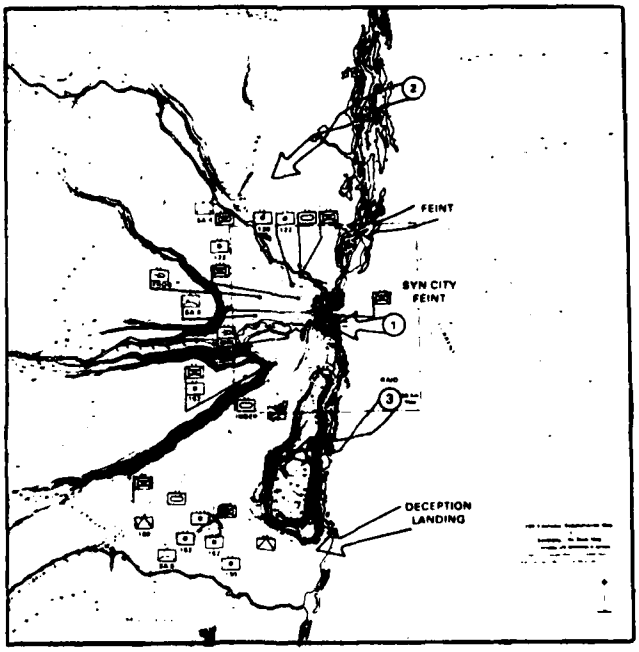


Figure IV-6. MID-BREAKER Deception Operations

Concept of Operations - Mid-Range Time Frame

Mission 1 - Deliberate Assault (Continued)

Detailed Concept of Operations

Phase I of Operation MID-BREAKER ONE consists of the Advance Force and Deception Operations described, and these occur between D-5 and D-day. Force Reconnaissance teams will be inserted during this period to observe and report on the major Aggressor forces and installations outside of SYN City. The insertion of Force Reconnaissance teams into the primary and alternate LZs will take place either late on D-1 or early on D-day. These personnel will parachute into the LZ areas wearing protective clothing and gas masks and will be equipped with NBC monitoring equipment and signal devices to enable them to function initially as LZCPs. Phase II includes D-day operations in which helicopters, LVTs, and LCACs are used to transport forces conducting assault operations to isolate SYN City, establish a beachhead, and destroy Aggressor forces within the city. Phase III comprises the period D+1 through D+3 in which the Landing Force seizes the FBHL. Phase IV includes the period D+4 through D+10 in which isolated pockets of Aggressor resistance within the FBHL are eliminated, Aggressor reinforcing units are attacked and attrited, and VII MAF conducts an active defense of the FBHL to facilitate port and airfield rehabilitation to accommodate the necessary logistics buildup and entry of follow-on forces to support a breakout and attack to the northwest.

Landing Force Ground Combat Element (7th MarDiv - TG 59.1)

Details of RLT/BLT-level tasking would appear in the 7th MarDiv Oplan. The VII MAF Oplan reveals only the broadest details. The division has specifically been tasked in Oplan 1-88 to conduct helicopterborne and surface assault landings at H-hour on D-day to seize ATF Objectives 1 and 2 and LF Objectives A, B, C, and D. The division is further directed to seize and occupy government, communications, and utilities installations within SYN City; establish control over Phase Line TIGER; seize, occupy, and defend the FBHL on order; be prepared to establish blocking positions and conduct artillery raids outside the trace of the FBHL; and prepare to continue the attack to the northwest.

The scheme of maneuver depicted in Oplan 1-88 reflects a heliborne landing of assault elements of the Light Armored Assault Battalion (LAA Bn) which, according to a recent NAVY TIMES article, could include 144 LAVs and LAV variants. In this scenario, the rationale for this commitment is to place a light, mobile, armored force deep inland, beyond ATF Obj 2 (Airfield 1) so that the force can attack the defenders from an inland flank. The rate at which combat power can be built up in this manner will relate directly to the number of operational heavy-lift helicopters which are available in the mid-term. Two squadrons of 16 aircraft each (CH53E) are assumed to be available to VII MAF. Medium helicopters are available in sufficient numbers to lift light infantry assault troops.

The VII MAF operations overlay for Operation MID-BREAKER ONE shows the 1st Tank Battalion landing by LCAC north of RED Beach in conjunction with the landing of RLT 2 over RED Beach in LVTs (A1 or X model). This concept has the advantage of placing a strong, balanced, mechanized combined arms team (MCATF) ashore rapidly, but it has an important disadvantage which derives from the long period of time that landing forces are exposed to enemy observation and fire while the LVTs swim ashore. An alternative is to embark three LVTs in each of several LCACs, embark the desired mix of tanks, SP artillery, LAV Assault Guns, or MPWS in other LCACs (depending on the total number available to the Landing Force) and conduct a surprise landing utilizing the 50-knot speed and 80-mile range of the LCAC. See the section on Embarkation for a further discussion of this concept.

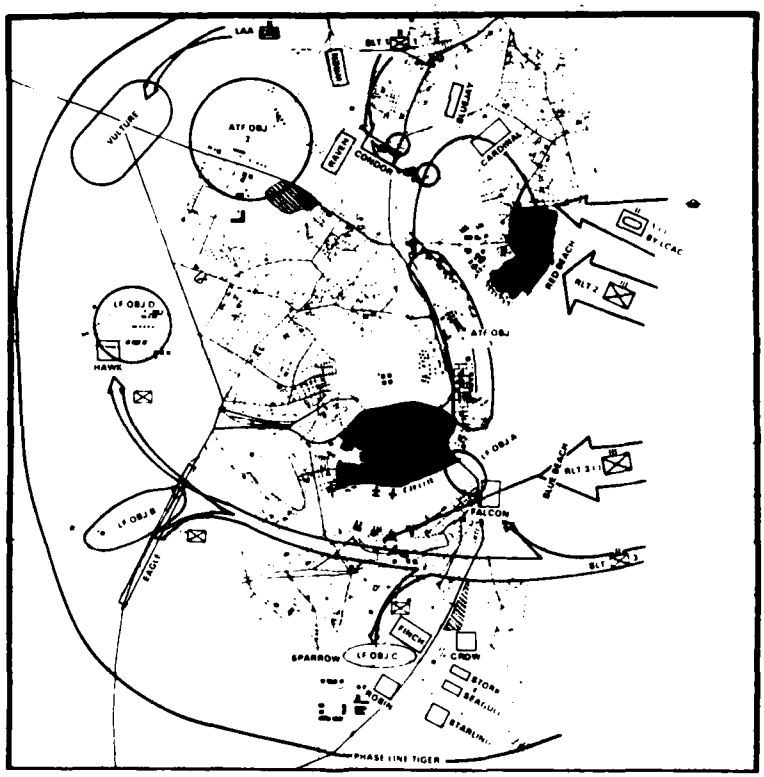


Figure IV-7. L- and H-Hour Operations - MID-BREAKER ONE

Concept of Operations - Mid-Range Time Frame

Mission 1 - Deliberate Assault (Continued)

Air Support Concept of Operations

The concept of air support operations in the mid-range period does not differ materially from that described for Operation BREAKER in the current time period. Principal differences will stem from introduction of the F/A-18 Hornet, the CH-53E heavy-lift helicopter, and the AV-8B Harrier with its improved range and payload. One of the criteria for the SYN City scenario is that the friendly forces will not enjoy air superiority at all times. When this factor is coupled with the improving enemy air defense capabilities, it becomes clear that only restricted air support can be expected for ground operations conducted within the metropolitan area.

The fixed-wing squadrons of VII MAF's Aviation Combat Element will provide air support from theater airfields initially. Depending on the tactical situation and the Aggressor air combat capabilities, 7th MAW fixed-wing units can begin phasing into the FBH by about D+3, using a 5,000' minimum operating strip (MOS) at Airfield 1. An 1,800' expeditionary air base can be ready for operation at Airfield 2 between D+8 and D+12, depending on the amount of damage that might be inflicted by the Aggressor forces. (See Chapter V - Engineer CSS-Horizontal Construction)

Helicopter and V/STOL aircraft will provide support from LHAs and LPHs until about D+4. They will rearm and refuel ashore during the day, as soon as those CSS capabilities exist, to shorten the time required to respond to requests for support.

Combat Service Support Concept of Operations

The most conspicuous impact on CSS operations in the mid-range time frame stems from the LCAC. Its 75-knot speed over water gives it remarkable tactical and logistical capabilities. The ability to negotiate mild gradients and move directly to inland beach support areas makes it possible to reduce the numbers of personnel and equipment needed in the beach area while simultaneously cutting transit and handling time substantially.

As in the current time frame, two BSAs are planned initially. They will be absorbed by two CSSAs as soon as the tactical and logistical situations permit, but supply levels will be kept to about 3 DOS. Vulnerability to enemy fire must be considered, and the LCAC fleet is capable of rapid delivery of emergency and routine resupplies. After D+11, CSSA 1 in the main port area will increase its stockage level commensurate with the tactical situation, daily consumption rates, and evolving plans for continuing the attack to the northwest. The anticipated stockage level in CSSA 1 is 15 DOS during Period VI (D+11 to D+30). Throughput of 30 DOS will commence as soon as CSSAs are established northwest of SYN City.

As in the current time frame, one of the principal problems facing logisticians will be the selection and construction of suitable ammunition dumps and ASPs for the prescribed tonnages of ammunition. This problem can be ameliorated in the mid-term period through extensive use of the LCAC and the heavy-lift helicopter, thus providing the potential for reducing substantially the tonnages of ammunition stored ashore.

The problem of delivering emergency bulk fuel stocks from ship to shore and then to inland fuel farms will be eased by the LCAC. Mobile-loaded fuel systems can readily be transported by air cushion vehicle as can palletized bladders and fuel containers of various descriptions. The DRACONE fuel system will also be used to store POL immediately offshore initially and in the North and South Rivers after consolidation of the city.

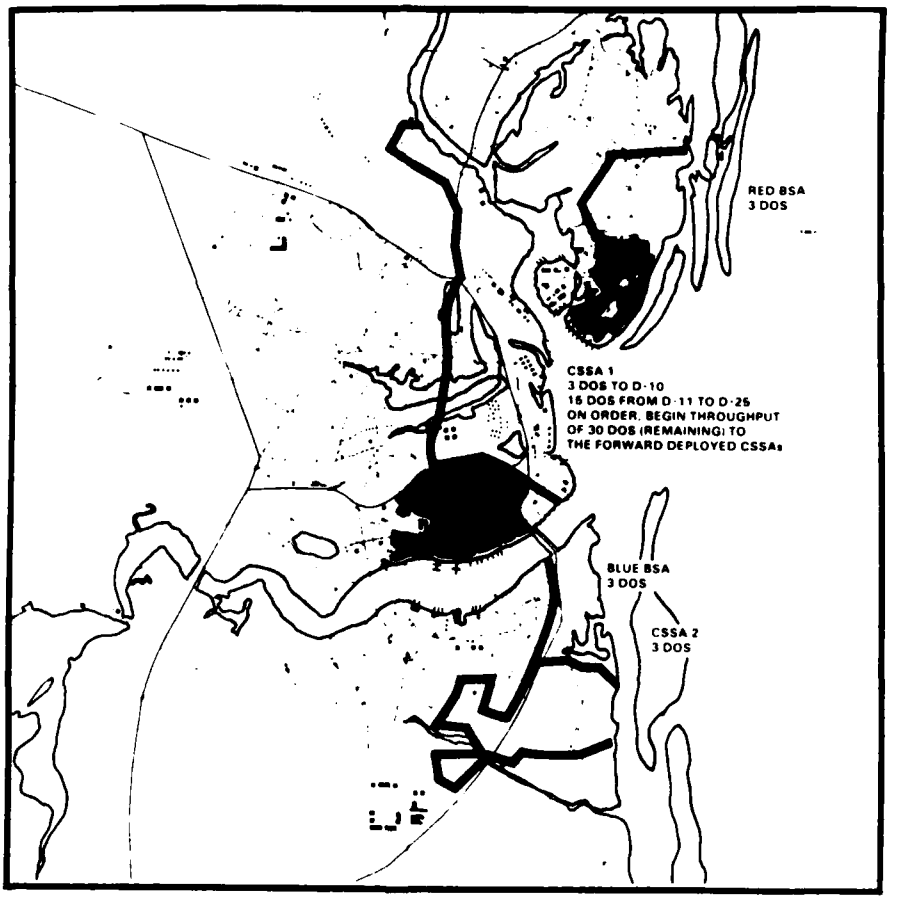


Figure IV-8. CSS Concept - MID-BREAKER ONE

Concept of Operations - Mid-Range Time Frame

MISSION 2 - SEIZE KEY OBJECTIVES

SEIZURE OF KEY OBJECTIVES IS CONTEMPLATED IN SITUATIONS THAT REQUIRE QUICK CONTROL OF AN URBAN AREA (USMC Study SCN 30-77-01).

Landing Force Mission

Commencing on D-day and no later than D+10, seize and control the city of SYN City; on order, be prepared to defend the city or to continue the attack to the northwest.

General Comments

This mission statement differs from that of the "Deliberate Assault" mission in only one respect: it requires the Landing Force to "seize and control" rather than "seize and occupy" the city.

In both missions an early requirement is isolation of the city to prevent reinforcement and minimize the amount of urban fighting that will be necessary. Availability of the heavy-lift helicopter and LCAC in the mid-range period enables the Landing Force to maneuver to control the objective area to a better degree than is possible in the current period. Several options are available. For example, using only LCACs and helicopters for the initial assault elements, two rifle companies and six tanks plus several light vehicles could be landed north of RED Beach by LCACs (where no resistance is expected); simultaneously with the landing of the assault elements of the LAA Bn west of Airfield 1 by CH-53E. The speed of these helicopters and air cushion vehicles is such that tactical surprise can be achieved. A landing of this nature would likely present problems to the defender in terms of assessing the nature of the entire operation.

Conversely, the LCACs can be used initially to lift tanks, SP artillery, and other vehicles following an assault by LVT-mounted infantry.

Tactical Considerations

The Amphibious Task Force and Landing Force Objectives are the same as for the deliberate assault. The ATF objectives will provide the port, harbor, and airfield facilities needed to support operations to the northwest. The LF objectives were selected to assure isolation of the city and prevent its reinforcement. Advance Force operations are planned for D-3 through D-1 to gain air superiority and conduct covert reconnaissance of offshore and beach areas and such countermining as might be required at RED and BLUE Beaches.

L-hour Operations

The 7th MarDiv will be prepared to land raiding parties from the Division Reconnaissance Battalion at L-hour to neutralize the two Army garrisons abutting the deep channel entry to the port. (It should be noted that reconnaissance personnel from the 1st Marine Division were engaged in amphibious combat raids in Korea in 1950. Although reconnaissance personnel are not normally used in this role, their amphibious specialty and T/E enable them to be used in this capacity when the situation demands.) The landing of the raiding parties will coincide with the L-hour heliborne landing of assault elements of the LAA Bn at ATF Obj 1 (Airfield 1) and the heliborne landings of company-sized units from BLT 1/3 to seize LF Objectives A, B, C, and D.

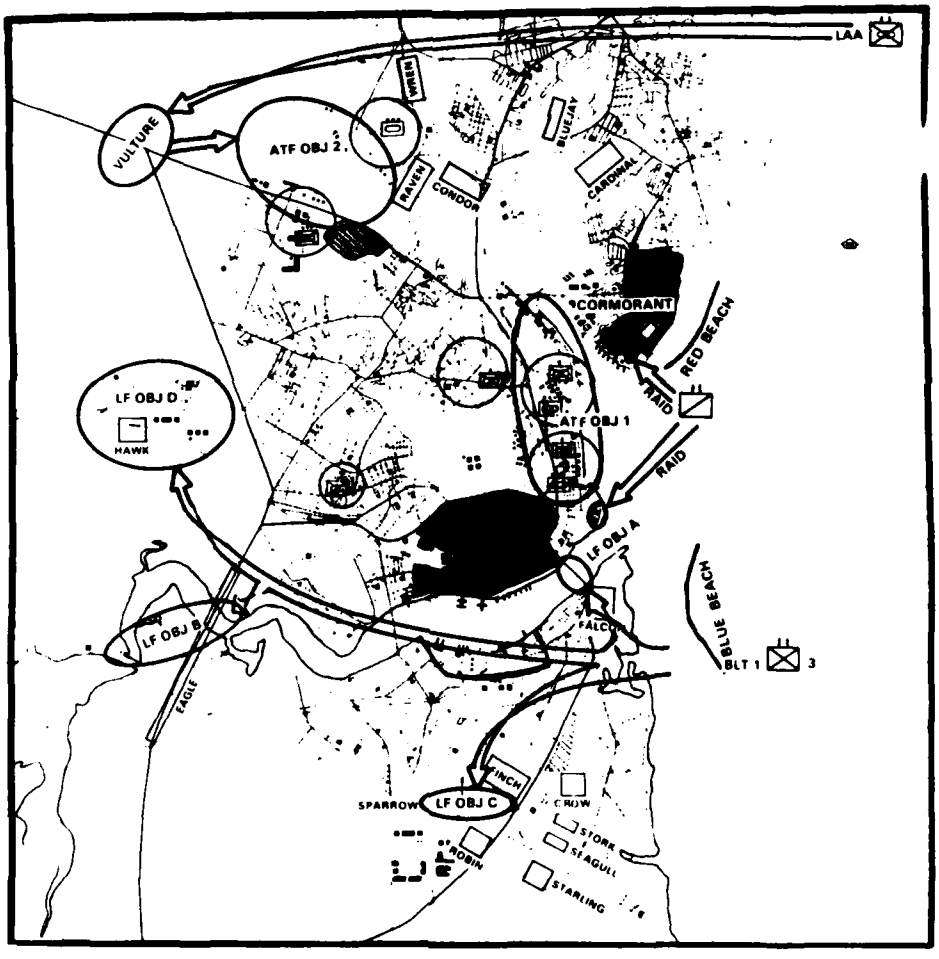


Figure IV-9. Mission 2 - Seize Key Objectives - L-Hour Operations

Concept of Operations - Mid-Range Time Frame

Mission 2 - Seize Key Objectives (Continued)

H-hour Operations

At H-hour, BMNT, surface assault landings will be executed over RED and BLUE Beaches by LVTs and LCACs, placing mechanized combined arms task forces (MCATF) ashore to isolate old city, the port area, and the naval station. These forces will link up with the heliborne forces that isolated the metropolitan boundary and major approaches to the city. Government facilities and communications and utilities installations will be seized.

Operations Ashore

Upon completion of link-up operations, the division will deploy MCATFs to seize key terrain on the FBHL. The irregular and rugged nature of terrain surrounding SYN City limits the number of terrain features that must be held to provide for the isolation and defense of SYN City area. For this reason, the 7th MarDiv has been tasked to be prepared to establish blocking positions and conduct artillery raids outside the trace of the FBHL in accordance with the active defense policy that has been announced.

Accomplishment of this mission in the mid-range will require the establishment of defensive positions south of South River to give depth to the FBH.

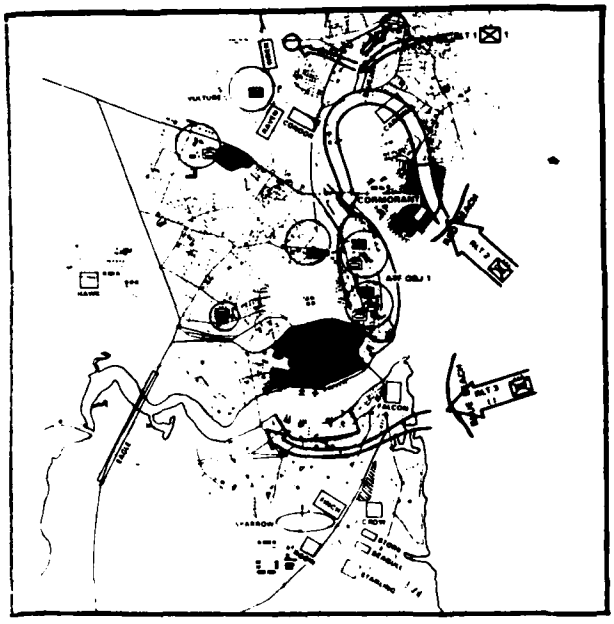
Air Support Operations

There are no differences in the concept of air support for Mission 2 when compared to Mission 1, except for the decrease from five to three days for Advance Force operations in which Theater-Based Landing Force Aviation will be employed.

Combat Service Support

Austere beach support areas (BSA) will be established on RED and BLUE Beaches. Two causeways will be established at RED Beach on D-day and a pontoon rafting service will be employed at BLUE Beach. After the assault landings have been completed, LCACs will be used extensively to deliver heavy equipment and supplies directly to BSAs. Where possible, mobile-loaded supplies will be used pursuant to the availability of transportation assets phased ashore during this time period. After seizure of the main port area, maximum use will be made of those facilities which can be converted to LF use. Care will be exercised to take custody of and safeguard installations and supplies that will be needed to support the civilian populace in the SYN City area.

H-HOUR OPERATIONS



COMBAT SERVICE SUPPORT

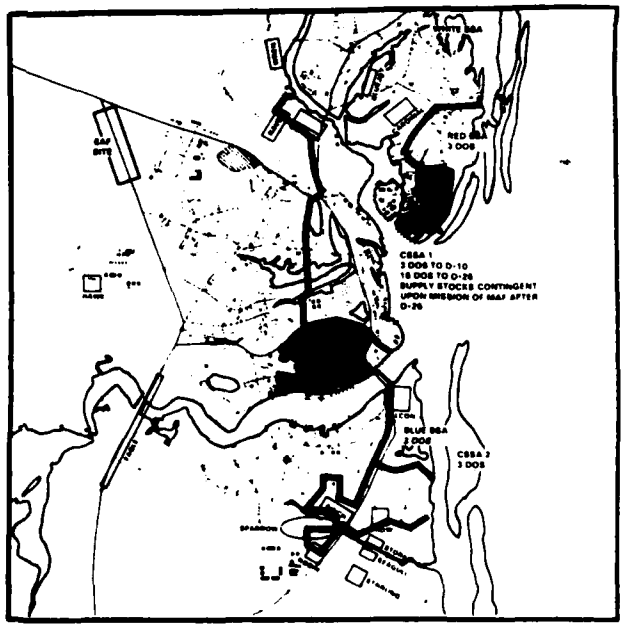


Figure IV-10. Mission 2 - Seize Key Objectives - H-Hour Operations and CSS Concept

Concept of Operations - Mid-Range Time Frame

MISSION 3 - ISOLATE AND CONTAIN

THIS IS A CONCEPT FREQUENTLY EMPLOYED IN PAST CONFLICTS WHEN A FORCE OCCUPYING AN URBAN AREA IS BYPASSED BY ATTACKING FORCES WHICH LEAVE SUFFICIENT TROOPS BEHIND TO CONTAIN OR "BOTTLE UP" THE OCCUPYING FORCE, PERMITTING THE ASSAULT FORCES TO CONTINUE THE OFFENSIVE TO ATTACK OBJECTIVES BEYOND THE OCCUPIED CITY. THIS CONTAINMENT CONCEPT COULD BE EMPLOYED AS PART OF THE LANDING FORCE CONCEPT OF OPERATIONS ASHORE WHEN A LANDING FORCE OBJECTIVE LIES WELL BEYOND A CITY CONTAINING FORCES WHICH MAY BE CAPABLE OF INTERRUPTING THE LF LOCs. (USMC Study SCN 30-77-01)

Landing Force Mission

Commencing on D-day and no later than D+2, seize and isolate the city of SYN City; contain the enemy within the city; on order, be prepared to continue the attack to the northwest.

General Comments

It is not feasible, even in the mid-range time frame, to isolate the Aggressor MRB (Rein) within the city while preparing to continue the attack to the northwest - unless a logistics base can be established nearby. Any such base would have to be of sufficient size to accommodate at least three DOS for major elements of a MAF. BDM analysts have concluded that a viable option may include sea-based logistical support with maximum use of helicopter and LCAC resupply until shore-based logistics facilities are fully developed and capable of meeting the demand. Although a BSA can be established at WHITE Beach (at the extreme northern portion of the SYN City map centered on E12.9-N15), there is not sufficient acreage in the beach area or the contiguous suburban area to support a major CSSA. It should be noted that WHITE Beach is on the mainland rather than the offshore islands. In the mid-range period the LCACs and LVTs will obviate the need to establish landing support facilities on the islands, and transfer operations will not be necessary. The WHITE and RED Beach BSAs will be austere installations, not capable of supporting MAF attacks to the northwest. Therefore, it is necessary tactically and logistically to seize the main port area to serve as the principal CSSA.

WHITE Beach is not suitable for landing tanks, wheeled vehicles, or supplies in the current time period because of the configuration of the offshore islands and the expanse of water that would have to be traversed between the islands and the mainland. In the mid-range period, however, LCACs make it possible to land directly across WHITE Beach, thereby enabling assault forces to isolate the city on the north more rapidly and effectively than can be done currently.

Detailed Concept of Operations

At L-hour on D-day, raiding parties from the Division Reconnaissance Battalion will seize the two Army garrisons abutting the deep channel entry to the port to destroy or capture the personnel thereat. Simultaneously, helicopterborne operations will be conducted to land assault elements of the LAA Bn in an LZ west of Airfield 1 with the mission of seizing ATF Obj 2 (Airfield 1); one BLT will land by helicopter in designated LZs to seize LF Objectives A (Bridge 3 and nearby dam and power station) and B (western industrial area) and establish blocking positions south of South River. Concurrently, surface assault landings will be made over Beaches WHITE and RED by LCAC and LVT; assault elements of these two BLTs will seize bridges over North River and isolate SYN City on the north.

L-hour operations are planned to take place at approximately 90 minutes prior to BMNT. Preparatory fires are not scheduled. Fixed-wing and attack helicopter support will be on station.

Successful execution of L-hour operations will isolate SYN City and place key bridges in the hands of the LF. Blocking positions will cover all major avenues of approach.

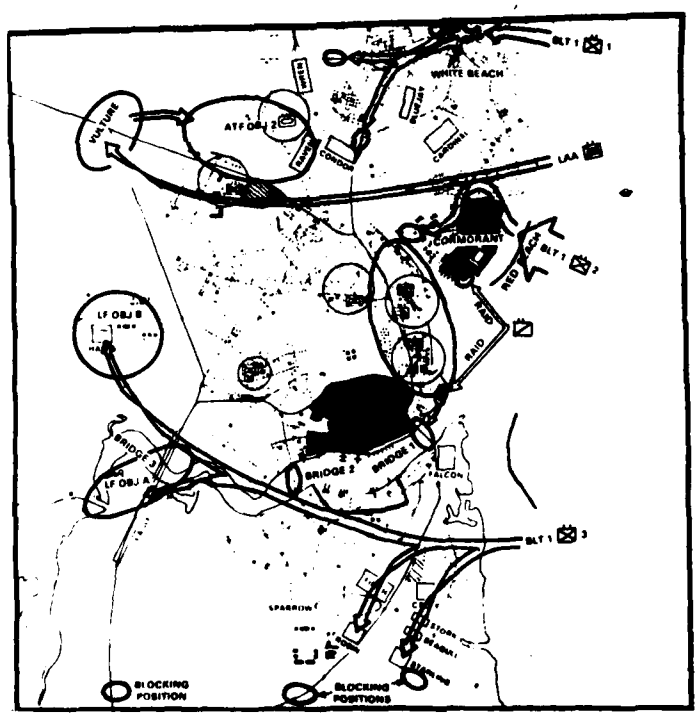


Figure IV-11. Mission 3 - Isolate and Contain - L-Hour Operations

Concept of Operations - Mid-Range Time Frame

Mission 3 - Isolate and Contain (Continued)

H-hour Operations

The assault elements of two RLTs, less a BLT each (already ashore), will land at H-hour as MCATFs over WHITE and RED Beaches in LCACs and LVTs. Forces landing over WHITE Beach will link up with LAA Bn elements at Airfield 1, defend the west flank of SYN City, and conduct MCATF operations west and north to the limits of the FBHL. Forces landing over RED Beach (from RLT 2) will pass through positions established by BLT 1/2 and be prepared to destroy Aggressor forces in the port area and seize the port.

Operations Ashore

The Landing Force will seize key terrain to secure the FBHL on D+1 and D+2, prevent reinforcement of SYN City, and simultaneously attack and destroy Aggressor forces within the city to secure the port area for use by combat service support units.

Beginning on D+3, Landing Force units will eliminate isolated pockets of resistance and conduct an active defense of the FBH. Bridges 1, 2, and 3 will be rigged for demolition in the event they have to be blown to deny Aggressor reinforcements in the south access to areas north of the river.

Air Support Concept of Operations

The density of troops and extensive requirements by combat and support units for space militate against early deployment ashore of aviation assets. The 1,100-meter grass strip (Airfield 2) south of the naval station is not an objective in this mission. The large open areas and LZs which are found south of South River will not be available. As a result, half of the helicopters and V/STOL aircraft in the AE will have to remain aboard LHAs and LPHs for basing and maintenance until suitable facilities can be established ashore.

An EAF will be established on the main highway west of Airfield 1. The location is tentative, but it appears to be the only open area with a hard surface capable of being used as an EAF early in the operation. Bypasses will have to be constructed. Parking areas and taxiways will be established using matting. (An EAF, such as that shown on page B-18 of ECP 4-4, would require approximately 2.3 million SF of matting if all airfield surfaces were matted.) The alignment of the highway does not provide an ideal EAF, but it can be used to augment Airfield 1, particularly if the airfield is rendered temporarily inoperable by enemy action. The farmland located immediately west of the tentative EAF site will be examined by engineer personnel as soon as possible to evaluate that area with respect to its ability to support various levels of aviation operations.

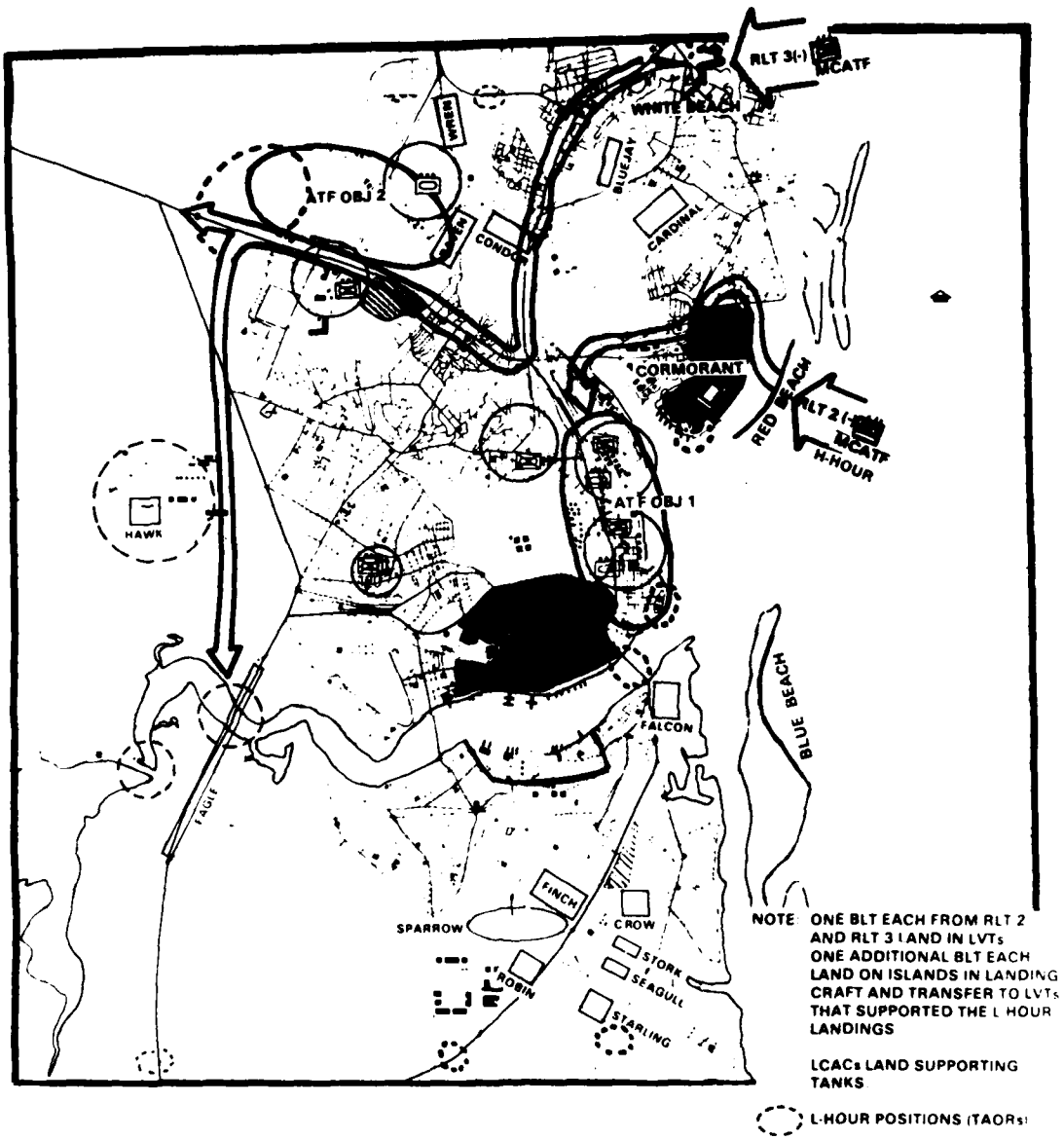


Figure IV-12. Mission 3 - Isolate and Contain - H-Hour Operations

Concept of Operations - Mid-Range Time Frame

Mission 3 - Isolate and Contain (Continued)

Combat Service Support

Initially, a supply dump will be established by the LAA Bn's HST at Airfield 1. Company-sized units in blocking positions south of South River will have minimal requirements and will be resupplied throughout the operation by helicopter. An alternative LOC will be the road net leading southward from Bridge 3 which will be in LF possession.

Austere BSAs will be established at WHITE and RED Beaches, with the former being serviced entirely by LCAC. Two causeways will be installed at RED Beach on D-day, which will enable that BSA to be supported by displacement landing craft. The exact number of available landing craft will depend on the introduction schedule of LCACs and the retirement schedule for landing craft. By two decades from now, all landing craft will have been phased out of the inventory (Marine Corps Gazette, December 1987, Col. John G. Miller, p. 48).

As soon as the main port area has been seized, a CSSA will be established using undamaged or repaired facilities. Three DOS will be stocked in the CSSA. Heavy reliance will be placed on ship-based supply until D+10 to minimize space, handling, and personnel requirements.

In anticipation of an order to continue the attack to the northwest, and in the interest of making storage space available to the follow-on forces, it is planned to develop additional CSSAs northwest of SYN City. When directed, supplies will be throughput from the dock area to the forward CSSA, bypassing the port CSSA. VII MAF units will continue to draw consumption requirements from the port CSSA to reduce stockage levels there to make room for CSS units of the follow-on forces.

There is not sufficient acreage available north of South River to accommodate the tactical deployment of the Landing Force and all of the supplies that comprise a 30-day level. To store 30 DOS of Class V with the requisite separation between stacks requires approximately 3,500 acres of storage space. Putting ammunition in urban or suburban areas creates a fire hazard of significant proportion in addition to subjecting the supplies to theft or sabotage. There is ample terrain outside the metropolitan limits of SYN City for storing Class V, but, until the FBHL is secured, that option cannot be exercised. Even after the FBHL is occupied (strong-points and blocking positions only) it would be unwise to risk more than 10 to 25 percent of the Class V stockage level by placing it outside the city limits. In Mission 3, 15 DOS of all classes can be accumulated beginning on about D+10.

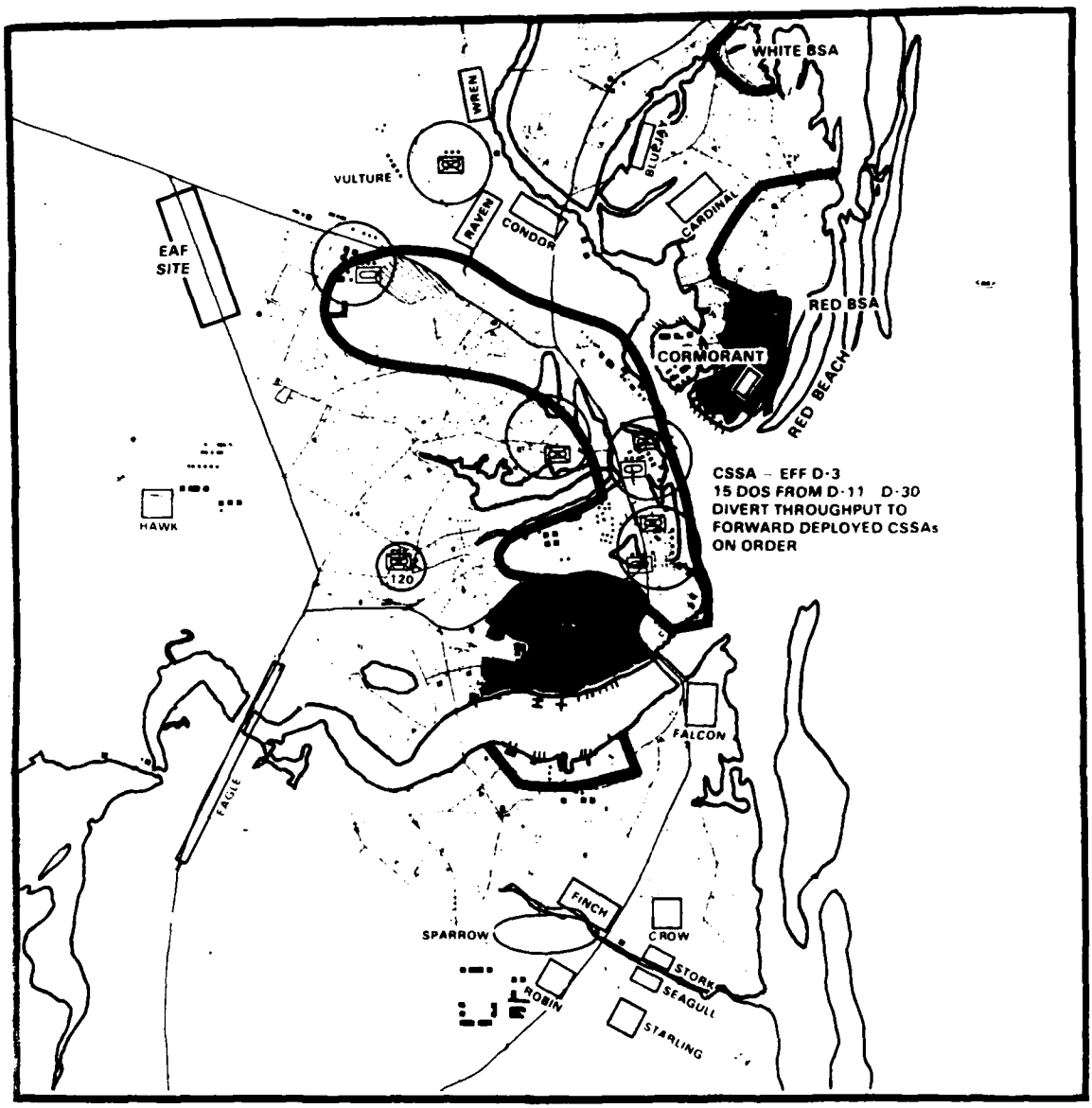


Figure IV-13. Mission 3 - Isolate and Contain - CSS Concept

Concept of Operations - Mid-Range Time Frame

MISSION 4 - SEIZE A CORRIDOR

THIS CONCEPT MAY BE PREFERRED WHEN THE CITY IS NOT AN OBJECTIVE BUT LIES ASTRIDE ROUTES TO LF OBJECTIVES (USMC Study SCN 30-77-01)

Landing Force Mission

Commencing on D-day and no later than D+2, seize and secure a corridor through the city of SYN City and continue the attack to the northwest.

General Comments

This mission statement does not stipulate that SYN City be isolated and the Aggressor forces contained therein, but the two missions are nearly indistinguishable. The external threat is the MRD located within 80 km of SYN City. Isolating the city and preventing its reinforcement by that MRD must be a priority undertaking for VII MAF. The mission does stipulate that the Landing Force will seize a corridor and continue the attack. The automatic nature of this directive makes it imperative that the Landing Force establish a viable corridor at the outset, one which can be maintained with confidence and one which has the characteristics and capacity to support the forces that continue the attack.

Consideration was given to use of WHITE Beach as a major logistical support base. The L-hour operations described in Mission 3 would be adequate to isolate the city. By omitting the RED Beach MCATF landing and putting an RLT MCATF across WHITE Beach, the Aggressor forces would not be engaged directly (except those at Airfield 1 confronting the LAA Bn) and the enemy within the city would effectively be bypassed. Tactically, this concept offers an opportunity to seize a corridor without having to fight in the port area. Logistically, however, an attempt to support the major portion of a MAF over the remote WHITE Beach, having to cross both tributaries of North River, and having to use LOCs that fall entirely within suburban areas, would present major CSS problems and would expose the MAF to a very tenuous supply line.

If, however, the Aggressor reinforcing forces were destroyed or engaged by other forces, so that a MAB could be committed in place of a MAF, the MAB could be supported over WHITE Beach and the Aggressor forces located within the city could be contained and bypassed.

Tactical Considerations

In seizing a corridor, the ATF and LF Objectives are the same as for Mission 3 - Isolate and Contain. Both the port and Airfield 1 are crucial to VII MAF plans to continue the attack. The corridor to be seized must include the port facilities which provide the only area on the SYN City map capable of serving as a major logistic installation.

The corridor chosen provides the only viable logistical base for supporting major forces. It includes the vital port area with warehousing facilities, docks, railroads, POL storage, and room for container storage. The corridor also includes Airfield 1 which must be taken to serve as the principal tactical airfield for 7th MAW fixed-wing squadrons.

Concept of Operations. See Mission 3 - Isolate and Contain.

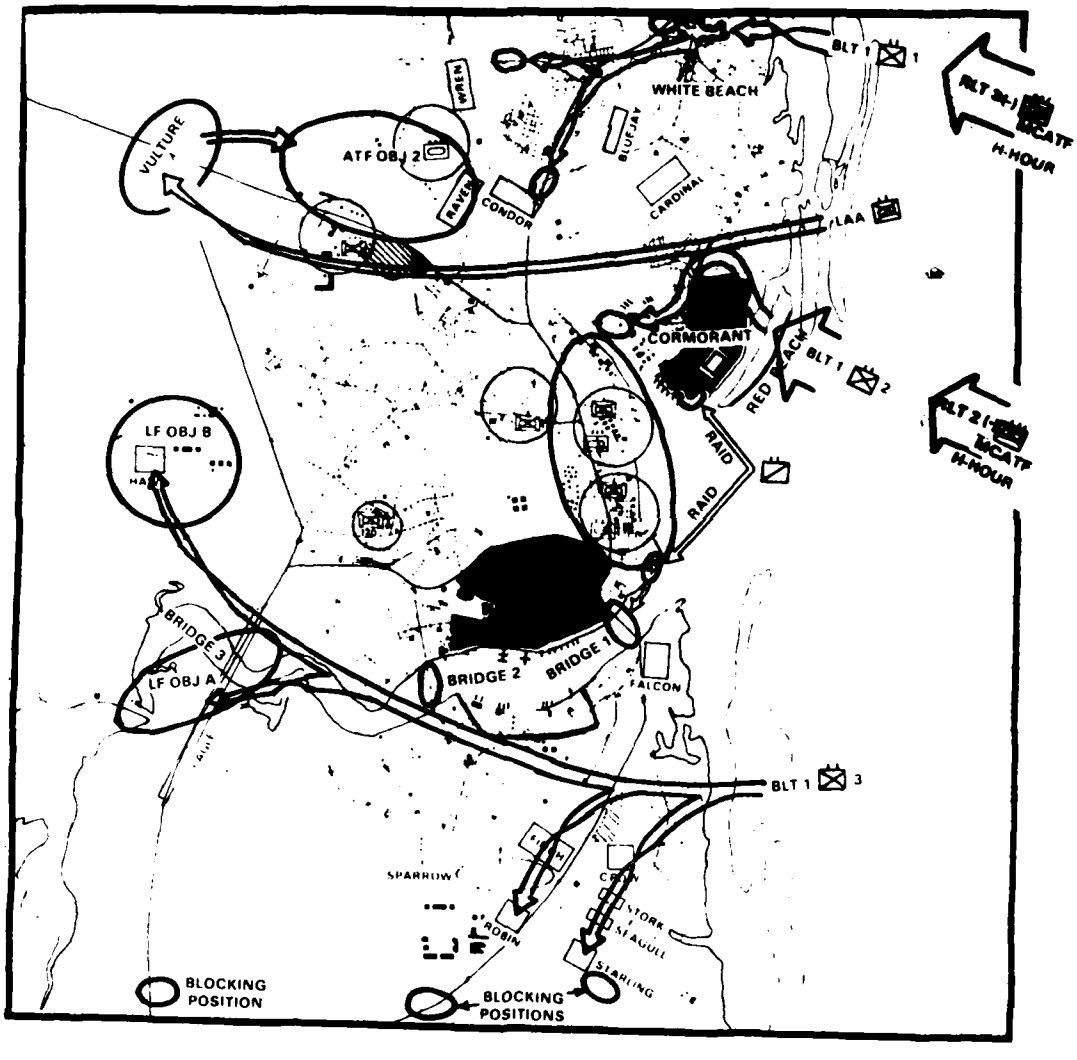


Figure IV-14. Mission 4 - Seize a Corridor - Tactical Operations

Concept of Operations - Mid-Range Time Frame

MISSION 5 - REDUCE DEFENSES

THIS CONCEPT IS LEAST LIKELY TO BE EMPLOYED DURING CONFLICT SITUATIONS. THIS CONCEPT CALLS FOR THE MAXIMUM APPLICATION OF MODERN FIRE POWER, TO INCLUDE UNCONVENTIONAL WEAPONS, UNTIL ORGANIZED RESISTANCE HAS ENDED. (USMC Study 30-77-01)

Landing Force Mission

Commencing on D-day until all resistance has ended or the enemy force surrenders, destroy all enemy forces located in the city of SYN City.

General Comments

The general comments set forth in Mission 5 for the current time frame apply equally in the mid range. International law, to which the US is an agreed party, would inhibit heavy bombardment of the urban and suburban areas in SYN City. Practical military reasons also militate against such bombardment since the damage inflicted and rubble created by bombardment would tend to favor the defender. Five days of Advance Force operations are called for in this case, mainly to establish air superiority and attack and destroy the Aggressor's reinforcing capability. The assault into SYN City should be scheduled after BMNT on D-day to assure that sufficient visibility is available for the use of discriminating weapons. Guided weapons will be used to the maximum degree possible. Conventional ordnance will be employed only when under the positive control of airborne FACs. The usual restrictions on the use of chemical weapons will be relaxed to the degree that CS may be used in any area. Lethal, nonpersistent chemical weapons may be authorized for use against military targets only, and only when such use does not unduly hazard LF troops or the civilian populace.

Tactical Considerations

Unlike Missions 1 through 4, the reduction of enemy defenses will be based on heavy, prolonged daylight attack of known and suspected Aggressor positions. The comparatively massive firepower to be used will enable the Landing Force to strike more directly at the enemy forces. RLT 1 will not be embarked in the ATF; rather it will be staged at theater air bases (TAB) from which it can be deployed by air or surface means into the FBH on order. Selected heavy equipment and supplies for RLT 1 are embarked in the AFOE.

L-hour Operations

At L-hour, under the cover of smoke, CS, and attack helicopter support, heliborne forces will be inserted into SYN City to seize Airfields 1 and 2, the two Army garrisons, TV and radio stations, railroad

terminal facilities, POL storage areas, and the telephone exchange. These operations can be undertaken in executing this mission because of the nature of the supporting fires, to include chemical weapons. Early seizure of communications facilities is desirable in carrying out any of the five missions, but it is particularly important in these circumstances where possession of the communications installations will prevent the enemy from rallying the population and facilitate VII MAF control of the city early, thus contributing to the destruction of the Aggressor MRB (Rein) within the city.

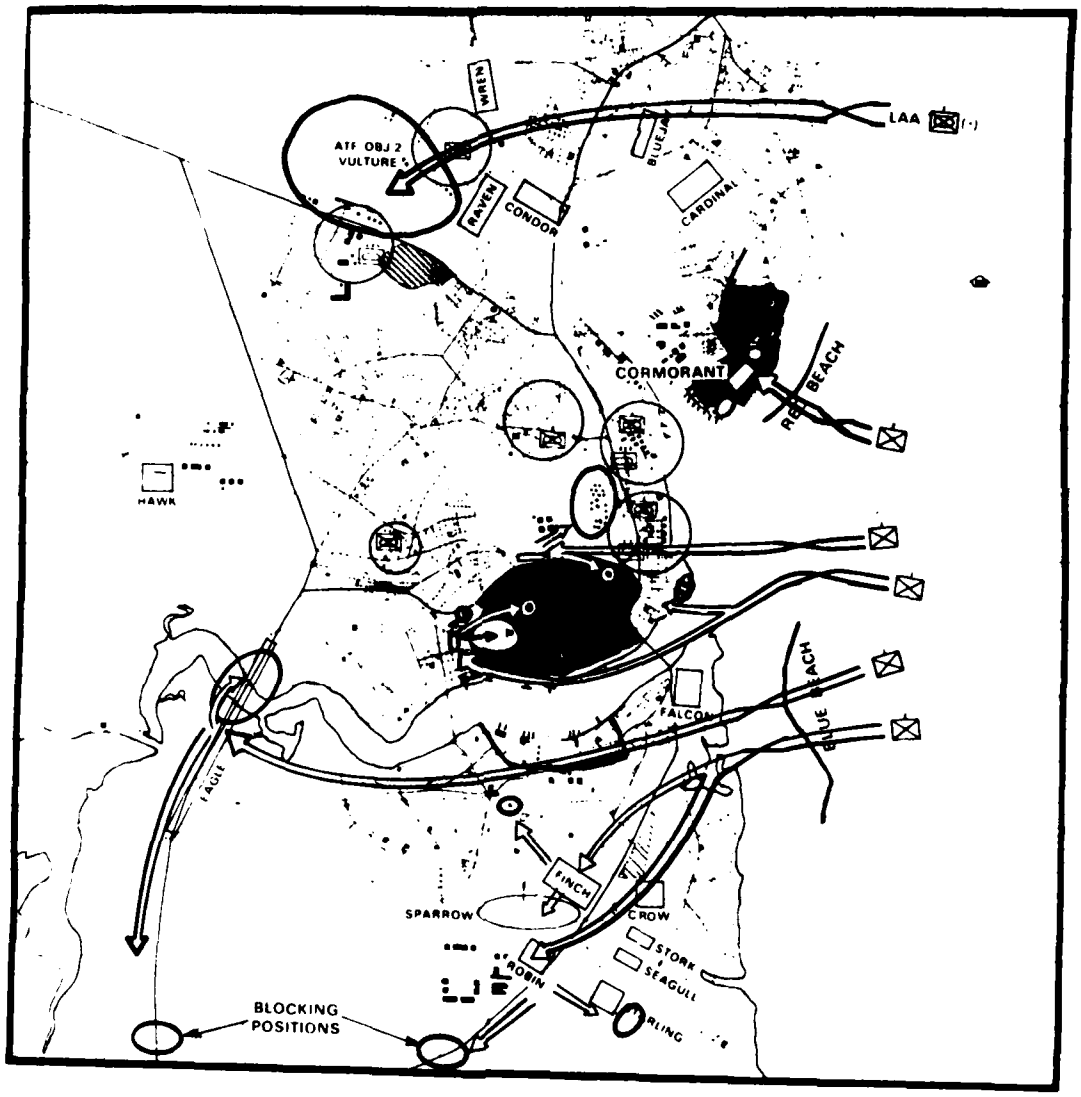


Figure IV-15. Mission 5 - Reduce Defenses - L-Hour Operations

Concept of Operations - Mid-Range Time Frame

Mission 5 - Reduce Defenses (Continued)

H-hour Operations

At H-hour, BMNT+120, RLT 2 (-) lands a MCATF over RED Beach by LCAC and LVT, isolates the old city, seizes bridges over North River, and attacks and destroys enemy forces in the port area. Simultaneously, BLT 3/3 lands by LVT and LCAC over BLUE Beach as a MCATF and attacks and destroys enemy forces in the naval station. The LAA Bn (-) is scheduled to be landed mainly by heavy-lift helicopter, on order, in LZ VULTURE.

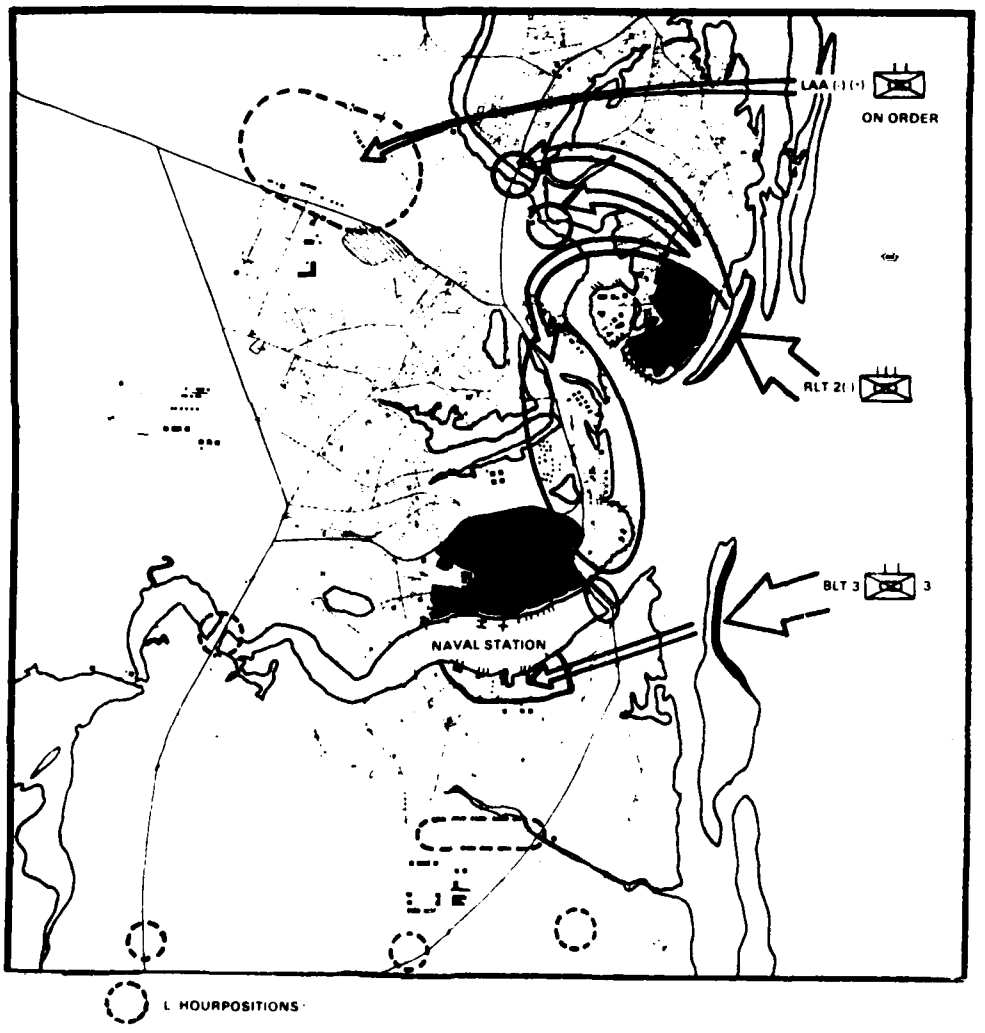


Figure IV-16. Mission 5 - Reduce Defenses - H-Hour Operations

Combat Service Support

Austere BSAs will be established at RED and BLUE Beaches, with stockage levels not to exceed 3 DOS. A causeway will be installed at RED Beach and a pontoon bridge rafting service will be operating at BLUE Beach. Sea-based logistic support will be required throughout the operation. It is not planned to establish a CSSA. CSS for fixed-wing aircraft, other than Harrier V/STOL, is not contemplated in the FBH unless VII MAF is directed to conduct further operations in the SYN City area or elsewhere in southern Aggressorland.

All supplies landed over RED and BLUE Beaches will be mobile-loaded. Emergency resupplies will be delivered by helicopter or LCAC. Forces to be supported ashore in the FBH will number about two thirds of the normal GCE of a MAF, half of the FSSG strength, and a MAG (VH) plus two VMA (V). Unless the VII MAF receives additional missions and is joined by the theater-based elements of the MAF, command will not pass ashore, and the MAF will make preparations to turn over the SYN City area to follow-on forces and depart the area.

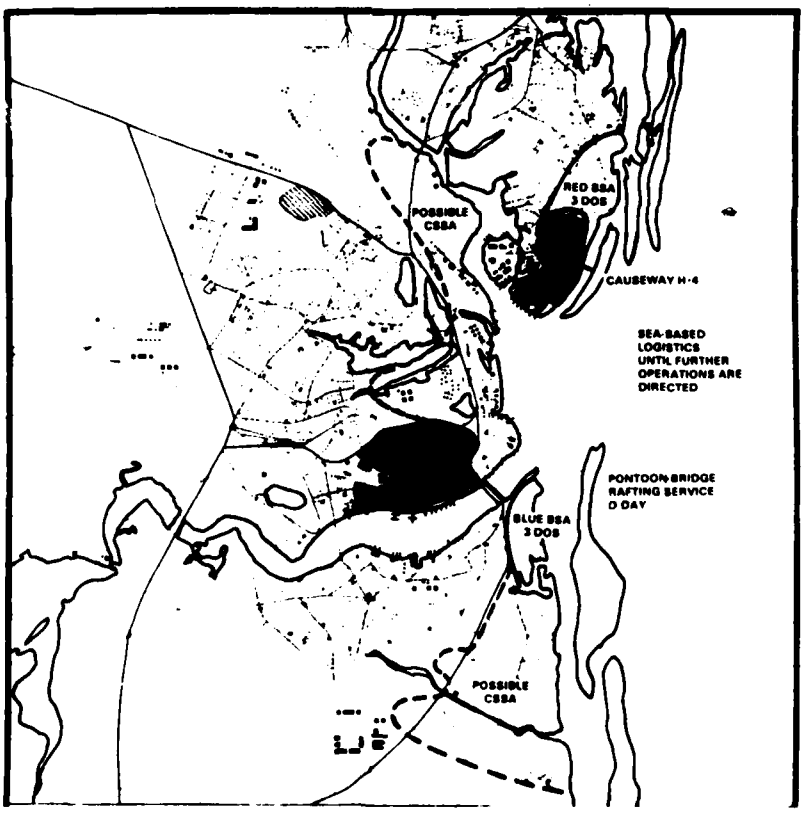


Figure IV-17. Mission 5 - Reduce Defenses - CSS Concept

CHAPTER V

COMBAT SERVICE SUPPORT FUNCTIONS AND REQUIREMENTS

LOGISTICS: The science of planning and carrying out the movement and maintenance of forces. In its most comprehensive sense, those aspects of military operations which deal with:

- Design and development, acquisition, storage, movement, distribution, maintenance, evacuation, and disposition of materials.
- Movement, evacuation, and hospitalization of personnel.
- Acquisition or construction, maintenance, operation, and disposition of facilities.
- Acquisition or furnishing of services.

COMBAT SERVICE SUPPORT:

The assistance provided operating forces primarily in the fields of administrative services, chaplain services, civil affairs, finance, legal service, health services, military police, supply, maintenance, transportation, construction, troop construction, acquisition and disposal of real property, facilities engineering, topographic and geodetic engineering, food service, graves registration, laundry, dry cleaning, bath, property disposal, and other logistic services.

Combat Service Support Functions

INTRODUCTION

IN AN AMPHIBIOUS OPERATION CULMINATING WITH THE DELIBERATE ASSAULT OF AN URBAN AREA, THE COMBAT SERVICE SUPPORT FUNCTIONS ARE THE SAME AS IN CONVENTIONAL OPERATIONS, BUT THE CONCEPTS AND PROCEDURES IN LOGISTIC AND COMBAT SUPPORT OPERATIONS ARE ADJUSTED TO THE MOBA ENVIRONMENT.

This chapter examines the various combat service support functions, their definitions, the organizations tasked to accomplish these functions, and the tasks and responsibilities for each within the MAGTF. The 24 CSS functions are examined in the context of the SYN City environment.*

For purposes of this analysis, the CSS (system) includes all classes of supply, personnel, organization and equipment. The logistic system will be composed of conventional elements which may be fragmented, parasitic to the civil system, or require augmentation from similar installations external to the urban environment or from the sea. That logistic system includes, but is not limited to:

- The customers
- Logistic units
- External support
- Combat Service Support Areas
- Transportation
- Supply routes/modes
- Ammunition Supply Points
- Airfields
- Fuel dump sites

*NOTE: The basic reference document listed in the Statement of Work is FMFM 4-1, "Combat Service Support for a MAGTF,: Draft, February 29, 1980 and it lists 24 CSS functions. ECP 4-1, "Combat Service Support", April 8, 1980 lists 26 CSS functions. The principal difference between these two documents is that FMFM 4-1 lists Military Police whereas ECP 4-1 breaks the MP CSS requirement into three separate requirements: Security, POW Management, and Law Enforcement.

FUNCTIONS OF COMBAT SERVICE SUPPORT
(FMFM 4-1)

- SUPPLY
- MAINTENANCE
- TRANSPORTATION
- ENGINEER SUPPORT
- LANDING SUPPORT OPERATIONS
- MEDICAL/DENTAL
- GRAVES REGISTRATION
- MATERIALS HANDLING EQUIPMENT
- FINANCIAL MANAGEMENT
- AUTOMATED DATA PROCESSING (ADP)
- EMBARKATION
- NONTACTICAL COMMUNICATIONS

- FOOD SERVICE
- POSTAL
- CSS TRAINING
- MILITARY POLICE
- EXCHANGE SERVICES
- PASSENGER AND FREIGHT TRANSPORTATION
- LEGAL
- SPECIAL SERVICES CLUBS
- CIVIL AFFAIRS
- ADMINISTRATION
- ECCLESIASTICAL SERVICES
- BAND

Combat Support Functions and Requirements

ENGINEER MOBILITY ENHANCEMENT

THE PRIORITY OF COMBAT ENGINEER EFFORT WILL BE DIRECTED INITIALLY TOWARDS PROVIDING MAF ELEMENTS WITH REQUISITE MOBILITY IN BEACH LANDING AREAS, BUILT-UP AREAS, AND OPEN AREAS WEST OF SYN CITY ONCE MCATF OPERATIONS COMMENCE.

The physical characteristics of each operational area influence mobility parameters and enhancements required by maneuver elements, including combat engineers. Beaches, urban areas, and flat open areas located in or near SYN City may each require peculiar mobility enhancements tailored to the units' organic mobility means, its area of operation, and the level of enemy resistance expected. Mobility for dismounted troops in the inner city requires a different type of engineer support than mechanized operations west of SYN City. Threat capabilities for scatterable mining and artillery munitions delivery require that engineers be prepared to breach multiple countermobility obstacles emplaced in the same location over a short period of time.

The first task for combat engineers supporting BLTs employed in the surface assault is to provide beach mobility by minefield breaching and possible surface matting. Mechanized minelayers and artillery mining systems give Threat forces the capability to emplace large quantities of mines rapidly through the entire width of each of the sand islands. UDTs will be tasked to breach underwater mines in the vicinity of the landing beaches, but these teams cannot be expected to locate and neutralize subsurface-laid mines on the offshore islands. Naval gunfire is only marginally effective in neutralizing mines in this situation since undetonated mines may be thrown by blast effects and large craters will impede movement over the beach. The only current alternative for breaching these mines rapidly is the employment of line charges delivered by amphibious vehicle (LVT), amphibious craft, or helicopter. Other standoff mine breaching systems will be available in the mid-range period. The 750' to 950' width of the islands will require a minimum of three M58A1 line charges per cleared lane and each BLT requires a minimum of two cleared lanes for the amphibious assault. LCPLs with externally mounted line charges could breach required lanes to a maximum depth of 350'. Engineers with LVT mounted line charges would then be responsible for clearing the full length of the lanes. This concept for beach mine clearance can also be used for mine neutralization in the 200' wide beach areas on the main land mass. It is recommended that line charges be mounted in amphibious trailers, rather than the M353 GP trailer chassis, to increase the utility of the line charge system since it could then be used in the surface assault as well as subsequent overland operations. The Cbt Engr Supt Co has 5760' (120 kits x 48'/kit) of Mo-Mat of which up to 3800' might be required for the four assault lanes alone. Beach reconnaissance information from UDTs will be used to determine surface matting requirements and the priority for landing these materials.

Extant bridging and other methods for gap crossing (rafts, ferries) must be seized early in the operation to reduce wet gap crossing requirements for supporting engineers. Key bridges (#1, 3, and 6 on SYN City overlay 3) are vital to the overall success of the MAF; non-repairable damage to these bridges would necessitate extensive rafting/ferry operations since the MAF only has 810' (247m) of float bridge (M4T6) currently. Possible USMC procurement of 1200' of medium girder bridge per MAF would provide only 756' of float bridging. While it would be possible (using all 3 M4T6 bridge sets organic to the MAF) to construct one float bridge across the North River, total destruction of all three bridges across the South River would require rafting (6 class 60 M4T6 rafts possible) or movement across the dam spillway. The use of pioneer bridging would be minimal and confined to expedient repairs and reinforcements of bridges on secondary and tertiary roads. Assault bridging (AVLB, M4T6 or MGB fixed-span, Israeli towed bridges) could be used for expedient passage across AT ditches or destroyed culverts on MSRs. Bridge repair would be limited to reinforcement of extant structures and span replacements if only one span of the bridge were destroyed. (Bridge information given in the SYN City data base is not sufficient for an analysis of the feasibility of span replacement on major bridges).

MSR repairs, including mine neutralization and surface repairs, would begin in the vicinity of the BSAs and proceed forward as consolidation occurred within SYN City and engineer equipment was phased ashore. Initial repairs would be expedient and provide short bypasses around major MSR damage. Subsequent repairs would be more complete and focus on repair of major MSR damage and upgrading of selected secondary roads as appropriate to the tactical situation. Indigenous road construction equipment including asphalt spreaders may be used to supplement MAF engineer equipment although MAF engineers do not have formal training in this type of horizontal construction. Stocks of engineer materials (sand, gravel, asphalt) should be located within SYN City in sufficient quantities to accomplish projected MSR repairs.

INITIAL ENGINEER MOBILITY ENHANCEMENT

1. BREACH TWO ASSAULT LANES PER BLT THROUGH MINED AREAS AT COLORED BEACHES:

   RED BEACH:275m ► 3 LINE CHARGES PER BREACHED LANE
   BLUE BEACH:225m ► 3 LINE CHARGES PER BREACHED LANE

2. BREACH MINED AREAS ON MAINLAND BEACHES.

3. EMPLACE SURFACE MATTING ON CRITICAL BEACH AREAS TO SUPPORT SUSTAINED LOGISTIC TRAFFIC.

4. BE PREPARED TO DEFUSE DEMOLITIONS EMPLACED ON KEY BRIDGES.

Engineer Mobility Enhancement (Continued)

Total construction of EAFs is not initially required in SYN City due to the existence of one hard-surface airfield and one sod-surface field. These airfield facilities are bound to be prime targets for Threat denial operations and are expected to be cratered so that the maximum useable length would not exceed 500'. These fields would still be usable for rotary wing and V/STOL aircraft; high performance aircraft would continue to utilize carrier task force and theater platforms until sufficient runway lengths were repaired. Engineer efforts at these facilities will be extensive and include mine detection and neutralization, matting of VTOL landing surfaces, repair of craters, and the subsequent upgrading of the sod-surface EAF in the southern portion of SYN City. Initial repairs would be the responsibility of division engineers. Force and Wing engineer units could be expected to provide limited support beginning in Period III but the bulk of the rehabilitation effort will be borne by NMCB assets landed with the AFOE. Engineer tasks at LZs include clearing of vegetation and obstacles and preparation of the LZ for logistic support operations. These tasks will be initiated by engineer personnel in the HST with additional engineer support as required. Prelanding photographic reconnaissance should provide engineer planners with the magnitude and scope of repairs necessary to aviation facilities.

Obstacle clearance requiring different types of engineer effort will be found in beach, urban, and outlying areas. Obstacles in the beach areas may include mines, wire/tape, steel or concrete tetrahedrons, craters, and antitank ditches. Breaching these obstacles will require linear demolition charges and medium dozers with combat engineers conducting initial breaches and LFSP teams completing obstacle breaches in the beach areas. Barrier systems within SYN City will include mines, wire/tape, craters, AT ditches, and contaminated areas in addition to rubbling and overturned vehicles, which are obstacles unique to an urban environment. The use of demolitions for obstacle reduction within the city should be carefully considered as improper use of explosives may create more problems than presented by the original obstacle. Rubble removal will require extensive use of dozers, scoop loaders, and dump trucks. Breaching equipment for use on inner-city obstacles should provide a measure of small arms and fragmentation protection for the operator. Dozers, scoop loaders, and dump trucks should be provided with armor for cabs and critical components such as hydraulic lines. The hardening of engineer equipment is not an urban-unique problem and may be accomplished by a number of expedient methods (i.e., sheet steel, sand bags, etc.).

Mine warfare in SYN City is constrained only by the ingenuity of the defenders as mines or boobytraps may be easily emplaced in streets and buildings. Vehicle-mounted mine detectors may not be effective due to piles of rubble or other debris on the road surface. Dismounted engineers

with portable mine detectors, although extremely vulnerable to fire, provide the most reliable means for mine detection within confined streets and urban areas. The use of line charges for mine neutralization within areas of multi-story buildings (especially concrete or stone) should be avoided since blast overpressures may cause undesirable effects. Isolated mines should either be marked and bypassed, or manually removed and neutralized. Minefield breaching in areas west of SYN City would be accomplished using mounted line charges.

Much of the mobility required by dismounted operations within SYN City must be provided by the employment of engineers or other trained personnel to breach building walls for rapid entry/exit. Current tank and artillery munitions cannot be expected to breach large holes through reinforced concrete or masonry, and both infantry and engineer personnel must be thoroughly familiar with breaching methods using satchel charges, backfilled explosives, and steel cutting charges to achieve the desired effect. The multi-purpose assault weapon, anticipated to be available in the mid-range time period, may be used to breach non-reinforced exterior walls provided that sufficient arming distance is available.

CM OBSTACLE	ENVIRONMENT: BEACH AREA	ENVIRONMENT: URBAN AREA	ENVIRONMENT: OPEN AREA	MOBILITY ENHANCEMENT REQUIRED
MINES	X		X	USE LINE CHARGES TO BREACH VEHICLE LANES
		X		NEUTRALIZE MINES INDIVIDUALLY
CRATERS	X	X	X	BYPASS, REDUCE BANK SLOPES, FILL
WIRE TAPE	X	X	X	BREACH WITH BANGALORE TORPEDOES
RUBBLE		X		BYPASS OR REMOVE WITH ENGR EQUIP
DAMAGED BRIDGES		X		REINFORCE, REPLACE SPAN, RAFT FERRY
DAMAGED MSR		X		BYPASS, REPAIR EXPEDIENTLY
DAMAGED AFs		X		SUFACE MATTING, CRATER REPAIR, SURFACING
SOIL VCI	X			SURFACE MATTING, STABILIZATION, GRAVEL

Figure V-1. Mobility Enhancements Required by VII MAF

ENGINEER COUNTERMOBILITY ENHANCEMENT

ENGINEERS WILL BE TASKED TO IMPLEMENT A BARRIER PLAN AS VII MAF FORCES CONSOLIDATE THEIR OBJECTIVES AND PREPARE TO DEFEND AGAINST EXPECTED ENEMY COUNTERATTACKS.

Obstacles employed to impede unconstrained mechanized operations must be designed to defeat or redirect the Threat tank, but obstacles in urban environments should be designed to defeat both personnel and mechanized vehicles as infantry units will be dismounted and conducting assaults through the city infrastructure. The types of obstacles emplaced by friendly forces within and in the vicinity of SYN City will be determined by the composition of the enemy force within that particular area of the city, the permanency of the obstacle and its effect on friendly mobility, and the local materials/equipment available for construction of the obstacle. The urban environment provides unique opportunities for obstacle construction by selective rubbling and demolition of underground storage areas and utility access tunnels.

Requirements for obstacles vary by the unit, location, and phase of the operation. All units will emplace expedient obstacles on the flanks of movement corridors during the advance and beyond the outer perimeter when the unit halts its advance to consolidate, regroup, or attack in a new direction. While units occupying positions in the outlying industrial areas and airfield facilities will require antitank obstacles emplaced in-depth, MAF elements within SYN City proper will require a mix of AP and AT obstacles.

Antitank obstacles in the flat, open areas on the fringes of SYN City must be employed in depth and sited in conjunction with major antitank weapon systems. AT ditches, minefields, and barbed wire/tape obstacles as well as concrete or steel tetrahedrons are all effective in stopping or redirecting the tank. AP mines and antihandling devices will discourage dismounted breaching of these AT obstacles. Mechanical ditchers and minelayers, while not in the current USMC inventory, would provide a rapid means for providing countermobility. Generic equipment providing this enhanced capability is a long-standing requirement and its fielding to USMC units is recommended to upgrade engineering capabilities in any environment, including SYN City. Construction of concrete or steel obstacles may not be feasible initially due to availability of local materials (EAF repairs would take precedence with concrete), equipment (concrete mixers and welders), and engineer personnel in direct support of the emplacing unit. Dynamic mine emplacement by artillery and air weapons systems would supplement ground engineer efforts but increase the logistical burden on these delivery systems.

Obstacles emplaced within suburban areas (single-story residential housing) are generally of a smaller scale than those in large, open areas since the housing structures are themselves an obstacle, and reinforcing obstacles are sited using existing structures as base points. Unless the

houses have basements, tanks will only be delayed by passing through wood or non-reinforced masonry structures. The structures are still obstacles since tank movement and target engagement are restricted while passing through such a structure. Mines that are carefully sited and camouflaged may be quite effective when emplaced singly rather than in standard pattern fields.

The highly urbanized interior of SYN City affords engineers with ample material for obstacle construction--rubble and abandoned vehicles. Streets passing between blocks of multi-story masonry structures may be blocked using demolitions to produce selected rubbling. This countermobility technique should be kept to a minimum since building destruction will increase the number of evacuees. Engineer equipment requirements for rubbling operations are minimal; engineer technical expertise in the area of controlled demolition is required to produce effective obstacles degrading enemy mobility rather than friendly mobility. Overturned and anchored vehicles can also be used to block urban streets. Medium capacity cranes and forklifts would be used to position and overturn these vehicles. Effective AT obstacles can also be constructed by placing demolitions in underground utility access lines to create craters and ditches flanked by tall buildings. As in the suburban areas, the buildings offer a base to which reinforcing obstacles are sited and constructed.

Antipersonnel obstacles in the built-up portion of SYN City must be used to deny ground movement as well as vertical movement within buildings. Barbed wire/tape, command-detonated mines, caltrops, and flame fougassé employed in combination would effectively slow enemy dismounted advances. Building roofs with sufficient load bearing capacity or space to support helicopter landings will require antilanding obstacles such as claymore or other fragmentation mines.

- Increased use of expedient demolitions to produce craters and rubble from hardened structures.
- Decreased use of standard mining techniques; Increased use of single mines emplaced in advantageous positions.
- Increased availability of obstacle construction materials--masonry, vehicles, lumber.
- Increased canalization caused by vertical structures suitably reinforced.
- Increased lethality of chemical weapons due to agent confinement and stagnation.

Impact of Urban Development on Countermobility Obstacles

ENGINEER SURVIVABILITY ENHANCEMENT

COMBAT ENGINEERS SUPPORTING OPERATION BREAKER WILL BE TASKED TO PROVIDE ASSISTANCE WITH CUT-AND-COVER FORTIFICATIONS, EXPEDIENT DECONTAMINATION, CAMOUFLAGE AND DECEPTION, AND MODIFICATION OF BUILDING STRUCTURES TO PROVIDE PROTECTED FIRING POSITIONS FOR CREW-SERVED WEAPONS.

MAF survivability within an urban environment may be significantly increased by divisional engineers providing assistance with standard cut-and-cover operations and expedient decontamination in open areas and specialized camouflage and building modifications in areas of multi-story buildings. The in-city fighting involving dismounted troops advancing street-by-street favors the use of deception and reinforced structures commanding wide fields of fire.

Threat doctrine concerning CB warfare stresses use of these weapons for denial of key facilities and areas. Chemical mines would likely be dispersed throughout the beach area and possibly within the inner-city. Elements of VII MAF occupying positions in the fringe areas of SYN City would be likely targets for artillery and air-delivered chemical and biological agents. Decentralized decontamination operations conducted by individual tactical units using M12lA1 apparatus and indigenous water supplies would minimize unit casualties and maximize the overall combat effectiveness of units by rapid decontamination, enabling them to continue with their missions. Urbanized areas will afford some protection during CB attacks but will cause non-persistent vapors to be concentrated for longer times than in an open area. Widespread use of CB munitions will require that assault forces wear protective suits for the duration of the operation and accomplish biological imperatives in a sanitized area. Vehicular decontamination could also be accomplished using indigenous bus or truck washing racks or equipment. Divisional enginers will be tasked to provide water sources, prepare decon stations using engineer equipment, and dig sump pits for waste water. The disposal facilities for contaminated water should be located away from established drainage networks, private wells, and open water sources depending upon the tactical situation.

Expedient cut-and-cover fortifications using engineer equipment and tanks with M9 blade kits would protect elements in open areas and beach landing areas but not in the built-up portion of SYN City. Direct fire weapons would be emplaced in modified structures as well as behind structures that masked the vehicle location. Engineer assistance would be required to modify structures by creating entry ways for vehicles and reinforcing the internal structure to prevent collapse from additional weight or blast effects. Divisional engineers possess a limited capability to accomplish building modifications; rehabilitation of structural components is not within this capability. The only engineers with a capability to determine structural modifications or blast resistance are degreed civil engineers, who should be located prior to the operation and consulted as required.

Camouflage of personnel, equipment, and supplies assumes increased importance in an environment containing both an opposing force and a hostile indigenous population. All fixed facilities should be camouflaged by use of screen systems or local materials. Engineers may assist with camouflaging efforts by preparing subsurface storage areas for essential supplies, advising unit commanders concerning camouflage techniques, and locating sources for camouflage materials. Further efforts should be directed towards an evaluation of the effectiveness of various camouflage systems in an urban environment as coloration patterns of current equipment may not be adequate.

Although deception may be difficult with an indigenous population numbering approximately 250,000, engineer units may be tasked to construct decoy weapons positions, dummy stocks of supplies, and hidden entrances to buildings. Extensive use of engineer resources to provide methods to deceive the enemy should be avoided until assault forces have consolidated their objectives and development of protective positions is well underway.

The primary difference between the enhancement of survivability in an open environment and an urban environment is the selective modification of buildings to accommodate vehicles, crew-served weapons, and dismounted personnel. Weapons should be sited in upper floors of corner buildings to maximize target engagement possibilities and deny possible flanking operations. These weapon positions (for Dragon, LAW, LMG, etc.) may require modifications to the building structure to allow for weapon functioning and provide protection from HE and small arms fire. Window areas may need to be enlarged to provide adequate ventilation for weapons with significant backblast. Firing positions should be protected with sand bags and lightweight armor. Heavy screens over windows would help protect firing positions from RPGs and hand-thrown demolition charges.

The use of internal building space to site vehicles is a viable alternative when VII MAF assumes a defensive posture but not practical during the assault phase if the building requires even moderate structural modifications to permit rapid ingress/egress and firing of the weapon system. Few structures with basements will be suitable for siting vehicles since only heavily reinforced concrete floors would carry up to Class 60 loads. Floor to ceiling heights greater than 129.5" are required for the M60A1 tank.

ENGINEER SURVIVABILITY ENHANCEMENT IN SYN CITY

- Reinforcement of vertical structures to protect weapons emplacements.
- Establishment of decontamination stations at vehicle wash racks and public shower facilities.
- Location and reinforcement of underground areas suitable for command bunkers and emergency troop shelters in event of NBC attack.
- Decreased requirement for T/E camouflage equipment as MAF elements are sited in extant structures.

Combat Support Functions and Requirements

GENERAL ENGINEERING

THE COMBAT ENGINEER BATTALION WILL BE TASKED TO PROVIDE GENERAL ENGINEERING SUPPORT AND SERVICES FOR DIVISIONAL AND OTHER SELECTED GROUND COMBAT ELEMENTS OF THE MAF. PRINCIPAL TASKS WILL BE PROVISION OF ESSENTIAL UTILITIES (WATER, MEP) AND HYGIENIC SLRVICES. INDIGENOUS FACILITIES WILL BE USED WHENEVER PRACTICAL.

Existing facilities within SYN City provide adequate utility support for the indigenous population of over 250,000. As MAF elements land, attack, and consolidate areas in SYN City, city planners must decide the level of utilities to maintain in operation and areas which will have water and electric utilities shut down. A complete cessation of all utility services would not be expected due to the harsh consequences on the indigenous population and defending Threat units. As Threat forces expect to counterattack within several days, selective utility shutdowns in the port areas and industrial facilities would deny friendly use while maintaining essential utilities for the population in residential and suburban areas.

Electric, water, and sewage services are operated by established work crews, and locations of major facilities are known prior to commencement of the operation. Friendly agents in-country should identify key personnel and general distribution networks for each of the utilities and ascertain to what extent service will be interrupted in event of an attack. Successful capture of power and water facilities southwest of SYN City will insure minimal support of the indigenous population and provide an interface for parasitic action by MAF engineers.

In the case that electric, water, and sewer facilities are intact and operational throughout SYN City, engineer support will be necessary only to modify the existing networks and provide backup facilities. Potable water can be tapped from private wells, fire hydrants, or secondary distribution lines. Water procured from these sources should be tested periodically to detect chemical and biological contaminants introduced within the distribution network. Electric power for static facilities could be provided by the existing grid after step-down transformers were added to reduce tertiary distribution voltages to 120 VAC. These step-down transformers are not available within the USMC inventory and rapid procurement would be a problem for no-notice deployments. Maneuver elements would be serviced by MEP equipment allocated by user requirements for electric power. Head facilities in the Old City and suburban areas would be annexed in sufficient quantity to service friendly forces in the immediate area. Units in the industrial areas and airfields would use indigenous facilities and individual means for hygiene until later in the operation when portable

head facilities were made available to these units. Engineers would insure that backup systems for each operational indigenous utility service were established and operational no later than D+3.

Divisional engineers must be prepared for the situation in which all utilities were selectively terminated by indigenous utility crews as MAF elements occupied areas of SYN City. Utility engineers assigned to the Cbt Engr Supt Co Util Plt would be concerned initially with the immediate supply of water and power, and later with assistance during the rehabilitation of the existing system. Initial water supplies will be obtained from distillation units aboard naval ships, private wells in the older sections of SYN City, and water purification units operating near the power plant. Distribution will be accomplished by heli-lifted drums and bladders and ground delivery by M50A2 water tankers and M149A2 water trailers. Individuals would be responsible for field sanitation until engineer assistance became available. Bathing and laundry are not considered essential and would not be operational until Period V of the operation.

Rehabilitation of existing utility systems must be a shared responsibility between all engineer personnel aided by indigenous work crews and under general direction of professional engineers included with the Civil Affairs Group. Civil engineers in the CAG would be tasked to evaluate any such rehabilitation effort before commencement of repair efforts. Repair efforts beyond the MAF capability will not be undertaken. Existing water and hygienic systems are adequate for use by MAF personnel, but the electric system (240/120 VAC 50 HZ operation) would require step-down transformers and other equipment to modify electrical output to be compatible with input requirements of USMC equipment (generally 120 VAC 60 HZ). Commitment of friendly forces in almost any urban area outside of North America will necessitate use of step-down equipment before power can be provided to the end user. It would be useful if selected equipment requiring electric power were provided with a built-in capability to interface directly with European power distribution grids.

The Cbt Engr Bn would also be expected to provide limited vertical construction services, survey support, and general civil engineering for divisional elements. These additional general engineering requirements will be low in priority due to the high level of combat engineering support required in the functional areas of mobility, countermobility, and survivability. Vertical construction will consist of these expedient repairs necessary to make existing structures usable and limited construction of new facilities to include field sanitation units. The survey capability of the Cbt Engr Bn will not be used extensively within SYN City except to supplement surveys performed by artillery units. Coastal and hydrographic surveys will be conducted as necessary by the FMF Topo Plt in conjunction with other naval elements.

ENGINEER CSS - INTRODUCTION

ENGINEER COMBAT SERVICE SUPPORT FUNCTIONS INCLUDING HORIZONTAL AND VERTICAL CONSTRUCTION, FACILITIES MAINTENANCE, UTILITIES SUPPORT, AND TECHNICAL ENGINEER ASSISTANCE COMPLEMENT ENGINEER COMBAT SUPPORT FUNCTIONS TO PRODUCE A COMPLETE PACKAGE OF ENGINEERING SUPPORT FOR THE MAF. THE MAJORITY OF THE ENGINEER CSS SUBTASKS INVOLVE GENERAL ENGINEERING AND CAN BE ACCOMPLISHED BY ANY ENGINEER ELEMENT.

Engineer combat service support involves both general engineering and combat engineering to provide mobility through horizontal construction of roads, bridges, and airfields. Utilities support (water, electric power, hygienic services), although included as a CSS function, is a task shared by all MAF engineers with individual responsibilities according to supported units. Technical engineer support including cartographic and survey operations is also a shared responsibility between all engineer units. Many of the CSS subtasks are expeditiously accomplished by combat engineers in a combat support role (i.e., bridging, EAF repair, utilities support) to the minimum extent necessary for the maneuvering elements to accomplish their mission. Further rehabilitation of stationary facilities, or construction of new facilities, then becomes a combat service support function that provides general support to the MAF rather than direct support to a particular maneuver element.

The overall plan for engineer combat service support will be heavily influenced by the analyses of pre-operation ground and aerial reconnaissance supplemented by intelligence information from in-country agents. These sources of engineer intelligence will provide engineer planners and analysts with the following data:

- Current land utilization practices.
- Preliminary cross-country movement analysis.
- Population density and evacuation requirements.
- Location and quantity of indigenous construction materials.
- Location and type of MHE, transport vehicles, lighterage, railroad equipment.
- Building profiles, construction, street widths.
- Threat barrier planning and executed obstacles.

S-2 sections of MAF engineer units will compile lists of engineer-oriented EEI (and Joint Tactical Air Request Forms) which will be forwarded to

higher echelon Intelligence Operation Centers for consolidation and action. Once the reconnaissance mission has been flown the imagery is processed by IPC and IIC elements of the MAGIS System. Satisfied EEI are then forwarded back to the requesting unit. These data may be used to determine damage, capacity, utilization, and construction of existing facilities as these data impact on the military requirements of VII MAF and subordinate elements, and the task organization of engineer units.

Engineer units in the MAF include the Cbt Engr Bn, the Engr Supt Bn FSSG, and the Engr Sqdn MWSG. Each of these units accomplishes selected combat service support tasks, although the bulk of the Cbt Engr Bn effort goes towards providing the division with engineer combat support rather than engineer combat service support. Only the Cbt Engr Bn will be landed in entirety during D-day; other engineer units will have task organized elements accomplishing selected combat service support missions at designated areas.

The normal complement of engineer units organic to the MAF are anticipated to be tasked heavily during the early stages of Operation BREAKER. Rehabilitative efforts at airfields, port facilities, and extant bulk fuel storage facilities are beyond the capability of MAF engineers and augmentation will be provided by the Naval Mobile Construction Regiment consisting of a headquarters section and three Naval Mobile Construction Battalions. A command nucleus will land with the assault echelon, but the bulk of these assets will land with the AFOE. NMCB elements should be prepared to construct EAFs, clear and repair light damage to port facilities, provide assistance with ASP construction, and rehabilitate extant fuel storage facilities (within their capability).

Indigenous labor provides the only viable means to maintain and provide services to the populace. The LF CAG will effect liaison with municipal labor to provide water, electricity, sewerage, garbage collection, and food distribution services. Indigenous labor will not be used to provide direct military benefit to the Landing Force, but will interface with MAF engineering and civil affairs personnel to minimize disruption of essential services.

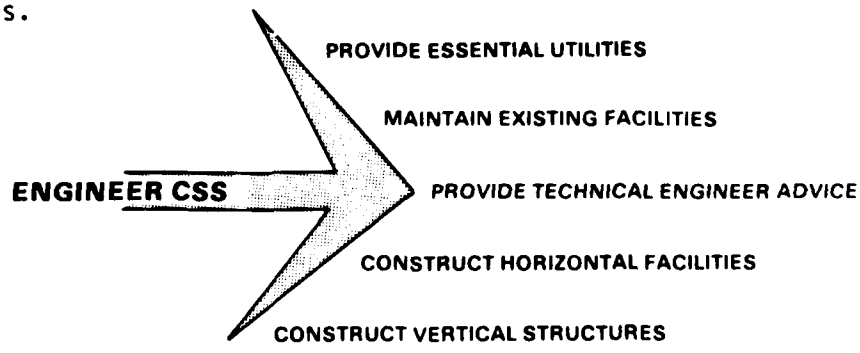


Figure V-2. Engineer Combat Service Support

Combat Service Support Functions and Requirements

ENGINEER HORIZONTAL CONSTRUCTION

ALTHOUGH MOST CONVENTIONAL LINES OF COMMUNICATION ARE WELL DEVELOPED IN SYN CITY, SIGNIFICANT ENGINEER REQUIREMENTS WILL BE LEVIED DURING THE REHABILITATION OF AIRFIELD FACILITIES AND THE DEVELOPMENT OF LOGISTIC SUPPORT AREAS.

Engineer combat service support tasks involving horizontal construction include:

- LOC Development
- Bridge Construction
- EAF, HLZ Construction
- Beach Preparation
- Bulk Fuel Operations
- Quarry Operations

All these construction tasks enhance mobility by providing surface transportation routes, support areas for MAW aircraft, and fuel for the MAF. Many of these tasks are begun by elements of the Cbt Engr Bn as they provide combat support for assault elements of 7th Mar Div. Expedient bypasses around road obstacles, obstacle clearance at HLZs, preparation of V/STOL surfaces, beach assault lanes, and assistance with AAFS installation are some of the tasks that will be completed by engineers in the assault echelon. Follow-on engineer elements in the Engr Supt Bn FSSG and Wing Engr Sqdn MWSG will be tasked to continue development of LOCs, preparation of BSAs and CSSAs, and installation of AAFSs and TAFDSs. All of the relevant horizontal construction tasks are progressive in nature and can be completed in phases by different engineer elements.

LOC Development

LOCs are well developed in the SYN City area and would not require any additional construction of primary or secondary roads to handle military traffic and associated load classes once the initial traffic control problems were solved and civilian traffic restricted. Due to the extent of the existing road net, new road construction would be limited to:

- Pioneer roads or improved surfaces in BSAs and CSSAs
- Combat trails through vegetated areas to forward battle positions
- Approaches to raft/ferry sites

Engineer resources landed with the Shore Party Teams will commence the upgrading of approaches to rafting and causeway sites at beach landing areas as soon as sufficient equipment has been landed on D-day. LOC development will proceed inland from the landing areas with pioneer road construction within the Beach Support Areas as dictated by the extent of the existing road net. Since the BSAs will serve as the focal point for logistics for less than five days, the extent of pioneer road construction in these areas is minimal and within the capabilities of each Shore Party Team.

Although the existing road network should be capable of supporting military operations within the populated areas, elements of VII MAF deployed on the fringes of the metropolitan boundary and west of the city may require the development of combat trails from existing roads to forward battle positions. The impact of vegetation upon cross-country movement in these areas could be significant, but the SYN City data base does not provide adequate data to assess mobility degradation. With the exception of farm land, swamp, and infrastructure at Airfield 1, all areas outside the metropolitan boundary are shown as being vegetated. It is doubtful, but not entirely impossible, that this vegetation would present an impenetrable barrier to vehicular mobility. A reasonable assumption is that the vegetation will degrade, but not prevent, movement over 75% of the vegetated areas.

The heaviest requirement for pioneer roads is expected at Industrial Area 1 from which Task Force A (MCATF) will be formed and deployed. Elements of BLT 1/3 deployed at the Dam and Bridge 3 will be foot-mobile and tasked to secure those key facilities. Requirements for cross-country mobility for this element will be minimal. Elements of BLT 1/3 deployed at the southern industrial area will have mobility requirements that can be satisfied by the use of existing lines of communication and open areas. Thus, the majority of pioneer roads will be required at the periphery of Industrial Area 1 and points west of that facility. It is estimated that a total of 3 km of pioneer road will be required in the immediate vicinity of Industrial Area 1 by the end of D+1. Construction requirements in or near the BSAs should be minimal and will not be included in the following equipment determination.

Using data from Table 16-12 FM 5-35, Engineers' Reference and Logistical Data, 1.6 man-days under adverse conditions are required to clear and grub 1000 SY exclusive of loading and hauling debris. A typical crew would include a crew leader, a dozer operator, and 2 to 5 men with pioneer equipment. Military two-lane roads are 15 yards wide including the travelled way, shoulders, and cleared lateral areas. If a seven man crew were utilized then 200' of pioneer road could be blazed in .23 days or 4.6 hours if a 20-hour day were used for calculation purposes. (If vegetation was limited to brush and small trees, then each dozer could clear 200' of double lane road per hour). Three teams, supplemented by tank dozers and infantry personnel, can accomplish the necessary construction by late on D+4 provided that equipment is on site by D+1. The Combat Engineer Battaliion Engineer Support Company will provide the operators and equipment which will move overland via secured route from the beach area to Industrial Area 1.

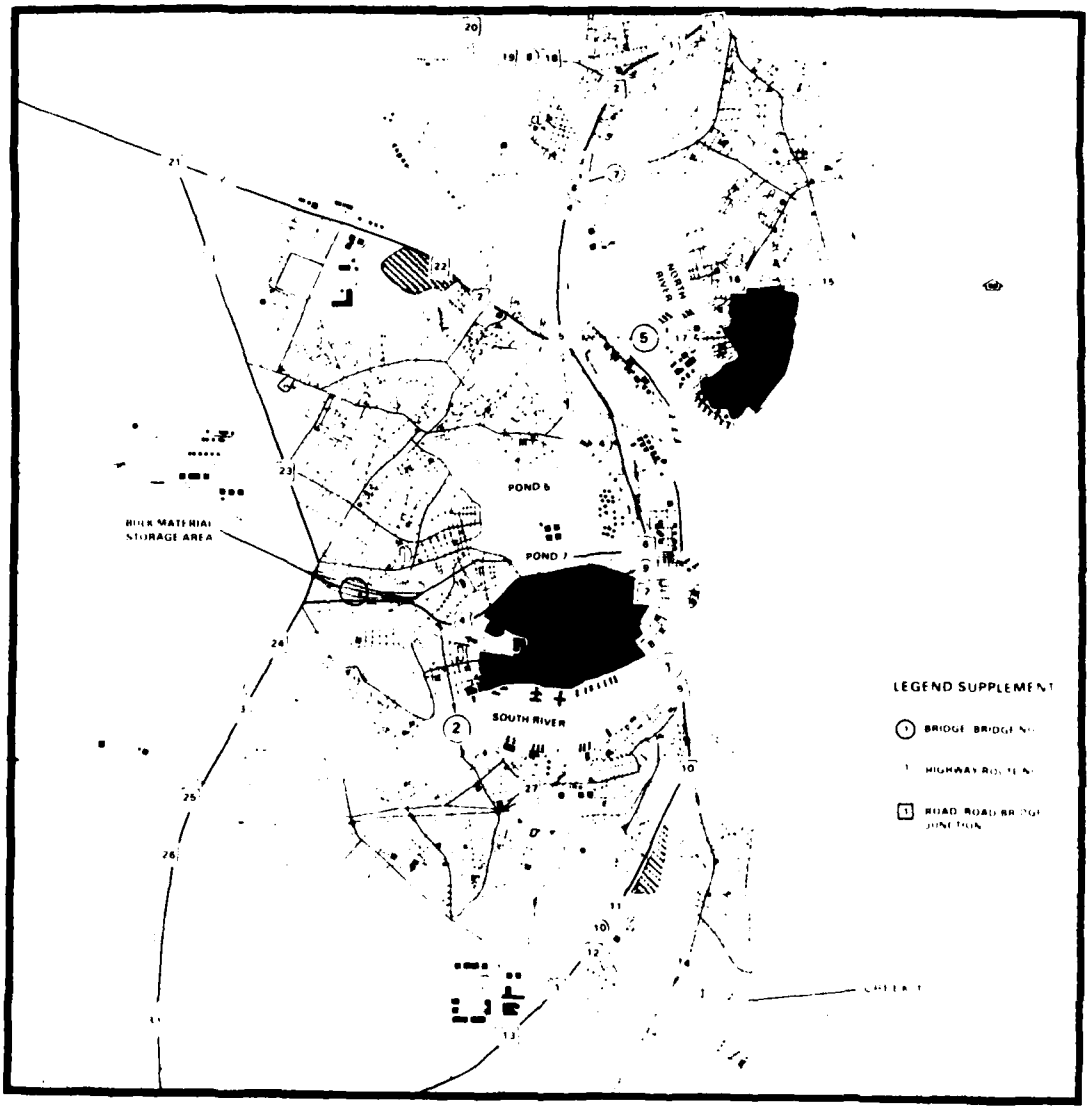
Engineer Horizontal Construction (Continued)

The rehabilitation of existing road surfaces will be necessary during the early phases of Operation BREAKER to repair combat damage and any serious deterioration that would degrade the movement of heavy logistics vehicles. Initial repairs will consist of backfilling craters, replacing damaged culvert, and expedient ditching in areas where substantial runoff is expected. (These tasks are also discussed in the Engineer Facilities Maintenance Section). Repair priorities, estimated start dates, and engineer unit responsibilities are shown in the table below. Numerical road designations are keyed to the modified SYN City map presented opposite.

It should be noted that road repair efforts will compete with EAF development and rehabilitation for the use of engineer equipment during the early stages of the amphibious assault. EAF development and earthmoving tasks in logistic support areas will be the top priorities in terms of horizontal construction tasks. Critical road repairs will be accomplished to the minimum extent necessary and only when this effort does not conflict with resource requirements at other areas.

TABLE V-1. PRIORITIES AND RESPONSIBILITIES FOR ROAD REPAIR

Priority	Road(s)	Estimated Task Size	Estimated Start Date	Unit Assigned
1	15, 16, 17, 5	Co.(-)	D+1	7th Cbt Engr Bn
2	3, 4, 5, 6, 7, 8	Bn.(-)	D+2	7th Cbt Engr Bn (Initially)
3	13, 12, 11, 10, 9	Plt. (+)	D+3	7th Engr Spt Bn 7th Cbt Engr Bn (Initially)
4	26, 25, 24	Plt. (+)	D+4	7th Engr Spt Bn 7th Cbt Engr Bn (Initially)
5	4, 22	Plt. (-)	D+5	7th Engr Spt Bn
6	5, 22, 21	Bn(-)	TBD	7th Engr Spt Bn
7	21, 23, 24	Bn(-)	TBD	7th Cbt Engr Bn
8	10, 14	Plt. (+)	TBD	7th Cbt Engr Bn
9	18, 19, 20	Plt. (-)	TBD	7th Engr Spt Bn
10	27, 26, 25	Co(+)	TBD	7th Cbt Engr Bn



Note: All primary roads have 4 lanes with a minimum width of 3.5m per lane and are composed of asphaltic and macadam blacktop material. All secondary and trinary roads have 2 lanes, minimum width 3.5m per lane. Secondary roads in the vicinity of the Old City (peninsula) are limited to 3 and 2.5m per lane. All secondary and trinary roads are composed of tar and imported gravel, macadam, and in certain areas of Old City, cobblestone material.

Figure V-3. Road Designations Within SYN City

Engineer Horizontal Construction (Continued)

Bridge Construction

The entire bridging capability of VII MAF is organic to the Bridge Co, Engr Supt Bn FSSG. The normal complement of bridging assets for this unit consists of 3 M4T6 bridge sets, 3 60T fixed highway bridge sets, and 6 floating foot bridges. These assets provide the capability to erect both fixed and floating bridges to support the movement of equipment and personnel. One M4T6 bridge set will be embarked in the Assault Echelon while the remainder of the bridging will arrive with the AFOE.

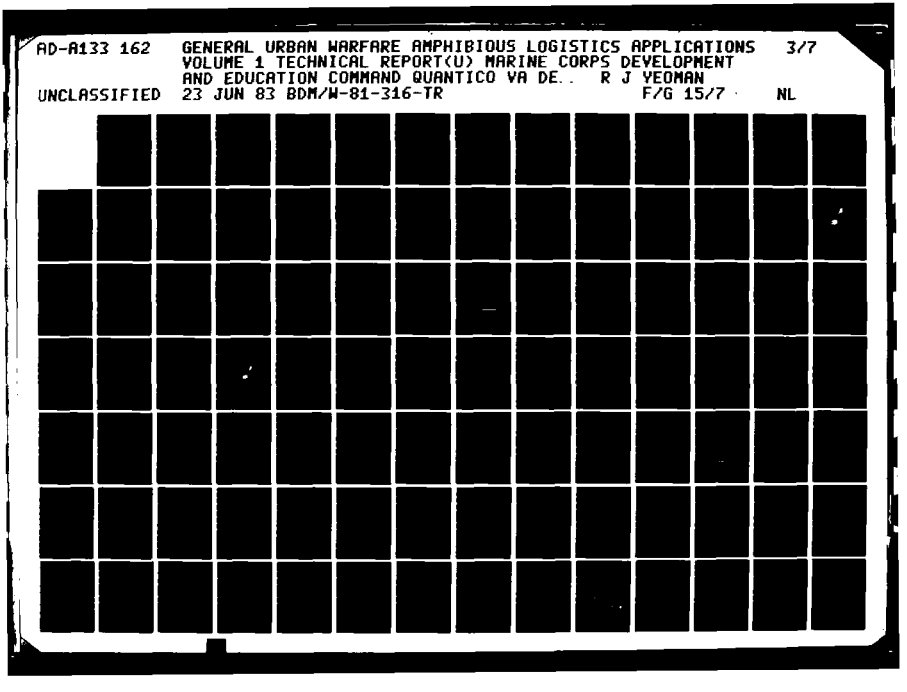
The SYN City metropolitan area contains ten bridges of military significance. These bridges, with pertinent dimensional and load data, are shown in the figure opposite. The current VII MAF capability to span wet gaps is limited to 810' (247m); consequently, heliborne elements landing at L-hour are tasked to seize (intact if at all possible) Bridges 1, 3, and 5 which are considered to be the most vital in terms of logistic and combat operations. Since the assets of one M4T6 bridge set will be earmarked for rafting operations at BLUE Beach, only 165m of float bridging will be available for use at other locations (North River). The total destruction of any bridges spanning South River will necessitate the use of M4T6 rafts, causeway ferries, or landing craft to maintain support of units south of South River.

Damaged bridge spans will be replaced using components of the fixed bridge sets. Repair of damaged bridging is the preferred course of action vice construction of float bridging due to the gap widths in South River. The construction of one float bridge across North River and one float bridge across South River (at existing sites) would require a minimum of 72% of the float bridge assets in the Marine Corps. The use of causeway ferries, rafts, and landing craft to supplement intact bridging will provide the time and flexibility necessary so that engineer elements can effect repairs to damaged bridge spans.

Fixed-span dry gap bridging requirements within the metropolitan boundary are negligible. Preassembled fixed spans will be used to cross dry gaps having no easy bypasses.

(10/50/14/40 T — BRIDGE #10, 50M LENGTH, 14M WIDTH, 40 T LOAD)

Figure V-4. Major SYN City Bridges - Pertinent Data


AD-A133 162 GENERAL URBAN WARFARE AMPHIBIOUS LOGISTICS APPLICATIONS 3/7
VOLUME 1 TECHNICAL REPORT(U) MARINE CORPS DEVELOPMENT
AND EDUCATION COMMAND QUANTICO VA DE.. R J YEOMAN
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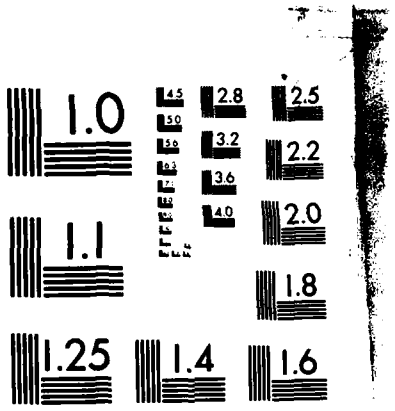


MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

Combat Service Support Functions and Requirements

Engineer Horizontal Construction (Continued)

EAF,HLZ Construction-General

Most cities with populations of 250,000 can be expected to have well-developed air facilities capable of supporting high-performance aircraft. Once rehabilitated, SYN City airfields will be able to satisfy all aircraft requirements during the assault and consolidation phases of the amphibious operation. Air facility requirements during sustained defensive operations must be reevaluated as high-performance aircraft assume increased importance for interdiction against Threat reinforcement efforts in areas external to the central metropolitan area. VSTOL aircraft and helicopter gunships will have a greater utility for use within the built-up area, but present lucrative targets for man-portable antiaircraft weapons sited in or around tall buildings. More accurate precision-guided munitions in the mid-range will increase the utility of fixed-wing aircraft and increase the requirements for well-developed air facilities.

Existing air facilities in SYN City consist of a 1,100m grass strip near the southern industrial area and a moderately well-developed airfield north of the urban area. This airfield has concrete runways of 2,900m and 1,300m, is capable of handling up to Boeing 737 aircraft, and would not require extension or modification of runway surfaces to handle military aircraft. Performance data from selected military aircraft is summarized in the table opposite. Runway length requirements vary by the aircraft, load, and climatology of the area. Figures given are for sea level ground runs with ambient temperatures in the vicinity of 60°F. Using data from Table 8-4 FM 5-35, Engineer Reference and Logistical Data, a C-130 aircraft utilized for medium lift would require 2,000' ground run at sea level and 59°F, or 2700' if a 1.25 safety factor and corrections for temperature and grade were included. Both airfields have the capability to land C-130 and C-141 aircraft although the sod strip runway surface and adjacent parking areas may be too rough and require additional leveling and compaction. A discussion of restoration (AF 1), development (AF 2), and construction (EAF 3) requirements for SYN City air facilities follows this subsection.

Helicopter landing zones (HLZs) will be used to land approximately 20% of the ground combat element. Each LZ must be able to accommodate a simultaneous landing of up to 16 CH-46 aircraft. HLZs have been sited in cleared, open areas free of overhead obstructions and are not expected to require extensive engineer development. Helicopter Support Teams are tasked to accomplish any engineering required on an expedient basis. Further development of HLZs will be the responsibility of the Combat Engineer Battalion and/or Engineer Support Battalion.

TABLE V-2. RUNWAY LENGTH REQUIREMENTS FOR SELECTED AIRCRAFT

AIRCRAFT	T-O RUN[1]	T-O RUN[2]	T-O RUN TO CLEAR 15m OBST[1]	T-O RUN TO CLEAR 50' OBST[2]
C-130E	1091m/3578'	3600'	1573m/5159'	5275'
C-141B	1829m/6000'	N/A	N/A	N/A
C-5A	2134m/7000'	6020'	2560m/8397'	6910'
BOEING 737	N/A	N/A	2073m/6800'[3]	N/A
A6E	610m/2000'	N/A	795m/2610'	N/A
EA6B	N/A	N/A	869m/2850'	N/A
F4E	1338m/4390'	2940'	1792m/5880'	3580'
F/A 18	305m/1000'	N/A	N/A	N/A
OV-10A	226m/740'	N/A	341m/1120'	N/A

Notes:
1 Data from Janes A/C of the World 75-76, 79-80; A/C at max load.

2 Data from FM 5-35, Engineers' Reference and Logistical Data; unspecified A/C load.

3 T-O to clear 10.7m obst with JT8D-9 engines, 1615m with JT8D-17 engines.

Combat Service Support Functions and Requirements

Engineer Horizontal Construction (Continued)

Airfield 1 Restoration

Airfield 1 is ATF Objective 2 and its seizure and early repair are essential to support MAW fixed-wing assets and provide a logistic base supporting breakout operations to the northwest of SYN City. The limited potential for establishing additional air facilities prior to D+15 makes it imperative that required engineer personnel and equipment be committed early in Operation BREAKER to effect major repairs to Airfield 1 and provide the capability for continued maintenance of this facility.

Threat forces are familiar with US Marine Corps material, equipment, doctrine and capabilities for establishing expeditionary airfields (EAF). In the attack on SYN City, or in any similar operation requiring seizure of a major airfield, Landing Force logistics and aviation planners must understand Threat defensive doctrine and practices and anticipate the worst case. The runway, parking areas and taxiways will be heavily cratered at intervals close enough to deny use of the airfield to any aircraft except helicopters and V/STOL aircraft. Control and communications facilities will be destroyed or rendered inoperable. Fuel storage tanks, material handling equipment (MHE) and aviation ground equipment (AGE) will also be destroyed or severely damaged. Mines, booby traps, and delayed explosive devices must be expected to be dispersed throughout the airfield area.

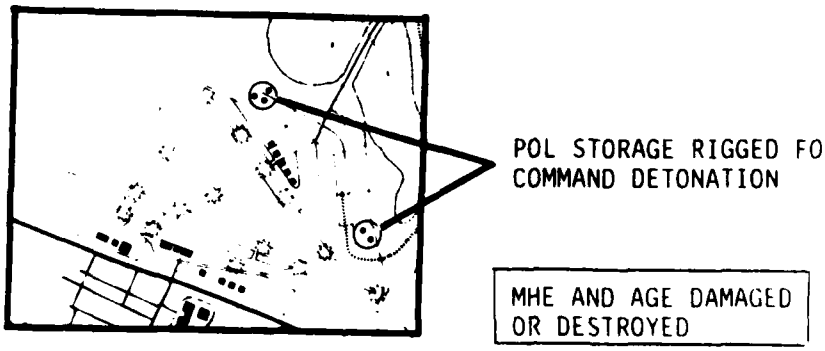


Figure V-5. Anticipated Denial Efforts at Airfield 1

D-day	•	BLT 1/1 seizes control of Airfield 1 (L-hour).
	•	Engineer equipment lands over RED Beach as unscheduled waves.
D+1	•	WES, Engr Supt Bn, and NMCB personnel complete repair estimate.
	•	Engineer personnel and equipment moves to AF 1 via secured route.
	•	Begin sweeping of critical areas for mines and boobytraps.
D+2	•	Complete sweep of essential areas.
	•	Establish 2 HERS.
	•	Establish 5000' MOS by repair of 2 craters.
D+3	•	Install TAFDS; fill using temporary pipeline from RED Beach.
	•	Rehabilitate main runway by repair of 3 additional craters.
	•	Establish 2 rearm points.
	•	Begin construction of Class V(A) ASPs (ultimate facilities must provide for storage of 3891 ST requiring 565 acres).
D+4 to D+6	•	Repair additional 9 craters.
	•	Continue development of ASPs.
D+7 to D+10	•	Install necessary EAF and SATS equipment.
	•	Complete 750 ST ASP; continue ASP development.

Figure V-6. Timetable for Rehabilitation of Airfield 1.

Engineer Horizontal Construction (Continued)

In estimating the time required to repair Airfield 1, the standards set forth in Air Force Regulation 93-2, "Special Civil Engineering Base Recovery Planning," were modified to reflect a 2.5x increase in time required for repairs based on discussions with personnel currently developing rapid runway repair (RRR) techniques and equipment. For example, the PERT Diagram in Appendix I of AFR 93-2 shows precisely four hours from start to completion for the repair of four large craters. This assumes that all personnel are on the alert in the operating area, all RRR equipment has been located and is operational, a preliminary determination of crater locations and the new emergency runway centerline has been determined by responsible authority, and team members have been identified, trained, and properly briefed on their assignments. Experienced personnel suggest that 10 hours is a more realistic expectation for a prescribed crew (91 men) to complete repairs to four large craters in a combat environment.

The Air Force data were then compared and contrasted with the estimated time for MAF personnel to repair six craters at a commercial airfield. Forces involved were engineer/MCB personnel supporting a MAF in the MARCORS 1-based study of "(S) Navy/Marine Corps Engineer and Construction Operations (1980-85) (U), Vol. III, Annex D." That document provides the crater description (32.5'Dia. x 8' Deep), the location of a borrow pit 1.5 miles away, and includes a requirement for laying 31,104 square feet of AM-2 matting. Thirteen personnel were estimated to be able to complete repairs to the six craters in 200 man hours in a 20-hour period. An additional double crew (32) of mat layers were credited with laying 31,104 square feet of AM-2 matting in 512 man hours during a six-day period (D+6 to D+12).

	NOTIONAL USAF RRR TEAM*	MAF EMGR AIRFIELD REPAIR TEAM**
OIC	1	
Damage Control Crew	4	
NCOIC	1	
Centerline Crew	2	
Hauling Crew:		
Supervisor	1	
Front End Loader Operator	1	3
Dump Truck Operator	15	3
Tractor/Trailer Operator	3	
Crater Crews:		
Supervisor	3	
Front End Loader Operator	6	
Grader Operator	3	2
Dozer Operator	3	1
Vibrating Compactor Operator	3	2
Vacuum Sweeper Operator	2	
Rotary Sweeper Operator	4	
Water Distribution Truck Opr		2
Mat Laying Crews		
Mat Crew Leader	3	2
Mat Laying and FOD Cover	36	30
Spall/Scab Repair Crew		
Total	91	45

* AFR 93-2, Special Civil Engineering Base Recovery Planning.
** MCDEC (S) Navy/Marine Corps Engineer and Construction Operations (1980-85) (U). Vol. III, Annex D.

Note: The USAF RRR Team used in this comparison has a relative equipment advantage of 7:3 Front End Loaders, 5:1 Dump Trucks, 1:1 Dozer/Scraper, and 3:2 Compactors. Adding the two equipment [illegible] indicate a rough advantage of 2.88:1 in equipment, including a very significant advantage in dump trucks, which is important when [illegible] cycle time from borrow pit to crater repair site.

- Using the MAF engineer airfield repair team shown above
- Discounting enemy interdiction or chemical warfare attack
- Assuming no delayed, command-detonated explosives.

A 5,000-foot MOS can be operable approximately 6.67 [illegible] commencement of work (two craters require repair). Thereafter, craters can be repaired by the 45-man MAF crew in 41.33 [illegible] hour working days.

Figure V-7. Proposed VII MAF Airfield Repair Team

The restoration effort at Airfield 1 will depend heavily upon the timely availability of requisite personnel and materiel resources. While selected engineer materials are available in SYN City, specialized resources such as matting and Silikal must be embarked aboard AE and AFOE shipping.

- Construction material stored at E6-N7 and E9-N8 will be exploited, particularly crushed stone required for crater repair and sand for mixing with Silikal to form a polymer-mortar for spall/scab repair. (Liquid components of Silikal have a minimum shelf life of five years).

- Fill materials can also be procured by collecting rubble and railroad ballast. Sand or other aggregate for mixing with Silikal is expected to be available at construction site; the sand along beaches and offshore islands is contaminated with salt and unsuitable for use.

- Construction equipment at the industrial area E8-N2 and other equipment known to be parked in various locations in SYN City will be commandeered as required to augment Landing Force construction equipment. Priority will be accorded to rehabilitation of Airfield 1.

- The Landing Force will embark AM-2 matting and components for fiberglass reinforced polyeser (FRP) in the AE and AFOE.

- Commercial shipping will deliver five million square feet of AM-2 between D+5 and D+30. (The total volume of this matting would require 65% of the capacity of one SEABEE vessel. The 25,000 square feet of FRP in the AE is sufficient to repair at least 18 large craters in a commercial runway and is the equivalent of two USAF RRR Base Sets.

- The Wing Engineer Squadron will assist a Naval Mobile Construction Battalion in accomplishing the necessary runway repairs, initially providing a 5,000-foot minimum operating strip (MOS) to acommodate fixed-wing aircraft. Thereafter, repairs will be made to the full length of the runway, taxiways, parking areas, etc.

During post-D-day operations, after Airfield 1 has been made operable, Threat forces will undoubtedly cause additional heavy damage to the runway and other facilities by artillery fire and air attack. The capability must exist for making rapid repairs. AM-2 matting and FRP will be stockpiled at the airfield, as will other supplies and equipment needed to make emergency repairs. FRP patches will be prefabricated as time permits.

Engineer Horizontal Construction (Continued)

Airfield 2 Development

In most scenarios the 1,100m grass strip at Airfield 2 will be required to support tactical air operations. Detachments from the 7th MAW Engineer Squadron, the 7th FSSG, and Naval Construction Regiment will be tasked to incrementally establish an EAF at Airfield 2. The level of effort to prepare Airfield 2 for use as an EAF will depend upon several factors:

- The nature and amount of any damage, such as cratering or ditching, that Aggresor forces inflict on the grass strip.
- The possibility that the airfield will have been mined prior to D-day.
- The nature and construction of buildings to the west of Airfield 2 that may have to be removed to provide for extending the strip. (This information is not provided in the SYN City data base).

It will be necessary to investigate the possibility of mining as soon as the airstrip is in friendly hands. Several options are open to the engineer unit commander who is assigned responsibility for beginning construction of the EAF:

- Initiate requirements for pre-D-day aerial reconnaissance to provide a variety of repetitive coverage designed to detect mining activities at or near the airfield.
- Initiate interrogations of local citizens on D-day at and near the airfield to determine whether recent mining has occurred.
- Conduct a careful heliborne visual reconnaissance of the airfield on D-day prior to sweeping it.
- Roll the field using compacting equipment. Alternatively, US Army mine rollers could be used if the requirement is identified prior to embarkation of the AE.
- Sweep the airfield manually using AN/PRS-8 and AN/PSS-11 mine detectors. In the mid-range period vehicle-mounted mine detectors, and possibly helicopter-mounted detectors, should be available.

If the decision is made to sweep Airfield 2 (26,400 square meters), it will take from 24.1 to 29.4 platoon hours for a 37-man engineer platoon to complete the sweeping operation using AN/PRS-8 and AN/PSS-11 mine detectors. If the airfield has been converted into a deliberate minefield, a decision might be forthcoming to forego its use and establish an EAF elsewhere, by using a section of a major highway or establishing an EAF in farmland or other previously cleared space. Clearing a heavily mined area the size of Airfield 2 using ropes and/or explosives could take from 2158.4 to 2423.3 platoon hours using the formulae in FM 5-34 or FM 101-10-1.

The most viable near-term solution to the mining problem at Airfield 2 is to utilize vehicular-mounted mine detection equipment to provide a quick sweep of the airfield surface. A sparse mining effort would be neutralized by combat engineer teams using standard methods to detonate individual mines. These methods would not be satisfactory to breach a heavily mined area due to the limited number of available mine detectors during this stage of the amphibious assault. Line charges and/or SLUFAE breaching munitions would cause a degradation in the sod surface as well as divert these resources from more profitable uses. A field-expedient solution would be to fabricate a heavy roller which could be pushed in front of an armored vehicle. The roller should be filled with earth to absorb mine blasts. Mine damage could be repaired with sheet steel and a portable welding set. Use of the roller would also tend to compact and level the landing surface prior to installing matting.

TABLE V-3. RANGE OF ENGINEER EFFORT AT AIRFIELD 2

Activity	Case 1 Airfield 2 Undamaged & Unmined			Case 2 Airfield 2 Heavily Cratered*			Case 3 Airfield 2 Heavily Mined		
	No. Men	Begin	Complete	No. Men	Begin	Complete	No. Men	Begin	Complete
Sweep Airfield							37	D+1	D+2
Fill Craters				24	D+2	D+5			
Remove Mines**							74	D+1	D+15
Install 72' x 72' EOS	32	D+2	D+2	32	D+2	D+2	32	D+2	D+2
Increase to 72' x 600' EF	32	D+2	D+3	32	D+2	D+3	32	D+2	D+4
Increase to 72' X 1,800' EAB Add Taxiways & Parking	64	D+3	D+10	64	D+4	D+11	64	D+5	D+12
Increase to 72' EAF 3,600' Add Taxiways & Parking	160	D+11	D+26	160	D+12	D+20	160	D+13	D+22

* Assumes 1 crater 20'L, 15'W, and 7.5'D every 100 feet; 1 hour for 4 men to fill each crater (3.5 man-hours); use of 6 teams with engineer equipment.

** Assumes 1 mine per square meter (26,400); mine removal @.588 man-hours per mine; two platoons of 37 men working 12-hour shifts.

*** Mat layers move at least 300 meters behind mine clearing teams.

Note: When planning factors consist of a range, such as 27-33 man-hours, the average (30) is used.

Reference: FMFM 5-4, Offensive Air Support; FM 5-34, Engineer Field Data; MCDEC (S) Navy/Marine Corps Engineer and Construction Operations (1980-85) (U) VOI. III, Annex D.

D-day	•	BLT 1/3 seizes control of Airfield 2.
	•	Engineer equipment lands over BLUE Beach as unscheduled waves.
D+1	•	WES, Engr Supt Bn, and NMCB personnel complete repair estimates.
	•	Engineer equipment and personnel move from BLUE Beach to AF 2.
	•	Begin sweeping for mines and boobytraps; neutralize.
D+2	•	Establish 2 HERS.
	•	Begin matting in trace of mine clearing teams.
D+3	•	Install TAFDS; Fill by temporary pipleine from BLUE Beach.
	•	Establish 2 rearm points.
	•	Begin construction of Class V(A) ASPs. (Ultimate facilities must provide for storage of 1946 ST requiring 282 acres).
D+4 to D+11	•	Continue mine sweeping, matting, and development of ASPs.
D+12	•	72' x 1,800' EAB surface with taxiways and parking complete.
D+22	•	72' x 3,600' EAF with taxiways and parking complete.
Note:	This timetable is applicable to Case 3 - Heavy Mining.	

Figure V-8. Timetable for Development of Airfield 2

EAF 3 Construction

Once SYN City has been seized and consolidated on or about D+10, elements of VII MAF will deploy to the northwest of SYN City to locate and destroy Threat forces. The displacement of these elements from SYN City may necessitate the construction of an EAF outside the metropolitan boundary at an unspecified distance. This new facility should be capable of supporting the deployment of two fixed-wing MAGs or equivalents. The 7th Naval Construction Regiment will be tasked with the sole responsibility for construction of this EAF. The construction effort will be progressive and incorporate three principal phases:

- Phase 1 - Complete 72' x 600' matted runway by D+15 (D+11 start date).
- Phase 2 - Expand runway to 72' x 1,800' with 236,448 SF matted taxiway and parking area by D+22.
- Phase 3 - Complete 96' x 5,184' EAF with additional 1,368,900 SF matted taxiway and parking area by D+32.

Equipment:	10 Scrapers	7 Graders	5 RT forklifts
	20 Medium bulldozers	7 Vibratory Rollers	1 Water Distribution Truck

Matting:	43,200 SF by D+15	(Delivery D+11)	2 matting crews
	322,848 SF by D+22	(Delivery D+15)	4 matting crews
	1,736,964 SF by D+32	(Delivery D+22)	10 matting crews
	2,103,012		

- Two operators per equipment item
- Motor transport resources excluded
- Matting crew consists of 16 personnel

Source: (S) Navy/USMC Engineer and Const Opns (1980-1985) Vol III Annex D (U)

Figure V-9. Resource Requirements to Construct EAF 3

Engineer Horizontal Construction (Continued)

Beach Preparation

The level of engineer combat service support for beach preparation depends on the extent of Threat obstacle emplacement, the existing road net into the beach area, and the trafficability of beach surfaces. Initial obstacle breaches will clear two lanes per assaulting BLT through each landing beach. Obstacles bypassed but not breached will be evaluated and breached later in the operation if they pose a hazard to friendly operations.

Although the beach landing areas have no appreciable vegetation, the compacted and confined sand will support only 6 T/SF and may require surface matting to support sustained traffic of heavy wheeled vehicles. Tracked vehicles will have excellent mobility in the beach areas but may require blazing of combat trails through thickly vegetated areas farther inland. The majority of beach preparation necessary to support the MAF landing will be accomplished by combat engineers breaching obstacles and preparing matted surfaces for movement of heavy wheeled vehicles.

Mobility degradation in the backshore areas is not expected to be significant and can be alleviated by the use of alternate routes or grading and compaction. The most serious problems occur in the near shore area and immediately into the surf zone. This "wet track" problem will occur during the landings of initial surface waves and will require that dunnage, Mo-Mat, or other shore-side surfacing materials undergoing development be available at beach landing areas early in the assault. Deflation of tires to recommended levels will also improve mobility over beach surfaces.

The Cbt Engr Bn Supt Co has 120 assault trackway kits, each 12' x 48', for a single lane total of 5760'. These Mo-Mat sections will be emplaced in selected areas to enhance beach mobility for wheeled vehicles. Unused trackway kits will remain in the beach support area until needed there or in the CSSAs when they are developed. No beach area is more than 500m from a secondary or improved road. Road construction within BSAs will consist of expedient unimproved trails permitting easy access to supply and equipment stocks.

Improvements in soil stabilization processes can be expected to occur during the mid- and long-range periods. Palliatives that are quick-hardening, easy to apply, and capable of supporting sustained wheeled traffic will significantly reduce engineer requirements for surface matting in beach areas. The use of LCACs for LOTS operations will also reduce the need for matting of beach surfaces, extensive horizontal construction of fair weather roads from the water's edge to the beach support area, and construction of numerous pontoon causeways.

Quarry Operations

The SYN City Data Base does not provide detailed information concerning the types or quantities of engineer materials such as construction quality sand, gravel, or cement. One of the EEI for pre-operation imagery will be the location of these materials. Once ashore, continued engineer reconnaissance operations will be undertaken to confirm any data compiled from the analysis of imagery. Although an unlimited quantity of sand is available in the beach areas, this sand will not be suitable for mixing with cement due to the presence of salt which will tend to decelerate the curing process. Suitable sand must be procured further inland or along rivers. This sand should be washed before use to reduce the level of trace salts. Beach sand will be suitable for firefighting, sandbags, and road construction.

While the availability of gravel in the local area is not known, the urban area may provide substitutes suitable for effecting hasty repairs during the assault phase. Railroad ballast and masonry rubble can be crushed as necessary with the 75-ton-per-hour rock crusher and screening plant organic to the Engr Supt Bn FSSG. (This equipment item is currently in storage but available for deployment. The real problem may be finding trained and experienced operators.) The rock crusher and screening plant will be embarked in the AFOE and earmarked for early unloading. Best available materials will be used until this item is operational ashore (D+7).

Cement may be available in SYN City and in-country agents, counterintelligence teams, and photointerpreters will be tasked to locate and quantify this material. Cement will be required to effect repairs to Airfield 1, harden defensive positions, repair damaged bridge surfaces, and a variety of other uses. In the absence of any information to the contrary, the Landing Force should plan to embark the normal load of cement and supplement this stock with any suitable indigenous stocks.

It is not anticipated that quarry operations per se will be required to secure engineer materials in SYN City. Local materials, readily available, will be exploited whenever possible and indigenous stocks will be commandeered as necessary.

Combat Service Support Functions and Requirements

Engineer Horizontal Construction

Bulk Fuel Operations

Bulk fuel operations require extensive engineer assistance for establishing the physical layout for fuel bladders and associated pumping equipment. MAF engineers are responsible for establishing AAFSs, TAFDSs, and HERs in locations appropriate to the tactical situation. Major bulk fuel facility locations, phasing, and responsibilities for emplacement are given in Appendix 1 (Bulk Fuel Operations) to Annex P (Combat Service Support) to Operation Plan 1-81. Engineer equipment (dozers, scoop loaders) is necessary to prepare the site by leveling and moving earth into berms before fuel bladders can be installed. Each Bulk Fuel Co in the Engr Supt Bn has 4 Terex 72-31MP scoop loaders to accomplish earthmoving tasks associated with emplacing the fuel bladders below ground level surrounded by earthen containment structures. A complete AAFS can be installed in less than 48 hours. Tank farm assemblies would require 8-10 hours to install. Installation of the fuel systems is an engineer responsibility - delivery of bulk fuel to the user is a motor transport responsibility. The basic concept is to establish storage facilities progressively corresponding to the build-up of VII MAF elements within the FBH.

Bulk fuel storage facility requirements are shown in the table opposite. These facilities are designed to provide storage for a 3 DOS level of both Class III(A) and Class III(W). The total number of AAFSs deployed in Period V equals 44% of the MAF AAFS assets. Although all sixteen AAFSs could have been sited within SYN City, the deployment of VII MAF to the northwest will require establishment of forward fuel storage sites. Storage facilities not required to support operations within SYN City will be stocked in CSSA 1 and be immediately responsive to the changing situation. Additional fuel storage can be provided by the use of DRACONEs which can store up to 135,000 gallons apiece (Type "L" DRACONE). Commercial lighterage available at Piers 5 and 25 could hold a total of 1300 bbl (54,600 gal) and be relocated to provide emergency storage either offshore or on the rivers. Fuel tankers in the Sea Echelon will deliver bulk fuel at two-day intervals.

The fuel farm complex located at E9-N9 (capacity unknown from data base) would be a key target for denial efforts by retrograding Threat forces. The level of damage may vary from slight damage and isolated tank ruptures to severe damage with all volatile fuels destroyed. Distribution lines, manifolds, and pumps would be targets for selective demolitions designed to isolate sections of the system. Threat denial efforts could be accomplished in several hours using as little as one engineer team aided by civilian technicians employed in the fuel complex. Consolidation of this area will not be possible prior to D+3 but engineer reconnaissance conducted from aerial platforms will be used to maintain a current estimate of the repair effort necessary to rehabilitate sections of the complex for use by friendly forces. Once the area has been consolidated, FSSG engineers in the Bulk Fuel Co will conduct a ground reconnaissance of the

fuel complex and distribution systems: prepare courses of action for repair, each with a detailed estimate of all resources necesary to complete that level of repair; and commence repairs once a course of acton has been selected and personnel become available. A Naval Mobile Construction Battalion will be tasked to complete the rehabilitation of the fuel system within SYN City as a secondary priority after airfield rehabilitation and port repairs are well underway and equipment becomes available.

The assets organic to the Bulk Fuel Companies (with slight augmentation from the Engr Supt Co) are adequate to establish the facilities noted below. Facilities noted under Period V should be embarked in the Assault Echelon as should all items of engineer construction equipment.

TABLE V-4. BULK FUEL STORAGE FACILITIES DURING OPERATION BREAKER

Location	Period II			Period III			Period IV			Period V		
	HERS	AAFS	TAFDS	HERS	AAFS	TAFDS	HERS	AAFS	TAFDS	HERS	AAFS	TAFDS
RED Beach	1	.4[1]	-	1	.6	-	-	.6	-	-	.6	-
Port	-	-	-	1	-	-	1	1	-	1	2	-
AF 1	2	-	-	4●	.2●	1●	5*	.6*	2*	5*	1.2	2*
AF 2	2	-	-	4●	.2●	1●	5*	.6*	2*	5*	1.2	2*
BLUE Beach	1	.4	-	1	.6	-	2	1	-	3	1	-
Industrial Area 1	1	-	-	2●	-	-	2	.6*	-	2*	1*	-

Note 1 An AAFS consists of 5 tank farms and ancillary equipment. A fractional requirement indicates the number of tank farm assemblies, i.e., .4 indicates 2 tank farm assemblies.

2 The storage capability provided above will satisfy a 3 DOS stockage level based on calculated consumption (1.5 DOS for Class III(A) in PII, III.) See Chapter VII for additional information.

● Fuel transported by M970 5000 gal semi-trailer refueler or or temporary pipeline.

* Fuel supplied by pipeline (may be temporary in Period IV).

Engineer Horizontal Construction (Continued)

Conclusions and Recommendations

Engineer horizontal construction tasks within the first fifteen days of combat in SYN City will include rehabilitation of Airfield 1, development of an EAF at Airfield 2, development of logistic support areas (BSAs, CSSAs), beach preparation, bulk fuel facility installation, LOC development, and limited quarry-type operations to secure engineer materials. These tasks are accomplished concurrently and are expected to exceed the resources available to the Engr Supt Bn FSSG which will have the primary responsibility for engineer development of logistic facilities. Some augmentation is possible from the Combat Engineer Support Co but the bulk of the additional personnel and equipment will come from the Naval Construction Regiment which is embarked in the AFOE.

General task responsibilities and associated unit responsibilities are shown below. This initial plan will be modified based on photographic intelligence, the level of battle damage, and resource availability after the assault echelon landing.

TABLE V-5. ENGINEER HORIZONTAL CONSTRUCTION TASKS, PRIORITIES, AND RESPONSIBILITIES

TASK	SUBTASK	START DATE	PRIORITY	RESPONSIBLE UNIT
LOC Development	Repair Battle Damage	D-day	1	CEB, ESB
	Blaze Combat Roads	D+1	2	CEB
	Develop LSA Road Net	D+1	2	ESB
Bridge Construction	Bridge Repair	D+5	2	ESB, NCR
	Float Bridging	D-day	1	ESB
EAF Construction	Rehabilitate AF 1	D-day	1	ESB,NMCB 1/7
	Develop AF 2	D-day	1	NMCB 2/7,ESB
	Construct EAF 3	D+11	2	NMCB 3/7
Beach Preparation	Enhance Mobility	D-day	1	CEB, LFSP
Bulk Fuel Operations	Site Preparation	D+1	3	ESB
	Facility Installation	D+1	2	ESB
Quarry Operations	Crushing & Screening	D+7	3	ESB
ASP Construction	Earthmoving	D+1	2	NCR, ESB

The following recommendations should be considered relative to the engineer horizontal construction effort. Implementation of these recommendations should facilitate the timely accomplishment of the numerous engineer horizontal construction tasks encountered in the early stages of an amphibious assault into the SYN City area.

- An informal Engineer Group should be formed to coordinate the utilization of engineer resources to accomplish horizontal construction tasks. Liaison sections from each engineer unit (CEB, ESB, WES, NCR) will maintain current estimates of all priority projects and recommend diversion of engineer resources when necessary.

- The Naval Construction Regiment should be programmed to arrive in the AOA no later than D+5. An austere advance party will be embarked with the Assault Echelon. NCR assets are vital for the development of airfield facilities, ASPs, and port facilities. The NCR augmentation will provide for sufficient engineer resources to handle worst-case denial efforts and equipment non-availabilities in engineer units organic to VII MAF.

- It is vital that the Wing Engineer Squadron and NCR be provided with the capability to effect Rapid Runway Repairs using techniques developed recently. Rapid Runway Repair sets should be added to the T/Es of these units.

- The Naval Construction Regiment capability to repair port facilities is questionable and should be reevaluated once the Amphibious Logistics System is fully implemented. In the near-term, the NCR should be prepared to repair light to moderate damage to modern docks and wharves.

ENGINEER VERTICAL CONSTRUCTION

THE URBAN SYN CITY ENVIRONMENT PROVIDES NUMEROUS EXTANT FACILITIES THAT MAY BE USED FOR BILLETING, MAINTENANCE, STORAGE, MATERIALS HANDLING, AND MEDICAL TREATMENT. THE PREPARATION OF DEFENSIVE POSITIONS WILL REQUIRE THE MAJORITY OF ENGINEER EFFORT WITH RESPECT TO VERTICAL CONSTRUCTION.

Engineers are responsible for providing combat service support in all areas of vertical construction by erecting:

- Temporary Camps
- Maintenance Facilities
- Storage Facilities
- Landing Ramps and Docks
- Medical Facilities
- Defensive Positions

Requirements for vertical construction are generally quite extensive for Marine forces landing in non-urban environments. The SYN City area with existing housing, storage, and maintenance facilities provides many opportunities for VII MAF elements to utilize these structures with expedient modifications based on the unit mission and the characteristics of the structure. Units that normally require enclosed areas to conduct operations will initially use organic tentage until local structures become available through consolidation of tactical areas of responsiblity. Unit commanders in conjunction with engineer representatives will survey selected buildings for suitability for military use. Relevant considerations include building location, ease of ingress/egress, building construction materials, intended use, and types of nearby buildings. Buildings selected for military use must be swept and cleared of mines (AP), boobytraps, and other hindrances to safe and efficient use.

Construction of temporary camps will not be necessary within SYN City. Elements of VII MAF will utilize organic shelters or annex civilian structures as appropriate to the unit mission and tactical situation. POWs and civilians internees will be housed in the prison complex located in the vicinity of E8.8-N8.5 as well as other detention facilities dispersed throughout the city. Should the number of detainees exceed available facilities, additional structures will be annexed. Construction of detention facilities is not anticipated during the assault phase of Operation BREAKER. Although temporary camps will not be constructed, selected facilities such as sanitation units, guard shacks, and command bunkers may be required. Any engineer unit attached or in general support of the requesting unit has the capability for rough carpentry work conforming to user specifications. All temporary camp facilities will be expedient T/O construction using indigenous materials whenever possible and LF supplies when indigenous materials are not available due to insufficient stocks or tactical situations that do not permit transportation of materials from the stockage point to the job site. Landing Force Class IV materials will not be landed in quantity prior to Period IV.

The development of logistic support areas (HLZs, BSAs, CSSAs) within the metropolitan boundary of SYN City will require the evacuation and relocation of up to 28,293 indigenous personnel. These personnel will be provided shelter in municipal schools proximate to their original residence. Educational facilities, including the university on the peninsula, are estimated to have the capability to provide temporary shelter for up to 44,668 personnel. The construction of resettlement camps to house these evacuees will not be necessary in this situation, due to the availability of suitable facilities that are designed to provide shelter, messing, and sanitary services. (Note that schools will likely not be in session during the amphibious assault and subsequent consolidation.) The evacuation timetable, requirements, and relocation sites are shown in the table below.

TABLE V-6. CIVILIAN EVACUATION TIMETABLE, REQUIREMENTS, AND RELOCATION SITES

AREA	BEGIN EVAC.[1]	NO. OF CIVILIANS	PURPOSE	POSSIBLE RELOCATION SITES[2]
RED BEACH BSA	D+1	6,412	RED BEACH/LOC SECURITY	UNIVERSITY (2,500) 3 OLD CITY SCHOOLS (5,271)
SOUTH OF AIRFIELD 1	D+1	1,764	AIRFIELD/LOC SECURITY	4 NEARBY SCHOOLS (7,029)
PORT AREA VIC. NEW CITY	D+3	4,144	CSSA 1 REQUIREMENT	5 NEW CITY SCHOOLS (8,785)
BLUE BEACH BSA	D+1	700	BSA SECURITY	1 SCHOOL WEST OF BEACH (1,757)
SOUTH OF BLUE BEACH	D+3	8,498	CSSA 2 REQUIREMENT	5 SCHOOLS IN WESTERN SUBURBS (8,785)
VICINITY OF AIRFIELD 2	D+3	3,275	EAF SECURITY AND RUNWAY EXTENSION	3 SCHOOLS (NW) (5,271)
WEST OF LANDFILL EAST OF AIRFIELD 2	IF REQ'D	2,240	LOC SECURITY	2 NEARBY SCHOOLS (3,514)
NNW OF CITY FUEL STORAGE	IF REQ'D	1,260	CSSA 1 OVERFLOW	1 NEARBY SCHOOL (1,757)

NOTE 1: ESTIMATED ACTUAL EVACUATION DEPENDS ON TACTICAL SITUATION AND AVAILABILITY OF SUITABLE SITES FOR SHELTERING EVACUEES.

NOTE 2: SUFFICIENT SHELTER IS PROBABLY AVAILABLE IN SCHOOLS. SCHOOLS (ESTIMATED CAPACITIES INDICATED) ARE WITHIN WALKING DISTANCE OF AREAS TO BE EVACUATED. THESE ARE ILLUSTRATIVE ONLY; OTHER FACILITIES SUCH AS PRIVATE HOMES, PUBLIC AND COMMERCIAL BUILDINGS, CHURCHES, ETC., MAY BE PREFERRED.

Engineer Vertical Construction (Continued)

Construction of maintenance facilities is generally required to provide covered working space for organizational, direct support, and general support maintenance operations. Overall requirements for maintenance facilities will be influenced by the scope and duration of the tactical operation, the level of maintenance accomplished, the type of commodity repaired, and the availability of buildings with structural characteristics compatible with the maintenance activity performed. Maintenance units within the FBH will be responsible for maintaining all ground combat equipment and MAW aircraft operating from within the FBH. All first echelon maintenance can be accomplished using open air facilities or expedient shelters, including flies and tentage organic to the unit. Second echelon maintenance will be accomplished whenever possible by DS contact teams from the parent organization at the user location. Base facilities for second echelon maintenance sections will consist of organic tentage initially and local structures when they become available. Contact teams from the Maint Bn FSSG must be operational by the end of Period III.

The number of buildings/garages within the BSA suitable for maintenance operations may be limited until the end of Period IV. Intermediate level maintenance elements will be phased ashore and located in BSAs until CSSAs are operational beginning in Period V. Since BSAs will be the focal point for intermediate level maintenance for only 6 to 7 days, these elements, primarily from the Maint Bn FSSG, will also use organic tentage unless suitable structures are favorably located. No vertical construction will be required for any MAF maintenance element in SYN City since units will use organic shelters initially and local buildings augmented by organic tentage once the areas have been secured. The availability of numerous facilities dispersed throughout SYN City significantly decreases and possibly eliminates total vertical construction of any maintenance facility during the anticipated duration of the MAF operation. Gasoline service stations and heavy equipment repair shops, located in every major city, will be annexed as soon as possible.

The figure opposite gives an overview of selection criteria that may be used by military units during their appraisal of urban structures for military operations. Unit commanders, with advice as necessary, will have the final responsibility for evaluation of structures whose use may be advantageous to the unit mission.

BUILDING CHARACTERISTIC		TYPE MILITARY ELEMENT: COMMAND & CONTROL	INFANTRY	MECHANIZED (TANK, AAV)	MOTOR TRANSPORT	MAINTENANCE	SUPPLY	MEDICAL & DENTAL	ANTIAIR DEFENSE (LAAM)	REFUGEE & EVACUEE CONTROL	REMARKS
CONSTRUCTION	REINFORCED MASONARY WALLS	X	•	•	X	X	X	X	X	X	BALLISTIC PROTECTION
	ROOF SUPPORTS HEAVY LOADS		X					X			HELO OPERATIONS
	MULTIPLE INGRESS EGRESS POINTS	X	X					X		U	
	LACK OF INGRESS EGRESS POINTS									X	
	BASEMENT AREAS	X						X			
	INGRESS EGRESS FOR MHE, MT EQUIP				X	X	•				
	MULTI-STORY CONSTRUCTION	X	X					X	X		
	GROUND FLOOR SUPPORTS HEAVY LOADS			•	X	•	X				
	WIDE STAIRCASES AND OR ELEVATORS							•			MEDEVAC
	LACK OF INTERNAL WALLS					X	X				
	INTERNAL WALLS	X						X			
	HOTEL APARTMENT TYPE CONSTRUCTION	X		U		U	U	X		•	
	MULTI-STORY PARKING GARAGES			X		X	X			U	
LOCATION	LOCATED IN OR NEAR LOGISTIC SUPPORT AREAS				X	X	•	X		U	
	SERVICED BY PRIMARY ROAD NET				X		•				
	SERVICED BY RAIL SIDINGS						X			X	
	COMMANDS WIDE FIELD OF FIRE		•	•					X		
UTILITIES	EXTANT UTILITY DISTRIBUTION SYSTEM	X				X		X			
	FIRE CONTROL SYSTEM (SPRINKLERS)	X	X	X	X	X	•	•	X	X	HIGHLY DESIRABLE
	HOIST LIFT EQUIPMENT			X	X	•					
	NEARBY UNDERGROUND FUEL STORAGE TANKS			X	X	X					
	EXTANT COMMUNICATION SYSTEM	X						X		X	CIVILIAN COMMUNICATIONS
	STANDBY GENERATING SYSTEM	X						•			

X FAVORABLE BUILDING CHARACTERISTICS • HIGHLY DESIRABLE BUILDING CHARACTERISTICS
U UNFAVORABLE BUILDING CHARACTERISTIC

Figure V-10. Relation of Building Characteristics to Military Elements

Engineer Vertical Construction (Continued)

Logistic support areas (HLZs, BSAs, CSSAs) will require covered/enclosed facilities for storing a percentage of all supplies within the areas. HLZs and BSAs will logistically support MAF elements through Period III. After Period IV, all logistic support will originate from the CSSAs. Only Classes I, III (Packaged), and V will be accumulated at HLZs. The remainder of supplies to support elements near a particular HLZ will be stored at the BSA closest to that HLZ. The maximum covered storage area for each dump can be calculated knowing the supported personnel strength, the DOS stockage requirement, the gross storage factor (from FM 101-10-1, paragraph 6-5e, 6-5i) and the percentage of covered storage. These figures, all in SF, are presented in the table opposite.

With few exceptions, the greatest requirement for supply storage arises from the need to protect Class I supplies from the environment. Class VI and Class II supplies require the next largest storage areas. Figures for the total storage area and total covered storage area were multiplied by a factor of 5 to provide for dispersion of stocks and access by materials handing equipment. The gross land requirement for storage of all supply classes (except Class III (Bulk) and Class V) prior to opening the CSSAs is only .87 acre. Land area requirements in the CSSAs total 7.5 acres. These figures allow for some degree of tactical dispersion and assume a noninterrupted homogeneous ground surface with no obstructions to movement or supply location. Few areas satisfy these criteria; but the increased area is not expected to exceed 15% of the original area. Inclusion of this nonavailability factor would yield land requirements of 1.09 acres (prior to D+4) and 9.4 acres through D+30. Note that land requirements for storage of bulk fuel and ammunition are separately calculated.

Since HLZs will stock only 3 DOS (2 DOS at HLZ Eagle) to support a limited number of troops (7,341), no vertical construction is anticipated at these areas. Supplies will be stored in any available structures that are nearby and suitable in terms of MHE access and construction. Supplies stored in the open will be covered, where necessary, by tarpaulin or plastic sheets. Net covered storage area in the HLZs totals 769 square feet and can be covered by one 26' x 22' tarpaulin, one 23' x 15' tarpaulin, and one 6' x 14' tarpaulin.

Supplies at BSAs and CSSAs will be stored in indigenous storage and warehousing facilities, municipal buildings, and storefronts wherever suitable facilities are available. Should these structures suffer excessive combat damage, the supplies will be dispersed around nonwood buildings. Cover will be provided by tarpaulin, plastic sheets, or other field expedients. Five large tarpaulins, 22' x 26', would satisfy the covered storage requirement at CSSA 2. At CSSA 1, a 30 percent availability of existing warehouse space would provide the requisite storage area for 15 DOS of all supplies, less Class III (Bulk) and Class V. In short, vertical construction will not be required to provide supply storage due to the availability of extant structures augmented by field expedients.

TABLE V-7. STORAGE REQUIREMENTS BY SUPPLY CLASS AND STORAGE AREA (EXCLUDING CLASS III BULK AND CLASS V)

SUPPLY CLASS	VULTURE 3 DOS (BSA RED)	EAGLE 3 DOS (BSA BLUE)	HAWK 3 DOS (BSA RED)	BSA RED 3 DOS	BSA BLUE 3 DOS	CSSA 1 15 DOS[3]	CSSA 2 3 DOS	COVERED STORAGE (%)	GROSS STORAGE FACTOR (SF/MAN/DAY)
CLASS I	435.2 (435.2)	18.4 (18.4)	314.6 (314.6)	1,188.9 (1,188.9)	640.8 (640.8)	21,088.0 (21,088.0)	1,320.3 (1,320.3)	100	.0353
CLASS II	* 266.4 (126.0)	* 8.8 (5.3)	* 150.6 (90.4)	928.2 (556.9)	315.6 (189.4)	10,095.0 (6,057.0)	632.1 379.3	60	.1169
CLASS III (PACKAGED)	6.2 (.2)	.3 (.01)	4.5 (.1)	16.8 (.5)	9.1 (.3)	298.7 (9.0)	18.7 .6	3	.0005
CLASS IV	* 90.0 9.0	* 3.6 (.4)	* 65.1 (6.5)	401.0 (40.1)	136.3 (13.6)	4,360.6 (436.1)	273.0 27.3	10	.0075
CLASS VI	* 305.8 (275.2)	* 12.9 (11.6)	* 221.0 (198.9)	1,362.1 (1,225.9)	463.1 (416.8)	14,814.6 (13,332.6	927.5 (834.8)	90	.0246
CLASS VII	* 67.6 (10.2)	* 2.9 (.4)	* 49.0 (7.4)	302.0 (45.3)	102.7 (15.4)	3,285.3 492.8	205.7 30.9	15	.0065
CLASS VIII	* 66.6 (59.9	* 2.6 (2.3)	* 48.1 (43.3)	296.6 (266.9	100.8 (90.7)	3,225.7 (2,903.1	202.0 181.8	90	.0054
CLASS IX	* 64.9 (9.7)	* 4.0 (.6)	* 66.8 (10.0)	422.8 (63.4)	143.8 (21.6)	4,599.6 (689.9)	288.0 (43.2)	15	.0077
MAX PERS SUPT (PERIOD)	4110 (P III)	260 (P II)	2,971 (P III)	11,227 (P III	6,051 (P III)	29,849 (P VI	1,867 (P VI		
TOTAL STORAGE AREA[1]	44.4	18.7	319.1	4,914.4	1,912.2	61,764.9	3,867.3		
COVERED STORAGE AREA[1]	44.4	18.4	314.7	3,369.7	1,450.4	46,964.4	2,948.0		
GROSS COVERED STORAGE AREA	222.0	92.0	1,573.5	16,848.5	7,252.0	234,822.0	14,740.0		
COVERING METHOD	TARPAULIN	TARPAULIN	TARPAULIN	TARPAULIN	TARPAULIN	WAREHOUSE/ EXPEDIENT[2]	TARPAULIN		

* - STORED AT BSA RED UNTIL REQUIRED. TOTALS FOR BSA RED REFLECT THESE ADDITIONS.

' - STORED AT BSA BLUE UNTIL REQUIRED. TOTALS FOR BSA BLUE REFLECT THESE ADDITIONS.

1 - 42 FIGURES INCLUDE STORAGE FOR CLASSES I AND III(P) ONLY; REMAINDER AT BSA.

2 - EQUALS COVERED STORAGE AREA x FACTOR OF 5 TO ALLOW DISPERSION AND MATERIAL HANDLING.

3 - TOTALS INCLUDE REMAINING DOS FOR ELEMENTS SUPPORTED BY CSSA 1.

Engineer Vertical Construction (Continued)

For purposes of convenience, the following discussion of land area requirements for ammunition storage will be included as an engineer vertical construction task, although the construction of ASPs may involve both horizontal and vertical construction tasks.

Class V(W) storage requirements were based on the troop strength in the FBH, the number of days' stockage per period, and the consumption factor of 30.59 lb/man/day, representing a moderate level of Class V consumption as determined by the Logistics Branch of HQ USMC and promulgated in the JSCP. US Army TM 9-1300-206 provided storage methods, compatibility criteria, and quantity-distance parameters for each ammunition catetory. To give an upper bound of land requirements, ammunition was stored unbarricaded by the area storage method and subdivided by storage category as follows:

- Categories A, B, and D - 70% of Class V(W) total
- Categories C, E, and F - 10% (each) of Class V(W) total
- Category G - 0%

Supply stockage levels are given in the Supply Section of Chapter V.

ASP requirements for storage of Class V(A) were calculated based on the aviation assets based within the FBH (or anticipated to be based within the FBH during succeeding periods). Daily consumption rates per aircraft type, as given in Table G-5 of the MAGTF Lift Validation, were summed for all pertinent aircraft squadrons. The assumed distribution per ammunition storage category is as follows:

	ALL	VSTOL ONLY
• Categories A, B, and D -	15%	35% of Class V(A) total
• Categories C and F -	5%	5% (each)
• Catogory E -	0%	0%
• Category G -	75%	55%

Vertical construction requirements for ASPs during the assault phase of Operation BREAKER will be minimal due to the use of above ground unbarricaded storage methods. Class V supplies that require storage by virtue of sensitve componentry or protection standards will be stored separately within available structures near ground ASPs or airfields. Expedient cover can be provided by tarpaulins, plastic sheets, or corrugated metal. As the tactical situation develops and initial engineer requirements diminish, a limited amount of vertical construction, and much horizontal construction, will be required to provide an increased level of protection for Class V stocks. These modifications are not anticipated before D+11 and will be discussed in greater detail under Phase II of this study effort--Defensive Posture.

TABLE V-8. LAND AREA REQUIREMENTS FOR AMMUNITION STORAGE

PERIOD	STORAGE LOCATION	CLASS V(W) STOCKAGE LEVEL	CLASS V(W) TONNAGE (ST)	CLASS V(W) ASP AREA (ACRES)	CLASS V(A) STOCKAGE LEVEL	CLASS V(A) TONNAGE (ST)	CLASS V(A) ASP AREA (ACRES)
III	BSA RED	3 DOS[1]	515.2	47.56	-	-	-
	BSA BLUE	3 DOS[1]	277.7	25.67	-	-	-
	AF 1	-	-	-	.75 DOS[3]	98.0	14.1
	AF 2	-	-	-	.75 DOS[3]	98.0	14.1
IV	CSSA 1	3 DOS[1]	991.3	91.59	-	-	-
	CSSA 2	3 DOS[1]	377.4	34.86	-	-	-
	AF 1	-	-	-	1.5 DOS[4]	196.0	28.2
	AF 2	-	-	-	1.5 DOS[4]	196.0	28.2
V	CSSA 1	3 DOS[1]	1202.0	111.07	-	-	-
	CSSA 2	3 DOS[1]	466.9	43.15	-	-	-
	AF 1	-	-	-	2 DOS[5]	778.0	112.9
	AF 2	-	-	-	1 DOS[5]	389.0	56.5
VI	CSSA 1	15 DOS[2]	9136.0	844.30	-	-	-
	CSSA 2	3 DOS	572.0	52.86	-	-	-
	AF 1	-	-	-	10 DOS[6]	3891.0	564.6
	AF 2	-	-	-	5 DOS[6]	1946.0	282.4

NOTE 1 STOCKAGE LEVEL IS 3 DOS FOR ALL ELEMENTS SUPPORTED BY THAT LOGISTIC ACTIVITY.

2 STOCKAGE LEVEL AT CSSA 1 INCLUDES 12 DOS FROM UNITS NORMALLY SUPPORTED BY CSSA 2 IN ADDITION TO 15 DOS FROM CSSA 1 SUPPORTED UNITS.

3 TOTAL STOCKAGE IS 1.5 DOS FOR CSSA 1 SUPPORTED UNITS.

4 TOTAL STOCKAGE IS 3 DOS FOR ALL VSTOL ASSETS.

5 TOTAL STOCKAGE IS 3 DOS FOR ALL VSTOL ASSETS AND FIXED-WING ASSETS IN 1st and 2nd FIE. STORAGE SPLIT IS 2/3 AT AF 1 AND 1/3 AT AF 2.

6 TOTAL STOCKAGE IS 15 DOS FOR SAME ASSETS AS IN PERIOD V. STORAGE SPLIT REMAINS THE SAME.

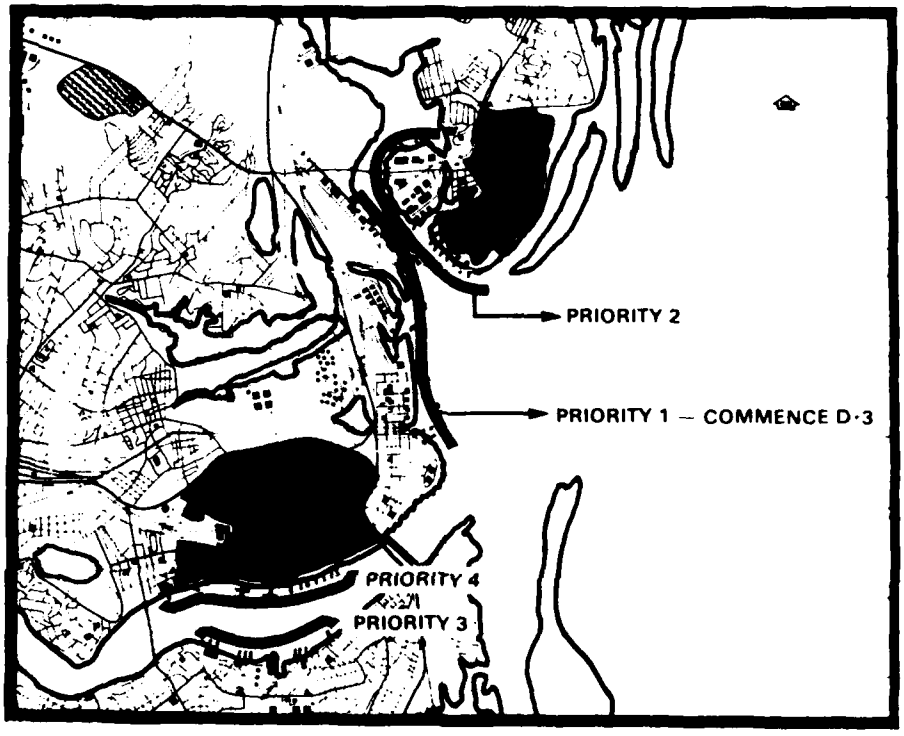
Engineer Vertical Construction (Continued)

Engineer combat service support units, including the Engr Supt Bn FSSG and the Naval Construction Regiment (NCR Hq plus 3 NMCB), will be tasked to construct landing ramps, loading ramps, and docks within their capabilities. The bulk of the Assault Echelon will be landed across Beaches RED and BLUE. These landing surfaces are bare beaches with no extant improvement which would facilitate the landing. Due to the mild offshore gradient and shallow water depths, causeway sections will be installed at each beach landing area. Further, causeway sections will be emplaced between RED Beach and the mainland, and M4T6 rafting sections will be emplaced between BLUE Beach and the mainland. Construction of expedient landing ramps may be required to smooth the transition between the beach surface and the causeway sections. Since these ramps will be used for up to ten days and may be immersed by high tide conditions, M4T6 ramp sections will be assembled as necessary and installed late on D-day by FSSG engineer personnel in the Bridge Co. Maximum use will be made of earthen ramps supplemented by flexible membrane surfaces.

Planning factors given in FM 101-10-1 indicate that of the total number of permanent wharves and quays, the following damage levels should be anticipated:

- 30% very badly damaged; early repair impractical.
- 30% heavily damaged; much debris; reasonably early repair possible.
- 40% lightly damaged; less debris; early repair practical.

It is expected that the heaviest damage or denial will be concentrated in the port area with selective destruction of all other landing surfaces. The docks, wharves, and quays in the main port area will be used to support the AFOE offloading beginning on D+7. One Naval Mobile Construction Battalion will be landed early on D+5 and tasked to clear debris and commence repairs to facilities which have suffered a light degree of damage. NCR elements will not be tasked to construct new dock or wharf facilities, since Temporary Container Discharge Facilities (TCDFs) and ELCAS will be used to discharge AFOE cargo. A minimum level of repair to four docks should provide the necessary interface for Amphibious Logistics System elements. Within capabilities, repair efforts should be prioritized as the main port area, the old city port area, and other facilities along South River.



NOTE: IT IS ANTICIPATED THAT REHABILITATIVE EFFORTS AT LOCATIONAL PRIORITIES 1 AND 2 WILL EXHAUST THE AVAILABLE NMCB RESOURCES FOR THE DURATION OF OPERATION BREAKER. THE URBAN NATURE OF THE NEW CITY AND NAVAL YARD WILL DELAY CONSOLIDATION EFFORTS AND THESE ARE NOT OPTIMAL LOCATIONS FOR AFOE DISCHARGE.

Figure V-11. Priority for Rehabilitation of Docks, Wharves, and Quays

Engineer Vertical Construction (Continued)

Medical facilities for emergency treatment and preparation of casualties for evacuation will be sited in indigenous structures (i.e., BSAs). Vertical construction of additional medical facilities is not warranted due to the availability of numerous facilities (five hospitals with over 300-bed capacity) within SYN City. VII MAF could annex one hospital for military-only use and transfer the civilian patients and selected hospital staff to other facilities within the city.

A major task involving vertical construction is the preparation of defensive positions requiring earthmoving or revetting. Defensive positions for units in outlying areas of the city will be prepared by maneuver unit personnel with assistance from supporting engineers. This engineer support will be limited initially, due to constraints on helicopter lifts of heavy engineer equipment. As equipment becomes available, combat engineers in a combat support role will assist with the development of initial defensive positions within the urban area; units engaged in urban or suburban combat will not "dig in," but will utilize vertical structures for cover and concealment. Modifications and reinforcements of structural components to provide firing ports for light weapons and concealed firing positions for tanks and mounted antiarmor weapons will also be accomplished by combat engineers. FSSG engineers and elements of the Cbt Engr Bn (-) will be tasked to implement barrier plans, including defensive positions and obstacles, for protection of BSAs and CSSAs. Only those areas that are open will require any type of vertical construction; other urban area defensive positions will utilize existing vertical structures with appropriate modifications.

ENGR CSS TASK	SYN CITY REQUIREMENT	RESPONSIBLE UNIT	ADDITIONAL LAND AREA REQUIREMENTS	MID-RANGE IMPACT
CONSTRUCT TEMPORARY CAMPS	LOW	ENGR SUPT BN	LOCAL STRUCTURES	NO CHANGE
CONSTRUCT MAINTENANCE FACILITIES	LOW	ENGR SUPT BN WING ENGR SQDN	LOCAL STRUCTURES	NO CHANGE
CONSTRUCT STORAGE FACILITIES	LOW	ENGR SUPT BN	LOCAL STRUCTURES	INCREASED CONTAINER STORAGE
CONSTRUCT LOADING RAMPS AND DOCKS	LOW	ENGR SUPT BN LANDING SUPT BN NMCB	NONE	LOWER--INCREASED USE OF ALS
(REHA3ILITATE WHARVES AND DOCKS)	(HIGH)	(NMCB) (ENGR SUPT BN)	(EXTANT STRUCTURES)	(NO CHANGE)
CONSTRUCT MEDICAL FACILITIES	LOW	ENGR SUPT BN	LOCAL STRUCTURES	LOWER--MODULAR SHELTERS
PREPARE DEFENSIVE POSITIONS	AVERAGE	ALL ENGR UNITS	NEGLIGIBLE	GREATER--INCREASED WEAPON LEATHALITY

Figure V-12. Engineer Vertical Construction Tasks in SYN City

ENGINEER FACILITIES MAINTENANCE

MOST OF THE VERTICAL AND HORIZONTAL STRUCTURES REQUIRED TO SUPPORT VII MAF OPERATIONS ARE AVAILABLE IN SYN CITY. FACILITY MAINTENANCE TASKS ARE SIGNIFICANTLY INCREASED IN URBAN AREAS DUE TO THE USE OF INDIGENOUS STRUCTURES AND LOCs.

Engineers provide combat service support to MAF elements by facilities maintenance of structures and LOCs. Subtasks of engineer facility maintenance defined in FMFM 4-1 are to repair and maintain:

- Buildings
- Admin/Maint Structures
- Drainage Systems
- Airfield Surfaces
- Roads and Bridges

Much of the engineer effort involving vertical structures, including large warehouses and maintenance facilities, will consist of modifications to the basic structure to accommodate military operations. Repairs to roads, bridges, and airfields will be a high priority for engineer CS and CSS as LOCs become increasingly important in urbanized areas with dense building patterns that degrade the mobility of mechanized vehicles.

Urban buildings that are used by maneuver units for C^2 and temporary defensive positions may require modifications to the basic structure to permit rapid ingress/egress and movement between floors or adjacent rooms. Holes must be breached through exterior walls often consisting of reinforced masonry; walls protecting firing positions must be reinforced with lumber, sandbags, or other material that will reduce fragmentation effects. Heavy wire mesh over open windows will limit the effectiveness of hand and rocket-propelled grenades. Ground floor areas of buildings without basements can be used for concealment of vehicular-mounted weapons including tanks and TOWs.

This military rehabilitation of selected urban buildings will be initiated by the maneuver element occupying the building. All infantry units carry a basic load of breaching demolitions and sandbags, and infantry personnel are trained in the basics of expedient breaching by demolitions. Due to other CS demands placed on supporting engineer elements, the majority of building modifications will be accomplished by the maneuver unit with engineers providing technical advice. Building modifications become fewer and more expedient as the tempo of street-to-street fighting increases. Only in a static situation would buildings be extensively modified and reinforced for use by military units.

Administrative and major support facilities including maintenance garages and warehouses may require expedient modifications to permit easy access by logistics vehicles and heavy materials handling equipment.

Removal and relocation of internal walls may be necessary to group similar supply stocks and isolate hazardous or sensitive materials. Engineers (FSSG or Wing) will be tasked to provide technical and equipment support when the modifications are beyond the capability of the using units or supporting combat engineers. Buildings will be modified only to the minimum extent necessary to accomplish the mission. FSSG engineer companies will provide engineer personnel with carpentry and other general engineering capabilities as tasked by the MAF engineer (normally the Engr Supt Bn commander).

Drainage facilities for storm water disposal in the SYN City area consist of storm sewers in the heart of the "New City" and open ditches following natural drainage patterns in the remainder of the metropolitan area. Engineers will be tasked to insure that drainage in the vicinity of military facilities is adequate and does not impair ground mobility. The storm water disposal capacity of the existing drainage network is sufficient to handle up to 10-year storms with only short-term flooding and sewer backup. The preliminary engineer estimate will indicate problem areas for drainage as they impact on the friendly concept of operations. The total engineer effort for rehabilitation of drainage facilities will not be extensive, but will be prioritized in the following manner:

- Airfields and Helicopter LZs
- Primary Roads
- Combat Service Support Areas (Beach Support Areas initially)

Drainage facility maintenance will be limited to cleaning of open ditches, replacement of culverts, and expedient ditching in soft surface areas. These tasks will be accomplished on a case-by-case basis by the engineer unit in the area. Engineer equipment will consist of backhoes, scoop loaders, and road graders.

The initial priority of engineer facility maintenance efforts will be directed towards rehabilitation of air facility runways, taxiways, and parking areas. Threat forces will attempt to limit the use of existing air facilities by selectively cratering runways and other load - bearing surfaces. The use of indigenous labor or prechambered demolitions would enhance denial efforts by creating numerous craters on every runway surface. Although extensively cratered air facilities would still support VTOL and helicopter operations using undamaged runway sections, extensive repairs would be required to support high performance and cargo aircraft.

See Engineer Horizontal Construction section for level of effort estimates for airfield repair.

Engineer Facilities Maintenance (Continued)

The specific type of repair depends on the level of damage and the intended use of the facility. Small craters can be repaired using methods developed for Rapid Runway Repair. Surfaces that are excessively rough or of insufficient load-bearing capacity would be rehabilitated using matting or membrane surfaces after compaction and grading of the base. Air facility repairs will be initiated by combat engineer elements that will assess the damage, formulate repair plans, and commence the repair process. FSSG, Wing, and NMCB engineers will be tasked to complete the repairs once these elements have been phased ashore. Major equipment items will consist of scoop loaders, dump trucks, vibratory compactors, concrete mixers, bulldozers, road graders, and materials handling equipment.

Various landing force elements have been given the mission to seize major SYN City bridges before they are damaged by Threat forces. If these bridges are seized intact the only maintenance required will be normal structural examinations and repairs of load-induced failures on decking and superstructure components. Minor damage to selected bridges would require welding, reinforcing, or replacement of single spans by USMC standard bridging. Any bridges totally destroyed would not be rebuilt until well into the operation and then by follow-on forces. Rafts or ferries would shuttle vehicles and personnel across the rivers and provide emergency transport should insufficient Class 60 bridging be available in the intended area of crossing. Road repairs will consist of expedient crater repairs or construction of bypasses around untrafficable areas or uncleared obstacles. Rubbling and overturned vehicles in the built-up areas will be cleared only to the extent necessary to provide mobility for maneuver elements and prevent enemy use of these road obstacles for defensive positions. Initial road repairs are completed by combat engineer elements until FSSG engineers with equipment are phased ashore.

FACILITIES MAINTENANCE IN MOBA/MOUT

ENGR CSS SUBTASK	RELEVANCE TO URBAN OPS	RESPONSIBLE UNIT	MID-RANGE IMPACT
MISC BUILDING MAINTENANCE	AVERAGE	ENGR SUPT BN	NO CHANGE
ADMIN/WAREHOUSE MAINTENANCE	AVERAGE	ENGR SUPT BN WING ENGR SQDN NMCB	INCREASED - GREATER CONTAINER STORAGE AREAS
DRAINAGE	LOW	ALL ENGR UNITS	NO CHANGE
EAF MAINTENANCE	HIGH[1]	CBT ENGR BN ENGR SUPT BN WING ENGR SQDN	LOWER[1]
ROAD/BRIDGE MAINTENANCE	AVERAGE	CBT ENGR BN ENGR SUPT BN NMCB	NO CHANGE
INDIGENOUS UTILITIES MAINTENANCE	HIGH	ENGR SUPT BN WING ENGR SQDN NMCB LF CAG LIAISON	NO CHANGE

1. LESS USE OF AIR SUPPORT IN MOBA/MOUT OPERATIONS, BUT IMPORTANT RELIANCE ON VSTOL AIRCRAFT. TOTAL REQUIREMENT MAY BE LESS THAN NORMAL, BUT ITS IMPORTANCE IS HIGH. INCREASED AIR DEFENSE CAPABILITIES IN MID-RANGE COULD FURTHER REDUCE USE OF AIR SUPPORT IN URBAN AREAS.

Figure V-13. Engineer Facilities Maintenance Tasks in SYN City

UTILITIES PROVISION

ENGINEERS ARE THE PRIMARY PROVIDERS OF ESSENTIAL UTILITY SERVICES FOR THE LANDING FORCE. EACH MAJOR ENGINEER UNIT IS RESPONSIBLE FOR PROVIDING SELECTED UTILITY SERVICES TO ITS SUPPORTED ORGANIZATION. EXISTING UTILITY NETWORKS IN SYN CITY PROVIDE UNIQUE OPPORTUNITIES FOR REHABILITATION AND USE BY FRIENDLY FORCES.

Combat engineers provide utility services both to maneuver units as part of the overall combat support package and to service support units as a combat service support function. The Combat Engineer Battalion is tasked to provide water, electric power, and hygienic services for the division. The Engineer Support Battalion FSSG provides the same services to non-divisional ground combat and CSS elements. The Wing Engineer Squadron provides utilities for all aviation elements except those that are based at sea or theater facilities. These major engineer units provide mutual support when necessary to insure that aggregate utility requirements are satisifed with efficient use of both equipment and human resources.

Military operations in an urban environment will require basically the same level of essential utilities as in other types of operational areas. The primary difference is in how the particular utility is produced and delivered to the final user. Virtually all urban environments have established water, electric, and sanitary utilities and SYN City is no exception. Water is supplied from private wells in the "Old City" and from the water treatment plant at the reservoir; all city water is potable. Electricity is supplied by two power plants with a combined generating capacity of 1600 MW. User voltages after tertiary distribution are 240/120 volts single phase @ 50 HZ. Sewage processing facilities are 100 percent utilized although the line capacity is only 30 percent utilized. Outdoor sanitary facilities and septic tanks are still in use throughout the metropolitan area.

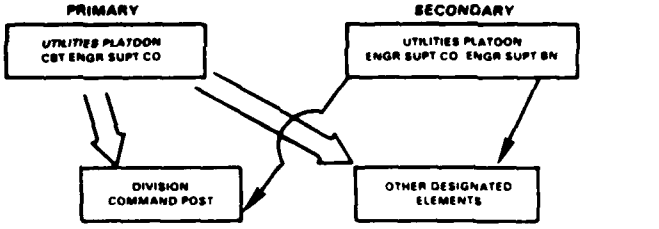
Utility production facilities are key objectives for initial assault operations. If these facilities are seized and under friendly control before Threat military forces or indigenous workers damage the equipment, the MAF engineers will be able to satellite off the existing system for provision of the bulk of the essential utilities. MEP support for maneuver units will continue to be provided by portable generators.

The basic concept for utilities support is presented in the section concerning engineer combat support functions. USMC elements will utilize any extant utilities before tasking the engineers to provide further support. Modification of distribution networks may be necessary before users can properly interface with the existing system. Task organization of engineer utility sections must proceed under the assumption that denial of essential utilities is possible within certain functional areas of SYN

City i.e. port areas and industrial areas. The type and level of utility support is also influenced by the landing sequence, assault echelon user requirements, and available engineer resources.

Utilities support during Period II (D-day) will be austere and limited to providing mobile electric power for those units (elements) lacking organic generators (i.e., Shore Party Teams). Water purification teams will not be operational before D+1; initial water supplies will consist of canteens, M149A2 water trailers, and emergency supplies in 55 gallon drums. Sanitary facilities including heads, baths, and laundries will also not be operational before the third period. Individual sanitary measures will be the norm until these facilities become operational. Use of civilian sanitary facilities is authorized and units are required to report the availability of major (public or private) facilities.

The overall level of engineer effort devoted to the provision of essential utilities in an urban environment is highly dependent on Threat denial efforts. The percentage of utilities supplied by MAF engineers may range from 100 percent to 0 percent in the case where Threat forces are taken essentially by surprise and no denial efforts are directed against utility facilities. There are sufficient water sources within SYN City to preclude well drilling even in the event that all potable water production is terminated. Management of resources to support the indigenous population will be handled by the Civil Affairs Group.



UNIT SECTION	GENERATOR TYPE	3KW 60HZ	3KW 400HZ	10KW 60HZ	10KW 400HZ	30KW 60HZ	30KW 400HZ	60KW 60HZ	60KW 400HZ	100KW 60HZ	200 KW 60 HZ
UTIL PLT CBT ENGR SUPT CO CBT ENGR BN		83	33	9	1	36	1	12		5	4
ENGR SUPT CO ENGR SUPT BN FSSG		8	49	26	17	56	6	26	14	14	10
WING ENGR SQDN MWSG		41	17	15	14	9		22	6	9	14

SOURCE ECP 4-4 ENGINEER OPERATIONS USMC EDUCATION CENTER MCDEC QUANTICO VA 22134 8 APRIL 80

Figure V-14. Electric Utility Production - Responsibility and Capability

ENGINEER TECHNICAL SUPPORT

ENGINEER TECHNICAL SUPPORT OF A COMBAT SERVICE SUPPORT NATURE MAY INCLUDE MAPPING, SURVEYING AND DRAFTING AS WELL AS THE TRAINING OF NONENGINEER UNITS TO ACCOMPLISH SELECTED ENGINEER FUNCTIONS.

Many of the tasks traditionally accomplished by military engineers will, by necessity, be accomplished by nonengineer units due to priority tasks that must be accomplished by engineers. Development of protective positions, camouflage, field decontamination, and expedient demolitions can be performed by virtually any maneuver unit. Cartographic and survey tasks will still be performed by engineer personnel in the various H & S companies. Training of nonengineers to accomplish simple engineer tasks reduces reliance upon engineers and promotes efficient use of engineer resources. It is recommended that familiarization be accomplished during advanced individual training and that periodic refresher courses to be conducted by a training cadre from the Combat Engineer Battalion.

The availability of accurate nonstylized map products of the SYN City area should be ascertained as soon as VII MAF receives its warning order. Contingency support from mapping agencies within the national command structure should be requested and mapping flights flown if necessary. In-country agents will procure any existing SYN City map products, including those detailing utility networks. Detailed pictomaps may be prepared by intelligence agencies within CONUS or by the FMF Topographic Platoon once the Landing Force is within the AOA. The Topo Plt will be responsible for compiling map revisions and omissions and overprinting required data upon standard map products. Map revisions may include CCM data, building height profiles, or other special data of relevance.

Engineers may be tasked to conduct third-order surveys in support of artillery units or to provide horizontal and vertical control for such horizontal construction projects as EAFs and roads. Survey capabilities are found in the H & S Co of the Cbt Engr Bn and Engr Supt Bn as well as the Engr Sec of the Wing Engr Sqdn. Assuming that the artillery units can accomplish all survey work incident to setting up their firing batteries, the only surveys that the engineers must accomplish are those required for modifications to the grass surface EAF near the southern industrial area.

Construction and cartographic drafting will be done on an as-required basis to support engineer construction projects and map revisions. Engineer units are not responsible for drafting of miscellaneous graphs, charts, and briefing aids used by other than engineer units. The volume of drafting required to support engineer operations is within the capabilities of existing drafting sections organic to FMF engineer units.

The largest requirement of engineer technical support is the training of nonengineers to accomplish engineer tasks. Many engineer tasks are not equipment-oriented and could be successfully accomplished by properly trained maneuver unit personnel. Some of these tasks are listed below:

- Expedient Demolitions
- Camouflage
- Obstacle Construction
- Development of Protective Positions
- Field Decontamination
- Reconnaissance

Other tasks such as emplacement of barbed wire and mines can be accomplished using maneuver unit personnel under the direct supervision of engineers. Cross-training of infantry personnel in expedient demolitions would be especially beneficial in the SYN City scenario since inner-city requirements for wall breaches and reductions of fortified positions may be beyond the physical capabilities of supporting engineer units. It is recommended that such cross-training programs be initiated at permanent duty stations as soon as possible since adequate time is never available once a deployment is initiated.

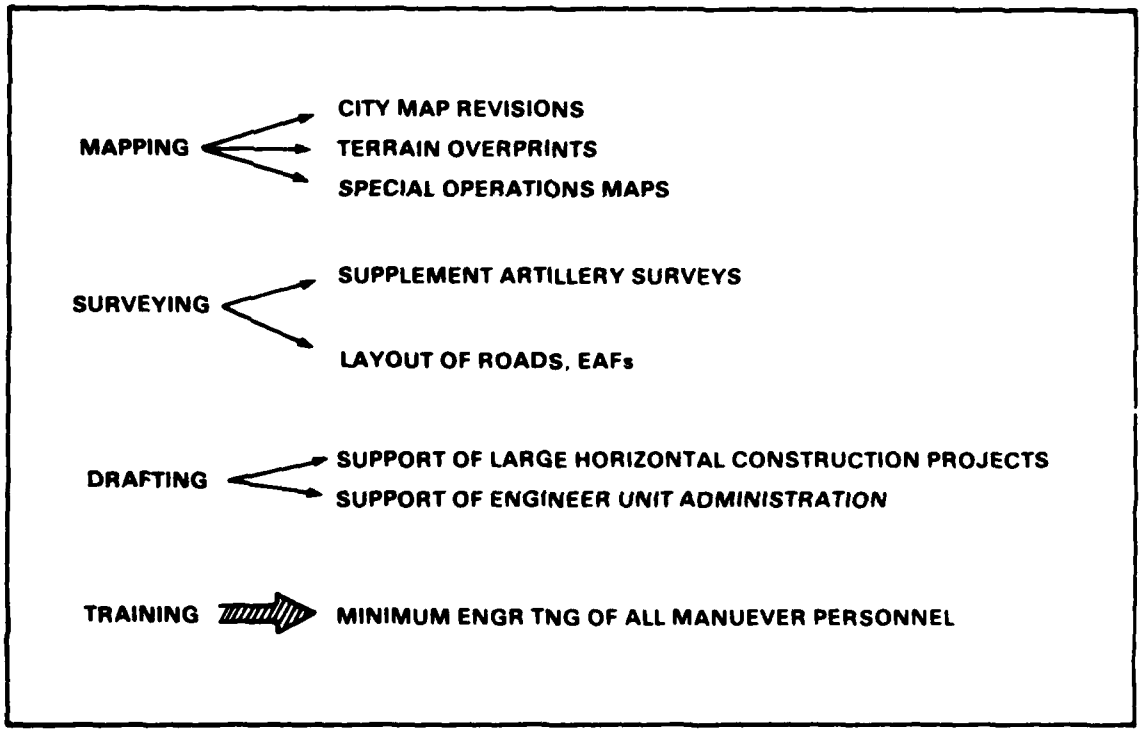


Figure V-15. Engineer Technical Support Tasks

Combat Service Support Functions and Requirements

CIVIL AFFAIRS

CIVIL AFFAIRS INCLUDES THOSE PHASES OF THE ACTIVITIES OF A COMMANDER WHICH EMBRACE THE RELATIONSHIP BETWEEN THE MILITARY FORCES AND CIVIL AUTHORITIES AND PEOPLE IN A FRIENDLY COUNTRY OR AREA, OR OCCUPIED COUNTRY OR AREA WHEN MILITARY FORCES ARE PRESENT. (JCS Pub. 1) THE CONDUCT OF CIVIL AFFAIRS IS AS MUCH A RESPONSIBILITY OF COMMAND AT EVERY LEVEL AS THE PLANNING FOR AND CONDUCT OF COMBAT OPERATIONS. (FM 41-10)

Civil Affairs Responsibilities

Joint Chiefs of Staff Pub. 2, Unified Action Armed Forces (UNAAF), delineates the assignment of responsibilities within the US Government for civil affairs operations. The Chief of Staff, US Army is Executive Agent for civil affairs planning, until such time as a Joint Civil Affairs Committee is formed when the outbreak of hostilities appears imminent. He is also charged with operating civil affairs training installations for the basic civil affairs training of all US civil affairs units and personnel and furnishing to the other Services, at their request, qualified personnel for service in their civil affairs units as specialists in the fields in which the Army normally has an interest but in which the other Services ordinarily do not require or maintain trained personnel.

The Commandant of the Marine Corps is responsible for mobilizing, training, and deploying civil affairs units and personnel required to support the operation of Marine Corps forces.

Fleet Marine Force Civil Affairs Operations

"...Marine Corps units will not participate in future civil affairs operations involving military government administered by the occupying forces. The Marine Corps will look to U.S. civilian agencies or other military services to conduct long-term operations. It is expected, then, that Marine Corps combat operations in the future will be of limited duration, i.e., the amphibious assault and consolidation. Concomitant civil affairs operations will be carried out with the assault and consolidation phases." (FMFLANT ForO P5080.2, SOP for Civil Affairs)

The Fourth Civil Affairs Group, USMCR (4th CAG) is a Selected Marine Corps Reserve (SMCR) unit in the 4th Marine Division (Reinforced); the 4th CAG is under the operational control of FMFLANT and is the only civil affairs organization in the Marine Corps. Additional personnel with some of the skills related to civil affairs functions are in the Individual Ready Reserve (IRR), Standby Reserve, Fleet Marine Corps Reserve (FMCR), and Retired Reserve. Retired regular officers may also have skills of civil affairs interest.

4th Civil Affairs Group

The 4th CAG is organized with a group headquarters and two civil affairs (CA) detachments. According to the FMFLANT Civil Affairs SOP, each detachment is considered to be capable of supporting an independent MAB or, in some circumstances, a division, wing, or service support command; as an entity, the CAG is generally considered to be adequate to support a MAF.

4th CIVIL AFFAIRS GROUP (4th CAG), USMCR (T/O 4998M)

	USMC Off-Enl	USN Off-Enl
GROUP HEADQUARTERS		
Command Section	2-4	
S-1 Section	1-4	
S-2 Section	0-3	
S-3 Section	1-4	
S-4 Section	1-4	
Motor Transport Section	1-9	
Communication Section	1-9	
Public Health Section		1-1
CIVIL AFFAIRS DETACHMENT 4-1 * / CIVIL AFFAIRS DETACHMENT 4-2 *	Each Detachment	
Detachment Headquarters	1-4	
International Law/Claims Team	1-3	
Displaced Person, Refugee, Evacuee Team	1-2	1-0
Liaison Team	1-1	
Civil Affairs Team	2-4	
Civil Affairs Team	2-4	
Civil Affairs Team	2-4	

* Each team and detachment headquarters includes a Marine Fleet Assistance/Contingency billet for an interpreter. These 14 billets are not normally filled in peacetime.

THE FOLLOWING ANALYSIS OF CIVIL AFFAIRS FUNCTIONS SHOWS THAT TO FACILITATE ACCOMPLISHMENT OF THE MISSION IN SYN CITY THE 4th CAG WILL REQUIRE AUGMENTATION IN SEVERAL IMPORTANT FUNCTIONAL AREAS.

Figure V-16. 4th CAG (USMCR) T/O

Combat Service Support Functions and Requirements

Civil Affairs (Continued)

Civil Affairs Situation in SYN City

The 250,000 Aggressor civilians in SYN city are generally hostile to the US, but, except for individuals and/or small groups of hostile persons, the populace is not expected overtly to oppose Landing Force operations. The following analyses are quoted from the draft Civil Affairs Estimate of the Situation that was prepared by the analysts as a working basis for evaluating civil affairs courses of action for each of the five operational concepts.

Displaced Persons, Refugees and Evacuees

There are no indications that any displaced persons (civilians who are involuntarily outside the national boundaries of their own countries) are present in or near SYN City. In all concepts, however, undetermined numbers of civilians will undoubtedly leave their homes to seek safety elsewhere because of real or imagined danger. Persons in this category may remain in SYN City or attempt to leave the city. Additional civilians will have to be evacuated by competent VII MAF officials from their homes to selected sites on a planned and controlled basis for their own safety or to accommodate military operations.

War Damage Suffered by the Economy

It is not anticipated that major damage will be inflicted within SYN City by Advance Force operations. Special efforts will be made to avoid damage that will impede friendly operations ashore. Some degree of damage will undoubtedly occur, however, particularly during the assault phase of the operation. Further, denial efforts by the Aggressor forces are likely to make roads, railroads, and bridges unusable in several places. The status of communication facilities and public utilities cannot be predicted, but they should be early priority objectives for the ground combat element of VII MAF. These facilities are essential to support a viable civil affairs program, which, in turn, will facilitate VII MAF operations. Destruction of the dam and power plant (E3-N5) would result in a loss of power for heat, cooking, and light and would contribute to a highly unsatisfactory and dangerous environment with respect to health and welfare of the inhabitants of SYN City. This, in turn, could threaten VII MAF with the possibility of epidemics or uprisings of sufficient magnitude to jeopardize accomplishment of the MAF mission.

Status and Character of the Civil Government

Note: In the absence of specific information in the SYN City Information Book, the Government of SYN City was compared to that of East Germany, using the Area Handbook for East Germany, DA Pam 550-155.

There are insufficient data to support a detailed analysis of the local government. It is assumed that SYN City has district status with a district assembly and a district council, the latter comprised of permanent councils and administrative divisions. The SYN City District Assembly and Council (if they exist as such) are believed to be subordinate to the Council of Ministers at national level; a council made up of Aggressor party members who figure prominently in both the party and government. The key individuals with whom VII MAF will have to make contact, and through whom most civil affairs actions should probably be undertaken, are believed to be as follows:

- Chairman of the City or District Council
- First Deputy Chairman of the Council
- Deputy Chairman for Internal Affairs
- Deputy Chairman for Trade and Supply
- Chairmen of the following standing commissions:
  - Agriculture
  - Health and Social Welfare
  - Police and Justice
- Division Chiefs of the following administrative divisions:
  - Construction
  - Transport and Municipal Works

SYN City Government officials are not likely to be sympathetic to or, initially, cooperative with VII MAF. Food shortages are predicted to begin in SYN City about D+4 for perishables and D+7 to D+10 for most staples. Because of VII MAF isolation of the city, the city or district government will not be capable of resupplying the normal food distribution networks of the city after D-day. The Aggressorland Government is unlikely to provide supplies to the people, thereby placing the burden on VII MAF. The local government will, therefore, be dependent on VII MAF and its supporting agencies for a subsistence level of food supplies during the early stages of the operation, possibly inducing them to take measures which are necessary to sustain the local populace.

Methodology for Estimating Numbers of Refugees

The five operational concepts considered in this analysis have different impacts on the refugee/evacuee situation: The number of refugees will be influenced by Aggressor policies and civilian perception of imminent danger; the number of evacuees will be determined by Landing Force requirements for the use of specified areas in which a civilian presence cannot be tolerated, notably BSA/CSSA areas and major command post complexes.

The five operational concepts/missions were analyzed with respect to their different impacts on the refugee situation. A "standfast" or "no refugee" policy applies in many of the NATO and Warsaw Pact countries. Such a policy would be logical for SYN City as well, particularly in light of the comparatively isolated location and apparent lack of suitable refuge in the nearby countryside. In addition, the Aggressor MRD in southern Aggressorland would tend to restrict refugee movements that might interfere with their freedom of maneuver for counterattacks.

Despite standfast policies, however, some refugees will inevitably result because of deliberate or unintentional destruction of their places of residence. Others may merely ignore public policies concerning fleeing their homes. Analysts considered the following circumstances to arrive at an estimate of the numbers of refugees that might flee from SYN City or become refugees within the city:

- Nature and extent of Advance Force operations.
- Pre-D-day indications to the populace that SYN City is the US objective.
- Characteristics and refuge potential outside of SYN City.
- Capacity of public and private transportation to support evacuation (i.e. 10,000 persons maximum per day by rail unless special measures are taken).
- Estimated Aggressor refugee policy and public attitudes/discipline.
- Landing Force plans with respect to isolating the city.
- Duration, intensity, and physical location of anticipated combat operations within the city.

- Planned duration of assault and consolidation phases.

- Proximity of combat to civilian-occupied areas.

The five-day duration of Advance Force operations planned for reducing SYN City defenses in Oplan 5-81 would undoubtedly be perceived by the populace as a clear and present danger. Analysts estimated that in ths case, despite any standfast policy, up to 10% (25,000) of the populace would flee the city prior to D-day. In the other four operational concepts, Advance Force operations focus on areas distant from SYN City, thereby lessening the perception of danger in the city. Analysts concluded that an undetermined but negligible number of people might depart the city before D-day in these four cases. Landing Force full or partial isolation of the city in all five operational concepts militates against any significant refugee exodus on and after D-day.

The numbers of civilians leaving damaged residences but remaining in the city were estimated to be as follows:

- Deliberate Assault: 5% (12,500)

- Seize Key Objectives 5% (12,500 or less)

- Isolate and Contain 1% (2,500)

- Seize a Corridor 2% (5,000)

- Reduce Defense 10%(25,000)

In each case it was assumed that one half of those people would take temporary refuge with relatives or friends; the remaining half would require shelter, food, and water from public sources or as arranged by the Landing Force.

Methodology for Estimating Evacuees

Land areas were identified in which no civilian presence could be tolerated. Those areas were the BSAs, CSSAs, airfields, CP sites, and sections in which civilians might pose a threat to LOCs. The areas were measured on the map and SYN City population density factors were applied to calculate the approximate number of residents that would have to be relocated. For example:

BSA RED LAND AREA REQUIRING EVACUATION

Old City: .100 SqKm X 5,700 Density = 570

Suburbs: 2.085 SqKm X 2,800 Density = 5,842

RED Beach Evacuees 6,412

Combat Service Support Functions and Requirements

Civil Affairs (Continued)

Refugee/Evacuee Impact on Operations

In Operation BREAKER the Landing Force has to deal with the refugee/evacuee problem almost immediately after landing. Evacuees will have to be relocated during the period D+1 through D+3 to meet operational requirements. Provisions have to be made for their movement, shelter, subsistence, and security. The total numbers of refugees/evacuees anticipated during operations differ for the five operational missions, those numbers being influenced by the factors previously outlined.

TABLE V-9. ESTIMATED REFUGEE - EVACUEE PROBLEM

Operational Concept (Tactical Course of Action)	Refugees Fleeing SYN City	Refugees* Within SYN City	Evacuees** Within SYN City	Estimated Total	Remarks
1. Deliberate Assault (D+10)	Negligible	6,250	28,000	34,250	Advance Force opns do not disclose focus on SYN City. No nearby sites for refugees. D-day opns isolate city and, thereafter, prevent mass exodus.
2. Seize Key Objectives (D+10)	Negligible	6,250	28,000	34,250	Same as above.
3. Isolate and Contain (D+2)	Negligible	1,250	28,000	29,250	Rapid mission accomplishment militates against significant exodus.
4. Seize a Corridor (D+2)	Negligible	2,500	16,000	18,500	Rapid opns and focus north of South River limit refugee and evacuee population.
5. Reduce Defenses (As Required)	25,000	12,500	28,000	40,500 in city	Five days' Advance Force opns at SYN City give time and incentive for departing.

* Assuming that pre-D-day refugees equate to 5%, 5%, 1%, 2%, and 10% (respectively) of total population, of which one half move in with friends or relatives in SYN City. Numbers shown reflect the homeless.

** Civilians (rounded to nearest 1,000) expected to require deliberate evacuation by VII MAF to accommodate CSSAs and other installations. Calculated 15,820 north of South River and 12,473 south of South River. Additional areas may have to be evacuated as the tactical situation develops.

Areas to be Evacuated

The areas to be evacuated are the same for four of the five missions. Only in Oplan 4-81 (Seize a Corridor) is there a difference, resulting from the focus of operations entirely north of South River. For that reason, no relocation of civilians is required south of the river (12,000) in Oplan 4-81, leaving only about 16,000 persons to be relocated in areas north of the river. The map below reflects the numbers of people and tentative schedule of evacuation for the 28,000 evacuees that would be relocated in four of the Oplans. (In Oplan 4-81 the three areas to the south would not be evacuated).

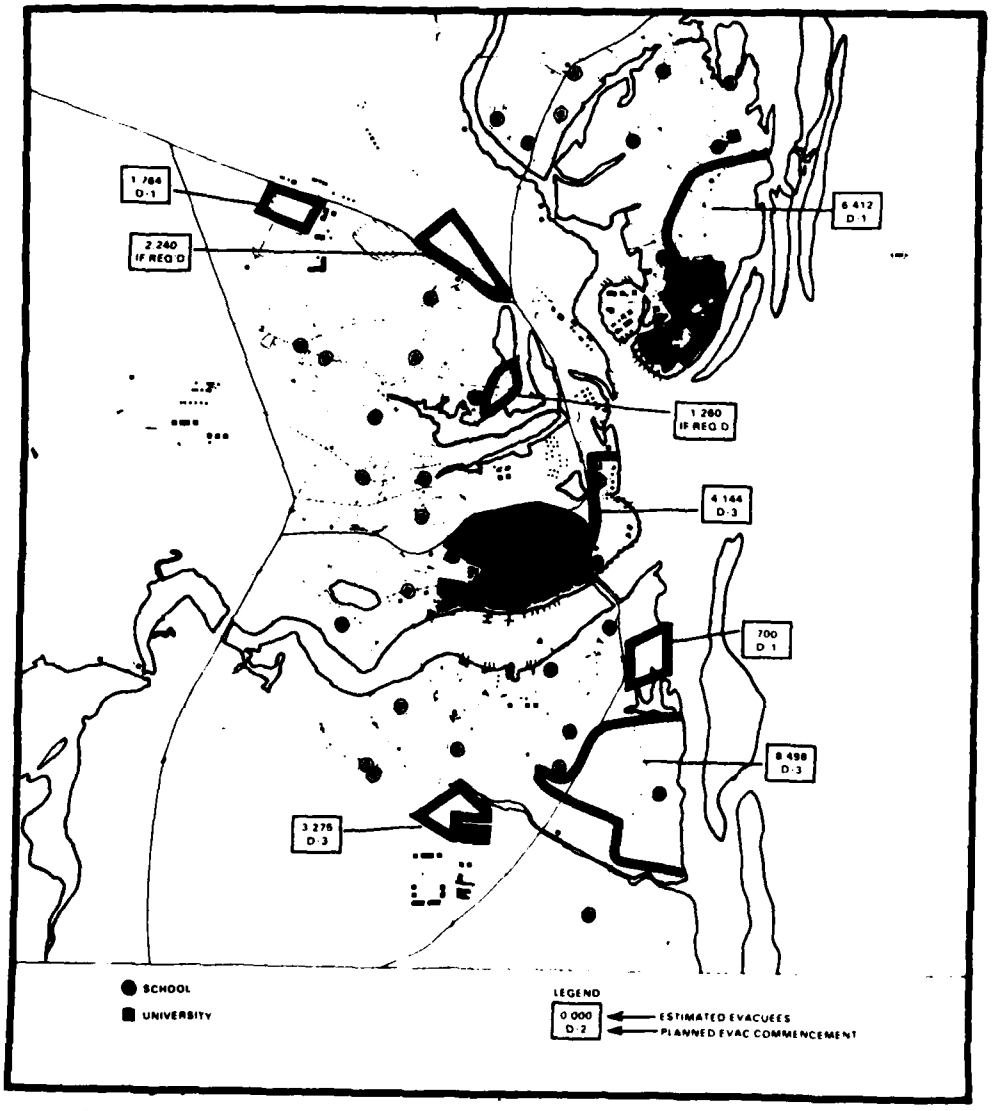


Figure V-17. Areas Evacuated During Operation BREAKER

Civil Affairs (Continued)

The general requirements for CA operations were analyzed with respect to each of the five mission statements and operational concepts. Three CA courses of action were articulated and examined. They were tested to assure that they expressed a sufficient range and diversity of CA involvement to provide a useful basis for analysis and comparison. The three CA courses of action were as follows:

- Course of Action #1. VII MAF establishes minimum essential control over government officials of SYN City, the general populace, refugees and evacuees to prevent indigenous civilian interference with Landing Force tactical and logistical operations.

- Course of Action #2. VII MAF augments local civilian resources until assumption of civil affairs responsibilities by follow-on forces, to provide subsistence-level rations, potable water, and emergency life-saving medical support to prevent civilian interference with Landing Force tactical and logistical operations, create an environment to facilitate long-term civil affairs operations by follow-on forces insofar as possible, and provide a basis for gaining immediate intelligence information.

- Course of Action #3. VII MAF provides a full range of civil affairs operations and support, within MAF capabilities, humanitarian services consistent with local customs, public health and welfare, sanitation, legal and public safety, population and resource control, consolidation psychological operations, and public information, to prevent civilian interference with Landing Force tactical and logistical operations and create an environment of support for the Landing Force and for follow-on forces.

The foregoing courses of action were analyzed for each tactical operational concept to determine the supportability of each concept. In particular, food support was evaluated on the basis of providing food to civilians only from local or captured stocks and providing either a subsistence diet of 1,500 calories or a 3,200-calorie daily diet which the Surgeon General considers to be adequate over long periods of time. The decision was to adopt CA Course of Action #2 with minor modifications based on insights gained during the estimate process.

TABLE V-10. SUBSISTENCE SUPPORT REQUIREMENTS - OPERATION BREAKER

BASIS FOR 1,500 CAL SUBSISTENCE DIET FOR SYN CITY CIVILIANS

CIVILIAN FOOD REQUIREMENTS	PER PERSON/PER DAY	TOTAL DAILY REQUIREMENT 250,000 PEOPLE	VII MAF/THEATER LEVEL OF SUPPORT PER DAY
STAPLE (Cereal, rice, etc.)	350-400 grams (12.5-14.3 ounces)	97.66 to 111.64 S/T	105 S/T
ENERGY FOOD (oil, etc)	20-40 grams (.7 - 1.4 ounces)	5.58 to 11.16 S/T	9 S/T
PROTEIN (Beans, meats, veg.)	50 grams (1.8 ounces)	13.95 S/T	14 S/T
TOTAL	420-490 grams (15-17.5 ounces)	117.19 to 136.75 S/T	128 S/T

*
Average rations for initial survival should provide at least 6.3 megajoules (MJ) (equivalent to 1,500 kilocalories). 1 MJ = 239 Kcal. The commonly used U.S. term for Kcal is calorie.

Additional items should be provided such as fruit, vegetables, condiments, tea, powdered milk, etc., but these will probably be available in the local economy. If not, and if a determination is made to provide any of these items, the supplies will be requested from Unified Command sources and delivered by whatever transport means are most feasible at the time they are required.

It is advisable to deliver rations for one week to family units.

POTENTIAL LOGISTIC SUPPORT REQUIREMENTS FOR ESSENTIAL FOOD SUPPORT OF SYN CITY POPULACE a/

SHORT TONS OF FOOD PER DAY & PER WEEK

OPERATIONAL CONCEPT	CIVIL AFFAIRS COURSE OF ACTION #1 MINIMUM ESSENTIAL b/	CIVIL AFFAIRS COURSE OF ACTION #2 PROVIDE SUBSISTENCE c/	CIVIL AFFAIRS COURSE OF ACTION #3 FULL RANGE d/
1 DELIBERATE ASSAULT	17.4/121.8	128/896	270.6/1894.2
2 SEIZE KEY OBJECTIVES	17.4/121.8	128/896	270.6/1894.2
3 ISOLATE AND CONTAIN	14.85/103.95	128/896	270.6/1894.2
4 SEIZE A CORRIDOR	9.4/65.8	128/896	270.6/1894.2
5 REDUCE DEFENSES	20.57/143.99	114.26/799.82	252.31/1766.17

a/ Under International Law, military commanders are required, if they are able, to furnish food, medicine, and other essential commodities. It is permissable to use food requisitioned from other civilians to meet essential needs.
b/ Refugees and Evacuees only.
c/ Refugees, Evacuees, and remainder of population at 1,500 calories per person per day.
d/ Refugees, Evacuees, and remainder of population at 3,200 calories per person per day.

Note: Subsistence diet is 1,500 calories, maintenance diet is 3,200 calories for purposes of this estimate.

Civil Affairs (Continued)

Logistic Impact of Civilian Supply Support

The level of effort required to support the three CA courses of action differed substantially. In Course of Action #1, no food support was contemplated from outside the FBH through D+30, and none was planned for the bulk of the population. No containers would be used. The supply tonnage, solely from local stocks, required to support refugees and evacuees amounts to 17.4 short tons per day which equates to about one container-equivalent per day spread throughout the city. From D-day until about D+10, all three courses of action rely on local stocks and have identical requirements. After D+10, CA Course of Action #2 requires 128 S/T of food per day to provide a 1,500-calorie subsistence for the entire populace, equating to about eight containers per day. The more generous 3,200-calorie diet for 250,000 people amounts to over 270 S/T per day, requiring about 16 containers per day.

Methodology for Determining Container Requirements

The standard 8X8X20 container has an inside volume of 1,063 cubic feet according to DARCOM's Container System Hardware Status Report, January 1981. The average density of dry Class I stock is 33 pounds per cubic foot. (See USACDEC Supply Agency, The Field Materials Handling Equipment Family Study. and JLRB, Logistic Support in the Vietnam Era, Monograph 7, 18Dec70.

$$\frac{\text{CuFt Inside Container X Wt per CuFt of Material (lbs)}}{2{,}000} = \text{S/T per Cntr.}$$

$$\frac{1063 \times 33}{2{,}000} = 17.5 \text{ S/T of Class I per Container}$$

This 17.5 S/T factor was then divided into the total S/Ts estimated to be needed to determine the approximate number of containers of Class I supplies that would be required to support CA Courses of Action #2 and 3.

$$\frac{\text{S/T Required per day}}{17.5} = \text{Container Equivalents Required per Day}$$

Course of Action #2: 7.31 or 8 containers per day @ 17.5 S/T
9.85 or 10 containers per day @ 13 S/T (CH-53E)

Course of Action #3: 15.46 or 16 containers per day
20.77 or 21 containers per day @ 13 S/T (CH-53E)

Potable Water Requirements

United Nations sources suggest that the potable water needs of a refugee population are as follows:

Individuals	15-20 liters/person/day	(3.9-5.2 gal.)
Health Centers/Hospitals	40-60 liters/person/day	(10.4-15.6 gal.)
Feeding Centers	20-30 liters/person/day	(5.2-7.8 gal.)
Sanitation Units	3,000 liters/day/1,000 people	(780 gal.)
Cattle	30 liters/day/animal	(7.8 gal.)
Small Stock	5 liters/day/animal	(1.3 gal.)

The foregoing represent optimum quantities of water that might be available to refugee populations in noncombat situations. In the case of Operation BREAKER in SYN City, various tables were consulted that reflected potable water requirments. The purpose was to identify minimum acceptable quantities of water for the 250,000 civilians during the consolidation phase, assuming that their normal supplies were interrupted.

Germans in the desert	1 quart/man/day (coffee or tea) (EUCOM Study)
British in the desert	1 gallon/man/day (water) (EUCOM Study)
US in desert combat	6 quarts/man/day (FMFM 8-1, FM 90-3)

Analysts considered that the population of SYN City has ample water available for most purposes, and that if supply of potable water is interrupted they can survive on one quart of potable water per day through the consolidation phase. The civilians would not generally be engaged in hard physical labor nor would they be subject to extremes of weather during the period. Ample quantities are available in the area to support cattle and other stock. One quart per person per day for the 250,000 civilians in SYN City equals 62,500 gallons per day, which can be produced by four water purification units.* Distribution would be made by local authorities in conjunction with distribution of food supplies.

* (TAMCN B2625 @ 1,100 gph for 20 hrs/day and .8 availability factor)

Civil Affairs (Continued)

Selecting Shelter for DPRE

Tentative designation of DPRE assembly areas to serve as temporary camps should be accomplished early in the planning phase to assure that suitable sites are available and not usurped for other less important functions. Actual selection will depend on several factors, including:

- Number and attitude of DPRE in each area
- Nature and extent of damage to designated facilities/areas
- Availability of food, water, and suitable shelter
- Capacity of shelters
- Existence of sufficient sewerage/sanitation features
- Availability of electric or other sources of power and fuel
- Distance from probable target areas
- Ease of providing security

Schools as Shelters - Methodology

ANNEX G (Civil Affairs) to Oplan 1-81 outlines the estimated DPRE effort and indicates that sufficient space is expected to be available in schools for use as DPRE assembly areas. Although other structures could prove to be more suitable, the schools are sufficiently large and conveniently located to accommodate the anticipated DPRE population. Classrooms, gymnasiums, cafeterias, and offices can be used, and, if the SYN City water supply remains operable, school buildings can be expected to have limited water available. The potential capacity of the schools for housing DPRE was calculated as follows, using East Germany as a model:

- The school-age population of East Germany as a precentage of total population was extrapolated from data in the Area Handbook for East Germany and the Europa Year Book 1980, Vol. 1, and calculated to be 26.7%. (The US percentage shown in various almanacs averages 26.1%)
- SYN City's population was factored accordingly and divided by the number of schools shown on the SYN City Map, 1:20,000.

$$\frac{250{,}000 \times 26.7\%}{38 \text{ Schools}} = 1757 \text{ Avg. School Capacity}$$

- Designation of schools to serve as DPRE assembly areas was based on providing more capacity (in terms of average student population) than required by the numbers of DPRE tentatively programmed to occupy the given facilities, to assure adequacy.

- Similarly, the average number of students per university in East Germany was averaged, based on data in the Area Handbook and Europa Year Book.

  - East German university students, approx.: 125,000

  - East German universities: 53

  - Average students per university: 2,358

- SYN City's 15.5-acre university was assumed to accommodate a slightly higher number than the East German average; it is the only university within at least 200 km according to the SYN City map product, it is an isolated port city, and its students would come not only from the city but also from the countryside.

TABLE V-11. EVACUATION TIMETABLE AND RELOCATION SITES

AREA	BEGIN EVAC.[1]	NO. OF CIVILIANS	PURPOSE	POSSIBLE RELOCATION SITES[2]
RED BEACH BSA	D+1	6,412	RED BEACH/LOC SECURITY	UNIVERSITY (2,500) 3 OLD CITY SCHOOLS (5,271)
SOUTH OF AIRFIELD 1	D+1	1,764	AIRFIELD/LOC SECURITY	4 NEARBY SCHOOLS (7,028)
PORT AREA VIC. NEW CITY	D+3	4,144	CSSA 1 REQUIREMENT	5 NEW CITY SCHOOLS (8,785)
BLUE BEACH BSA	D+1	700	BSA SECURITY	1 SCHOOL WEST OF BEACH (1,757)
SOUTH OF BLUE BEACH	D+3	8,498	CSSA 2 REQUIREMENT	5 SCHOOLS IN WESTERN SUBURBS (8,785)
VICINITY OF AIRFIELD 2	D+3	3,775	EAF SECURITY AND RUNWAY EXTENSION	3 SCHOOLS (NW) (5,271)
WEST OF LANDFILL EAST OF AIRFIELD 2	IF REQ'D	2,240	LOC SECURITY	2 NEARBY SCHOOLS (3,514)
NNW OF CITY FUEL STORAGE	IF REQ'D	1,260	CSSA 1 OVERFLOW	1 NEARBY SCHOOL (1,757)

NOTE 1 ESTIMATED ACTUAL EVACUATION DEPENDS ON TACTICAL SITUATION AND AVAILABILITY OF SUITABLE SITES FOR SHELTERING EVACUEES.

NOTE 2 SUFFICIENT SHELTER IS PROBABLY AVAILABLE IN SCHOOLS. SCHOOLS (ESTIMATED CAPACITIES INDICATED) ARE WITHIN WALKING DISTANCE OF AREAS TO BE EVACUATED. THESE ARE ILLUSTRATIVE ONLY; OTHER FACILITIES SUCH AS PRIVATE HOMES, PUBLIC AND COMMERCIAL BUILDINGS, CHURCHES, ETC., MAY BE PREFERRED.

Combat Service Support Functions and Requirements

Civil Affairs (Continued)

Civil affairs operations by MAGTFs are expected to be of limited duration, encompassing the assault and consolidation phases of an amphibious operation. The MAF Fingerprint (CG MCDEC, Notional MAGTF Lift Requirements for the Marine Corps Mid-Range Objective Plan, (MMROP)) depicts the personnel strengths, square, cube, and weight of a notional MAF, and shows the spread between the AE and AFOE. In the fingerprint, the CA group is shown entirely in the AFOE. While that embarkation posture may be adequate for a conventional amphibious operation, it is not suitable when the Landing Force will be involved in urban combat prior to the arrival of the AFOE.

Civil Affairs Functions in SYN City

The CA estimate for SYN City showed that several of the 20 CA functions (FM 41-10) would have to be performed to minimize civil affairs problems, prevent civilian interference with Landing Force operations, and comply with the provisions of international law. Vital functions such as Civil Information, DPRE, Civilian Supply, and the initial Public Safety liaison and evaluation effort should commence as early as possible, particularly since refugees will be encountered on D-day and hundreds of civilians will have to be evacuated and relocated beginning on D+1. Accomplishment of other functions, such as Food and Agriculture, may be delayed until arrival of the AFOE. About nine CA functions will probably not be performed by the Landing Force, although follow-on forces will have to address all or most of them.

Reserve Component Implications

Both the US Army and US Marine Corps regular establishments lack regularly assigned, readily deployable, active duty, civil affairs functional specialists. Although some of these function can be performed satisfactorily by personnel untrained in civil affairs operations, or by civil affairs generalists, several functions can be performed optimally only by trained and experienced specialists; in this sense they act as FORCE MULTIPLIERS, freeing tactical and supporting forces from having to perform CA functions.

The US Army has only one active duty civil affairs unit, the 96th Civil Affairs Battalion at Fort Bragg, NC. Currently, it is at or below about 100 personnel in strength. Personnel assigned tend to be generalists, as is normally the case, with the 20 functional CA specialties being represented mainly in Major Army Reserve Commands, the 351st, 352nd, and 353rd Civil Affairs Commands.

Requisite functional skills/teams for an actual operation would have to be provided from the Fleet Marine Forces, another Service, the reserve

component, or the retired rolls. Use of reserves would depend on call-up for up to 90 days of the 100,000 Selected Reservists by the President (10 USC 673 (b)); Presidential declaration of a national emergency, in which individuals or units of the Ready Reserve can be activated for not more than 24 months (10 USC 673); or a Congressional declaration of emergency, which provides for authority to call to active duty any member or unit of a reserve component for the duration plus six months (10 USC 672(a), 674, 675, and 6485 (a)).

Language Teams

In the US Army civil affairs structure language teams are in addition to the 20 functional teams. Language/interpreter billets in the 4th CAG are Marine Fleet Assistance/Contingency billets, not normally filled in peacetime.

AUGMENTATION REQUIREMENTS

US Army Civil Affairs Functional Teams	USA Team 1/	Agg. Str	Required Level of Performance to D+30	4th CAG Capability	Augmentation Required 1/ Team	Str
Arts, Monuments, & Archives	FB	5	Not Required			
Civil Defense	GB	5	Not Required			
Civil Information	HB	5	Plan, direct, supervise	CAG Hq/PA/CommBn		
Civilian Supply	IB	5	Survey, supervise		IB	5
Displaced Persons, Refugees, Evacuees	JB	6	Coordinate, administer, advise	CAG Dets/FSSG		
Economics & Commerce	KB	7	Not Required			
Food & Agriculture	LB	5	Survey, supervise		LB	5
Labor	MB	4	Supervise, coordinate	CAG/FSSG		
Property Control	NB	4	Supervise		NB	4
Public Administration	OB	5	Liaison, monitor	CAG HQ		
Public Communications	PB	5	Analyze, evaluate, administer		PB	5
Public Education	QB	5	Not Required			
Public Finance	RB	5	Not Required			
Public Health	SB	7	Analyze, supervise, coordinate	CAG/FSSG		
Public Safety	TB	5	Supervise, advise 2/		TB 2/	10
Public Transportation	UB	5	Evaluate, supervise 3/		UB	5
Public Welfare	VB	4	Not Required			
Public Works & Utilities	WB	5	Evaluate, supervise, advise		WB	5
Religious Relations	XA	2	Not Required 4/			
Tribunals	YB	5	Not Required			
Language Teams	ZB	4	Not Required 5/			

1/ Requirements are shown in terms of US Army Civil Affairs Functional Teams described in FM 101-10-2. The 4th CAG will require augmentation in several functional areas with the same capabilities and approximate strengths.
2/ Two Public Safety Teams are needed to provide timely staff support, liaison, survey, and enforcement of orders relating to security control of the populace, plus supervision of police, fire department, and prison operations. Fire-safety personnel must have demonstrated skills and experience in all aspects of preventing, controlling, and fighting fires in urban areas.
3/ A Public Transportation Team is needed to evaluate the status and potential operability of the two rail networks and coordinate and supervise repairs, maintenance, and operation if restoration of some railroad service is possible.
4/ A Religious Relations Team will be required if the predominant religion in the area is sufficiently different from those in the US. Religious scholars and linguists may be needed.
5/ Language Teams or some other outside support will be required if the 15 Marine Fleet Assistance/Contingency billets in 4th CAG cannot be filled with Marines fluent in the Aggressor language.

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Figure V-18. Civil Affairs Group Augmentation Requirements

Civil Affairs (Continued)

Summary

- The 4th Civil Affairs Group, USMCR (4th CAG) is the only civil affairs unit in the Marine Corps, and partial or full mobilization must be declared to call members or units of the Selected Reserve to active duty.

- The organic civil affairs capability in the Marine Corps is not adequate to support MAF offensive operations in a hostile urban environment. (Defensive implications are examined in Phase II of this study).

- Several of the 20 CA functions must be performed in urban combat operations to facilitate mission accomplishment, and the 4th CAG would require augmentation of its current capabilities to perform many of these important functions.

- Augmentation of 4th CAG can be accomplished by having appropriate CA functional teams from the US Army reserve component assigned to MAGTFs, as required, assuming that USMC requirements are properly expressed in current contingency plans and further assuming that partial or full mobilization is declared.

- When urban warfare is expected, commanders should task organize CA units as FORCE MULTIPLIERS and embark appropriate elements in the assault echelon for early responsiveness to CA requirements.

- Offensive military operations in urban areas are likely to generate extensive logistic requirements in direct support of the populace; these requirements must be met to prevent civilian interference with tactical and logistic operations.

- The magnitude and timing of anticipated CA problems should be determined early because of their impact on CA functional requirements and the resulting influence on the CA task organization.

SYN City Specific

- Analysis of the situation in SYN City disclosed that of the 20 CA functions, 12 were of such importance to successful accomplishment of the Landing Force mission that they had to be provided for.

- The 4th CAG T/O was found to lack essential capabilities in seven CA functional areas, and augmentation by USAR functional CA teams is required.

- Two Public Safety Teams are needed to provide adequate expertise and professional liaison in the police and firefighting functions.

- Food relief for the entire populace was planned at a 1,500-calorie per day subsistence diet.

- Deliberate evacuation of civilians from BSAs, CSSAs, and other key areas was planned for approximately 28,000 people. (See section on military police for discussion of the magnitude of the security problem).

Recommendations

- CA functional areas in which the Marine Corps does not normally require or maintain trained personnel, but which are important in urban warfare, should be the basis for levying USMC requirements as follows:

  - Appropriate quotas at US Army civil affairs training installations for regular USMC personnel to qualify for additional MOSs in the field of civil affairs, thereby assuring the availability of CA-trained individuals for short-notice contingency deployments.

  - Designation of USAR functional CA teams with specific specialties (such as railroad expertise and operation of major municipal utilities systems) to support CA requirements identified in USMC contingency plans.

  - Identification and maintenance of current rosters of personnel in the USMCR and USMC retired-officer communities having urban warfare-related CA skills to meet shortfalls described in this report, plus any additional shortfalls identified in current or future contingency plans.

  - Modification of 4th CAG T/O to include the functional teams described herein as essential for urban combat CA operations, at least to the extent of having minimal expertise available in each area with billets available to be filled in time of emergency as Fleet Marine Assistance/Contingency billets.

Combat Service Support Functions and Requirements

MILITARY POLICE

OPERATIONS IN THE SYN CITY ENVIRONMENT INCREASE THE REQUIREMENT FOR MILITARY POLICE ELEMENTS BEYOND THOSE AVAILABLE IN THE DIVISION AND FSSG. IN PARTICULAR, AN INCREASED CRIME RATE WILL IMPACT ON THE MP WORK LOAD AS LONG AS THE LANDING FORCE IS OPERATING IN THE URBAN AREA. MOVING OUT OF SYN CITY AS EXPEDITIOUSLY AS POSSIBLE WILL BE A MAJOR CRIME-PREVENTION GOAL.

General

VII MAF Military Police functions include the following:

- Law Enforcement - Police protection, conduct of criminal investigation, straggler control, operation of confinement facilities.
- Security - Physical security of facilities or areas under MAF control.
- POW Management - Collection, guarding, and evacuation of POWs.
- Traffic Control - Control of the flow of traffic within the VII MAF area of operations, i.e., from the beach areas to the regimental rear boundaries.

Organization

The military police elements within VII MAF are found in the Division Headquarters Battalion and in Force Service Support Group Headquarters and Service Battalion.

Considering constraints of available amphibious shipping, MP elements assigned to the assault echelon will be limited. The remainder of MAF MPs would arrive on the assault follow-on echelon (AFOE).

The mission of the divisional MP Company is to:

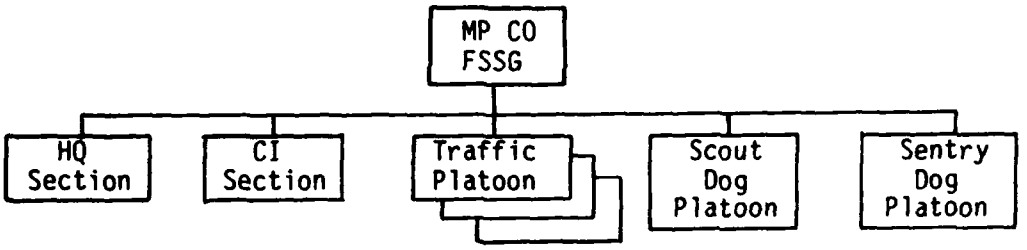
- Provide beach and traffic control.
- Provide general guard duty.
- Provide local security.
- Establish and operate POW stockades and evacuate POWs to rear.

In general, the division MPs limit their operation to within the divisional combat area.

Military police support for the remainder of the MAF is provided by the MP Company organic to the Force Service Support Group. It is a larger organization than the divisional company and its scope of operation is much greater than the divisional company. Its mission includes:

- Traffic Control
- Convoy Escort
- Law Enforcement
- Circulation Control
- Physical Security
- Crime Prevention
- Investigation
- Limited Counter-Insurgency
- Scout/Sentry Dog Support

This unit is organized as indicated below.



In addition to the headquarters section there are three traffic control platoons, a scout dog platoon to support MAF offensive operations, a sentry dog platoon for security of key facilities, and a criminal investigation detachment. The traffic platoons provide traffic control, escort convoys, and provide a force for general MP duties.

MP Support for Landing Force Aviation

Under the SYN City scenario the Marine Aircraft Wing fighter and attack elements will be operating offshore from theater air bases. Normally, the military police support for the MAW would be provided by the MP Company of the FSSG. However, under normal conditions where the MAW operates in the general locale of the other MAF elements, the MP support can be provided with the geographical separation, and the requirement for adequate support would increase slightly. Hence, additional MPs would probably be required to support the MAW less the elements in the AE. Since the nature and locale of the theater airbases are not given, it is not practical to calculate what MP augmentation might be needed. In any event, the number and skills of additional MPs required in support of 7th MAW Theater-based units is not expected to be significant.

MILITARY CRIME

THE MILITARY POLICE ASSETS NORMALLY ASSIGNED TO A MAF ARE NOT SUFFICIENT TO MEET THE REQUIREMENTS FOR INVESTIGATING THE NUMBER OF SERIOUS CRIMES THAT ARE LIKELY TO OCCUR IN A MOBA ENVIRONMENT. AUGMENTATION WILL BE NECESSARY.

Serious Crimes

FM101-10-2 dated July 1971 (later versions do not contain this data) estimates that the average annual crime rate will approximate 37.06 serious crimes per 1000 military population. This is a theater planning level factor developed from historical data covering both peacetime and wartime situations. This factor is used for determining the criminal investigation workload and the related workload of military units in the crime detection and prevention area. This factor is also considered with respect to the number of military prisoners that must be confined, cared for, and evacuated to CONUS. It is assumed that this planning factor will still be valid for current and mid-range operations.

It is estimated that a Criminal Investigator (CI) can effectively accomplish 34 criminal investigations a year; thus requiring approximately one CI per 1000 troops. In a MAF of over 50,000 personnel, a CI detachment of at least 50 personnel would be required for prolonged operations. The VII MAF mission calls for defending SYN City or continuing the attack to the northwest; therefore, the MAF should plan for including a small CI detachment of about 12 personnel in the Assault Echelon with additional personnel in either the AFOE or the Fly-in Echelon.

Military Prisoners

The confinement, care, employment and disposition of Marine prisoners is a major responsibility of military police elements. For a MAF-size unit, a military confinement facility would be operated normally by the FSSG MP Company in a wartime situation. However, such a facility would not be established until the combat situation permits. Normally in an assault phase, the military prisoners would be confined aboard a designated amphibious ship until a facility was established ashore. For theater planning purposes in a nonnuclear environment, confinement rates average 1 percent of command population. Command population in this case equals MAF strength in the FBH plus strength at theater support facilities. If nuclear weapons were employed, a higher rate would result. For Force Units preparing to deploy to a combat zone, the rate might be higher. The location of the unit, the mission, the caliber of people in the unit, and national attitudes are some of the determining factors influencing confinement rates.

MP Organizations, VII MAF

Unit	MO	ME
MP Co, Div Hq Bn	6	120
MP Co, H&S Bn FSSG	11	193
Total MPs/MAF	17	313

Source: MCDEC Ltr Subj: Development of Notional MAGTFs.... dated 12 Sep 1980

MP Elements in VII MAF Assault Echelon

Unit	Strength MO	MI
MP Co, Hq Bn MARDIV	6	120
Detachment, MP Co, H&S Bn FSSG	6	131*
Total MPs Assault Echelon	12	251

Source: MCDEC Ltr Subj: Notional MAGTF Lift Requirements.... (MMROP) dated 23 Oct 1980

* Includes augmentation of 12 CI.

Criminal Investigator (CI) Augmentation

VII MAF will require CI augmentation in approximately the following numbers:

- Assault Echelon (AE).....12 CI
  (3 per RLT and 3 for Division/FSSG until absorbed by MAF about D+10)
- Assault Follow-On Echelon (AFOE).....48 CI
  (At VII MAF Hq. and assigned investigations as required)(NOT REQUIRED FOR SHORT-TERM OPNS)

Total 60 CI

SYN CITY IMPACT ON CRIME RATE, CRIMINAL INVESTIGATIONS AND MILITARY CONFINEMENT

HISTORICALLY, MILITARY OPERATIONS IN URBAN AREAS HAVE BEEN ACCOMPANIED BY SIGNIFICANT INCREASES IN BOTH MAJOR AND MINOR INFRACTIONS OF MILITARY AND CRIMINAL LAW. FIRM LEADERSHIP AND SUPERVISION WILL BE MANDATORY AT ALL LEVELS OF COMMAND.

In an urban area with its high density of civilians, high value of real property, generally hostile environment and the length and continuous nature of operations, it can be anticipated that the crime rate in SYN City, both civilian and military, would be much higher than operations conducted in rural terrain. Although it is difficult to predict the precise increase in rate, it is assumed that the crime rate would be higher for a rear area (FSSG) unit than for the combat elements. For planning purposes, BDM analysts have estimated that the rate would be 20 percent higher for CSS units in a MOBA environment than it would be otherwise.

In light of this projected increase in the crime rate, 20 percent additional criminal investigators would be needed. This would require about 10 additional CI personnel for the VII MAF, more than the 50 initially calculated. The number of military prisoners would also increase accordingly. Discipline in an urban environment would be adversely affected. There would also be an impact on the requirement for MPs - more would be needed.

These increases in personnel requirements could be reduced if the crime rate is lowered. This can be accomplished by:

- Establishing close control over personnel, particularly those in the CS and CSS elements.
- Minimizing the number of personnel operating in the urban environment, thus reducing the number of personnel exposed to potential civilian-related criminal activities.
- Moving unessential facilities out of urban areas as quickly as possible.
- Providing wholesome recreational facilities and activities that involve a maximum number of personnel in the urban area during off-duty periods. This can be accomplished by establishing Rest and Recreation camps outside the city area after SYN City has been secured.

Lessons learned in past wars confirm that these means of minimizing disciplinary problems in urban areas are sound. General Westmoreland's operation "MOOSE" (Move Out Of Saigon Expeditiously) was a recent example confirming this method of reducing the crime rate. However, certain troops have to remain in the urban area to meet their mission requirements, such as naval, port, transportation, communication, aviation, civil affairs, and other personnel. The crime rate will still be higher than in normal operations, at least during the assault and consolidation phases of the operation. In the occupation or subsequent operational phase when SYN City is the major throughput location, military police units will be needed to operate in the city, although the major elements of the MAF will have moved out of the urban area. Thus detailed planning will probably indicate the need for military police augmentation by at least a company-size unit.

RECOMMENDATIONS FOR LAW ENFORCEMENT OPERATIONS IN SYN CITY

- Command emphasis should be placed on minimizing the number of military personnel in direct contact with civilians in the urban area.
- Criminal Investigation personnel should be augmented by 60 personnel to handle the anticipated workload during prolonged operations.
- Confinement facilities should be established as soon as possible. Confinees during the initial amphibious assault phase will be held in ships' brigs until suitable facilities are available elsewhere.
- An urban environment may have extant facilities such as police stations, detention centers, and prisons which may be used to hold civilian internees.
- Rest and Recreation Centers should be established in combat service support areas once SYN City has been consolidated.

Combat Service Support Functions and Requirements

POW, CIVILIAN INTERNEE, DPRE CONFINEMENT/SECURITY

IN SYN CITY OPERATIONS HANDLING AND GUARDING POWS, CIVILIAN INTERNEES, AND DPRE WILL PRESENT SIGNIFICANT PROBLEMS BEYOND THE CAPABILITY OF THE MILITARY POLICE ASSETS NORMALLY AVAILABLE TO A MAF. A DIRECT INTERFACE WILL BE ESSENTIAL BETWEEN THE VII MAF PROVOST MARSHAL AND CAG COMMANDER.

Among their many other responsibilities, the MP companies of 7th MarDiv and 7th FSSG will have the following specific responsibilities with respect to handling and guarding Aggressor military personnel and civilians:

- POW Escort
- Civilian Internee Escort
- Collection Point Security
- DPRE Escort
- DPRE Evacuation Control
- DPRE Security at Assembly Areas

In SYN City it is estimated that approximately 47-50 prisoners will be captured per day during the assault phase of the operation. This is a theater rate based on the enemy force confronting the MAF, which includes the MRB (Rein), 200 Army garrison personnel, and 1,000 Navy personnel at the naval station plus the MRD (-) within 80km of SYN City. In SYN City it is estimated that civilian internees will number from 900 to 2,800. Normally, civilian internees remain in theater and impose a workload on military police or other Marine elements to guard and administer them. In regard to POWs, 60 percent are normally retained in the immediate area as a labor pool.

POWs taken in and outside of SYN City and civilian internees will be held in the city prison as soon as the existing prison population has been screened and sufficient secure cells and other facilities have been vacated for use by POW/CI. The MP companies of 7th MarDiv and 7th FSSG will operate POW collecting points in their respective areas and be responsible for evacuation to the prison. Initial intelligence exploitation of POWs will occur at the point of capture or forward collecting points. Management and/or disposition of the prison inmates and prison staff will be determined by VII MAF Provost Marshal after the prison has been seized.

PERSONNEL REQUIRING CONFINEMENT	NORMAL ALLOCATION OF MP UNITS*	APPROXIMATE SECURITY REQUIREMENT	STRENGTH OF MP OR OTHER UNIT*
500-1,100 POW	1/500 POW	1-2 MP Guard Co	125 each
900-2,800 CI	1/2,000 CI	1 MP Guard Co (+)	125

POW/CI will be confined in SYN City prison. Two USMC MP Guard Companies, or the equivalent in personnel, will be needed in addition to the MP Cos in 7th MarDiv and 7th FSSG to run the prison, possibly augmented by other VII MAF troops if the maximum numbers of POW/CI are confined.

* FM 101-10-2, Staff Officers' Field Manual, Organizational, Technical and Logistic Data Extracts of Nondivisional Tables of Organization and Equipment. Chapter 14 provides data on Military Police units and the basis for their allocation. These factors were used to provide a basis for estimating VII MAF requirements in SYN City. It should be noted that MP requirements will differ for various urban situations, but the presence of large numbers of civilians, whether friendly or hostile, will inevitably generate the need for more MPs than are normally reflected in MAF structures and the MAF AE/AFOE Fingerprints.

RECOMMENDATIONS

In any planning that will involve combat in a major populated urban area, the concept for POW/CI management must be considered and the range of military police requirements determined to assure that sufficient MP units to accomplish all vital MP functions are included in the task organization and embarked in the appropriate movement echelon.

The equivalent of two MP Guard Companies should be added to VII MAF task organization to provide POW/CI prison administration and security; the companies should be embarked in the AFOE and scheduled for landing as early as possible, preferably about D+5.

POW, CI, DPRE Confinement/Security (Continued)

DPRE Operations

Deliberate evacuation of civilians from BSAs, CSSAs, and other designated areas is planned for nearly 25,000 civilians with an additional 3,500 identified to be relocated if required. Evacuees will be held in groups of less than 5,000. An estimated 6,250 refugees will also require billeting in assembly areas. These persons are expected to be scattered in small groups throughout the city and will be accommodated in the nearest assembly area. Approximately 19 school buildings or their equivalent will be used as displaced person/refugee/evacuee (DPRE) assembly areas in addition to collection points or other areas used temporarily for POW/CI.

Evacuation and movement control in and from 7th MarDiv TAORs will be accomplished by tactical units, assisted by the MP Co, H&S Bn, 7th MarDiv. Evacuees in other areas, notably CSSAs 1 and 2, will be relocated by LFSP/FSSG personnel, assisted by the MP Co, H&S Bn, 7th FSSG.

A guard force will be required at the temporary evacuee assembly areas that will serve as refugee/evacuee camps. The actual number of guards needed is estimated to be 399, not including a command element of up to 60 men. This figure is based on a 21-man detachment at each of the 19 school assembly areas to provide security and liaison. This small number would be effective only if the evacuees were generally cooperative and local authorities exercised a measure of internal control. The guard force would provide the following personnel at each assembly area beginning D+1/D+3 and continuing through D+30:

- 1 Sergeant
- 4 Corporals
- 16 Privates

These may be off-duty CSS personnel under MP supervision, or a rifle company from each regiment. Adjustments in the numbers of personnel required should be made over time based on experience. After about D+10, replacement draft personnel may be available for this purpose.

VII MAF should be prepared to commit a significantly larger security force if the evacuees become overtly hostile. For example, if the estimated 28,000 evacuees and 6,250 refugees require a level of security normally associated with POW camps (WORST CASE), from 2,100 to 3,200 guards could be required to man three 12,000 POW-type confinement areas. To allocate that number of personnel for evacuee security without seriously degrading tactical and logistical capabilities would not be possible unless VII MAF included in its task organization the equivalent of 9 to 18 additional MP Guard Companies. Significantly, these personnel do not have to be military police; replacement draft personnel or additional tactical units can meet this hypothetical requirement if available in sufficient numbers.

EVACUEE ASSEMBLY AREA SECURITY REQUIREMENTS

BEST CASE:
- 399 Security Guards plus approx 60 Command Personnel

OR

- 3 Rifle Companies (One from each regiment)

WORST CASE:
- 2,094 to 3,219 POW Camp Guards*

OR

- 1 Infantry Regiment

OR

- 2,000 to 3,000 additional personnel in Repl. Draft

* FM 101-10-2: Includes 3 POW-type confinement areas, each for 12,000 civilians. Requires 3 HHC, 9-18 MP Cos, and 1 HHD Br US PW Civ Internee INFOCEN. Assumes DPRE area overtly hostile.

In this WORST CASE hypothesis, the 34,250 DPRE would be actively hostile and require the same degree of security accorded to POWs. If that circumstance is considered to be possible, the remainder of the population would also have to be considered to be actively hostile, and the decision to launch an amphibious assualt directly into SYN City should be reevaluated. The only tactical course of action that might minimize the almost overwhelming civilian problem would be that of seizing a corridor.

RECOMMENDATION

The evacuee population is not expected to be as militant as POWs and CI, and they will be dependent on VII MAF for food and other emergency support. On a calculated risk basis, VII MAF should use a rifle company, or the equivalent, from each regiment to provide security at assembly areas and increase the replacement draft by at least an additional 2,000 men for security duty after D+10 if required.

MEDICAL SUPPORT

TIMELY AND EFFECTIVE TREATMENT OF THE CASUALTIES INCURRED IN AM AMPHIBIOUS OPERATION, PARTICULARLY ONE INVOLVING URBAN COMBAT, REQUIRES THAT SUITABLE MEDICAL FACILITIES, BOTH AFLOAT AND ASHORE, BE INCLUDED IN THE AMPHIBIOUS TASK FORCE AND THE LANDING FORCE.

In examining urban warfare amphibious logistics applications, logical general and special situations were postulated. These situations were designed mainly as the basis for studying Landing Force combat service support requirements and related management guidance, including medical support.

The Threat force's courses of actions and capabilities are such that moderate casualties will be inflicted on the Landing Force in the normal progression of the assault landing, isolation of the city, and reduction of comparatively limited enemy forces within the city. Detailed casualty estimates have been prepared for all MAF units down to company (or equivalent) level. These estimates are based on the anticipated combat action at each location and use applicable loss rates as given in FM 101-10-1 (July 1976). Returns to duty, whether immediate or as a result of the AOA evacuation policy (7 days), were reintroduced into their respective units. Medical support requirements that are discussed in the following paragraphs result from the consolidated casualties occurring within the FBH. Casualties occurring at other locations, including theater airbases and AFOE shipping prior to arrival in the AOA, will be handled by medical teams at those locations. All estimates are based on the assumption that Threat forces do not counterattack before the MAF consolidates SYN City and begins to deploy to the northwest.

The casualty loss will be extremely heavy, however, if reinforcing Threat forces succeed in entering SYN City, thereby greatly expanding the urban battle. In this eventuality, Landing Force occupation of the city will be delayed well beyond D+10 as planned, with a commensurate increase in casualties, and the outcome will be in doubt without significant friendly reinforcements. The possibility that Threat forces will initiate chemical warfare or, in extreme, nuclear warfare cannot be discounted. In either case, mass casualties will result.

SYN City has an indigenous population of 250,000 and extant medical facilities will be earmarked for treatment of civilian casualties resulting from the action of the deliberate assault. Facility utilization rates presented in the data base suggest that the indigenous medical facilities have the capacity to accommodate additional civilian casualties. Indigenous facilities will be used by VII MAF only as a last resort resulting from the premature departure of AE shipping or other unusual conditions that inhibit the transfer of military casualties to casualty receiving and treatment ships (CRTSs).

Employment of Medical System Elements

The overall medical system required to support an amphibious assault consists of several major elements and the evacuation modes used to link these elements. Elements of the total system are provided by the MAF, Navy, and Department of Defense in conjunction with certain civilian agencies. Origins of these support elements are shown below.

MAF	NAVY	AIR FORCE	DOD
MEDICAL BN (FSSG)	CRTSs	TRANSPORT (MAC)	THEATER SUPPORT
MEDEVAC (MAW)	MEDEVAC (ACU)		CONUS SUPPORT
FIXED-WING TRANSPORT (MAW)	MEDEVAC (AE SHIPS)		

Since this analysis is concerned primarily with logistic support in an urban environment, MAF and naval medical support responsibilities will be highlighted as USAF and DOD responsibilities are largely unaffected by the presence of the urban environment within the AOA.

MAF and naval medical systems within the AOA may be structured under various basing and evacuation concepts in order to provide the requisite support to deployed combat units. Since VII MAF has the mission to be prepared to continue the attack to the northwest after consolidation of the city proper, MAF medical assets are phased ashore progressively based on the debarkation schedule. Overall support for the Landing Force is also progressive in nature and evolves through several stages once combat units have landed in SYN City. All medical support for staged forces aboard AE and/or AFOE shipping will be provided by medical elements aboard those ships. MAF medical personnel will augment ships' staffs as necessary. Once ashore, medical workflow will be processed as shown in the figure below.

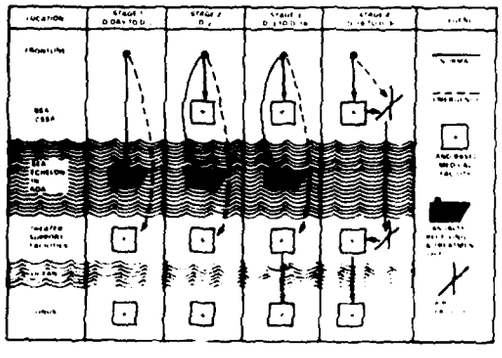


Figure V-19. Medical Support During Operation BREAKER

Medical Support (Continued)

Definition of Medical Support Requirements

Detailed casualty estimates were prepared for all VII MAF units within the AOA from D-5 through D+30. These estimates were compiled per period (D-5 to D-1, D-day, D+1 to D+3, D+4 to D+6, D+7 to D+10, and D+11 to D+30) and further divided into a daily workload by dividing the casualties per period by the number of days in that period.

Not all casualties will become admissions into a definitive care facility i.e. FSSG Med Bn Med Co, CRTS, or theater medical facility. Casualties treated at forward aid stations and immediately released for return to duty status (10 percent of WIA and 33 percent of DBNI) and servicemen killed in action (KIA) were subtracted from total casualties to find the actual number of admissions. A seven-day evacuation policy was implemented within the AOA, and a fifteen-day policy was implemented at the theater medical facility to reduce medical requirements in the AOA and provide for rapid evacuation and treatment for all casualties. A by-product of these evacuation policies was to reduce the number of returns to duty from either facility thereby increasing the requirement for replacements.

Requirements for operating rooms (OR) were based on two factors, each of which is not absolute and is subject to change. The number of patients that require surgery can be expressed as a percentage of the total number of admissions. This percentage has been estimated as high 50 percent (Letter PON-20-MLC-pmb dtd 23 April 81 as an enclosure to the 1982 MMROP) or as low as 15 percent (conversations with senior medical officers). The actual surgery rate will likely fall between these two extremes. The analysis of operating room availability/requirements will use factors of 50 percent and 20 percent to place a range to identify possible deficiencies or excess capabilities. The second factor pertinent to the calculation of OR requirements is the daily productivity of each OR (with appropriate staffing, of course). A daily productivity of six major surgical cases per OR was selected, although under surge conditions the OR throughput would be much greater.

The determination of bed requirements was made for the worst-case situation in which all admissions into AOA definitive care facilities occupied a bed throughout the entire course of the seven-day evacuation policy. Normally, a casualty is evacuated to the next level of definitive care as soon as his situation stabilizes sufficiently to permit evacuation. This situation would not highlight potential deficiencies in bed availability and, therefore, was not included in the analysis. Since all admissions remained at Med Bn or CRTS facilities for the entire seven-day period, and most patients require 3 to 5 days to stabilize before any evacuation, once the patient had been in a "primary care" bed for five days

he was transferred to a "rehabilitative care" bed for the remaining two days of the evacuation policy period. In addition, if evacuation means were not available the patient was placed in a staging area complete with beds and medical staff. Thus, the total beds required equalled ((primary care beds plus rehabilitative care beds) x 1.25 spot factor) plus evacuation staging beds. The 1.25 spot factor was introduced to allow for patient dispersion, housekeeping functions, and provide a safety margin for surge periods.

The table below provides an overview of anticipated medical support requirements tabulated per period of combat action. These requirements are exclusive of those levied by MAF units not within the FBH by the end of the reported period. Support requirements at theater airbases and AFOE shipping will be satisfied by medical teams at each location.

TABLE V-12. MEDICAL SUPPORT REQUIREMENTS IN THE FBH

PERIOD (DAYS)	CASUALTIES	KIA[1]	ADMISSIONS[2]	TOTAL[3] OR REQ	CUM BED REQ[4]	BED AVAIL ASHORE[5]	BED AVAIL AE SHIPS[5]	EVAC TO THEATER[6]
I (D-5) to D-1)	1663	48	1068	89	1338	0	3250	0
II (D-day)	887	144	674	57	2181	0	3250	0
III (D+1 to D+3)	1359	231	969	81	2857	120	3250	428
IV (D+4) to D+6)	1024	166	754	63	3000	300	2776	642
V (D+7 to D+10)	977	141	743	62	2198	540	1952	1320
VI (D+11 D+30)	5717	1147	3792	316	1663	540	0	4293

Note: 1. Represents casualties occurring for forces within SYN City (staged AE during Period I)
2. Defined as those personnel provided care at definitive care facilities.
3. Estimated that 50 percent of admissions require surgery; each OR handles 6 surg/day.
4. Represents bed requirement at end of period.
5. Represents bed availability at end of period.
6. Cumulative evacuees by end of period.

Medical Support (Continued)

Operating Room Requirements and Availability

As stated previously, operating room requirements are based on the number of admissions, the percentage of admissions requiring surgery, and the number of major surgical cases that can be handled by each operating room during the course of a normal working day. For purposes of this analysis the following factors apply:

- Admissions = Casualties - KIA - Immediate Return to Duty.
- Surgical Cases = 50 percent x Admission or 20 percent x Admissions. These percentages will give a range of surgical demand. (The actual surgical workload will be slightly lower as there are different factors applicable to WIA and DNBI.)
- Each OR can handle 6 major surgical cases per day.

The number of operating rooms available during the early stages of the assault is the sum of the major operating room facilities aboard CRTSs and the number of operating rooms established ashore from the Medical Battalion FSSG. Although the majority of vessels utilized to embark the assault echelon have organic medical facilities, certain AE vessels have been designated as primary casualty receiving and treatment ships by virtue of their ability to receive casualties and provide definitive treatment. The figure opposite shows the availability of operating rooms aboard primary CRTS, secondary CRTS, and other AE shipping. For planning purposes in this analysis, the amphibious shipping includes all five of the Navy's LHAs and six of the seven LPHs. (Such a generous allocation is unlikely to be available in any one theater for any lengthy duration.) These ships have 32 operating rooms aboard primary CRTS, 8 OR aboard secondary CRTS, and 16 OR aboard other AE vessels. There are also a total of 10 OR in the assault echelon assets of the Medical Bn FSSG.

TABLE V-13. OPERATING ROOM AVAILABILITY IN AMPHIBIOUS SHIPPING

ASSAULT ECHELON VESSELS (QUANTITY)

	LHA(5)	LPH(6)	LPD-1(1)	LPD-4(8)	LCC(1)	LKA(4)	LSD-28(3)	LSD-36(5)	LST-1179(16)
PRIMARY CRTS	20	12	-	-	-	-	-	-	-
SECONDARY CRTS	-	-	0	8	-	-	-	-	-
OTHER AE SHIPPING	-	-	-	-	2	4	0	10	0
MED BN (AE)	MED CO(4) - 8, H&S Co - 2								
MED BN (AFOE)	MED CO(1) - 2, HOSP Co - 6								

These assets are not constant during the entire course of the amphibious assault and subsequent consolidation. Medical Bn medical companies will not be operational ashore until D+2 at the earliest and will be progressively phased ashore as the tactical situation permits. The entire Medical Bn (including assets within the AFOE) is expected to be operational on or about D+10. Once the assault echelon has been offloaded and the MAF is established ashore, the assault shipping will redeploy to other locations. This redeployment is also phased with the first element departing the AOA on D+3 and the last element leaving on D+12. The loss of assault shipping reduces the number of available operating rooms to 18 by D+12.

Operating room availability and requirements have been summarized graphically in the figure below. Operating rooms aboard primary CRTS will be able to handle the surgical workload at the 20 percent level, but all available operating rooms must be utilized on D-day to handle surge casualties if 50 percent of the admissions require surgery. The capability exceeds the requirement if less than 27.5 percent of the admissions require surgery. The OR availability ashore by D+10 will be sufficient to handle the surgical load, at either rate, once the AE shipping leaves the AOA.

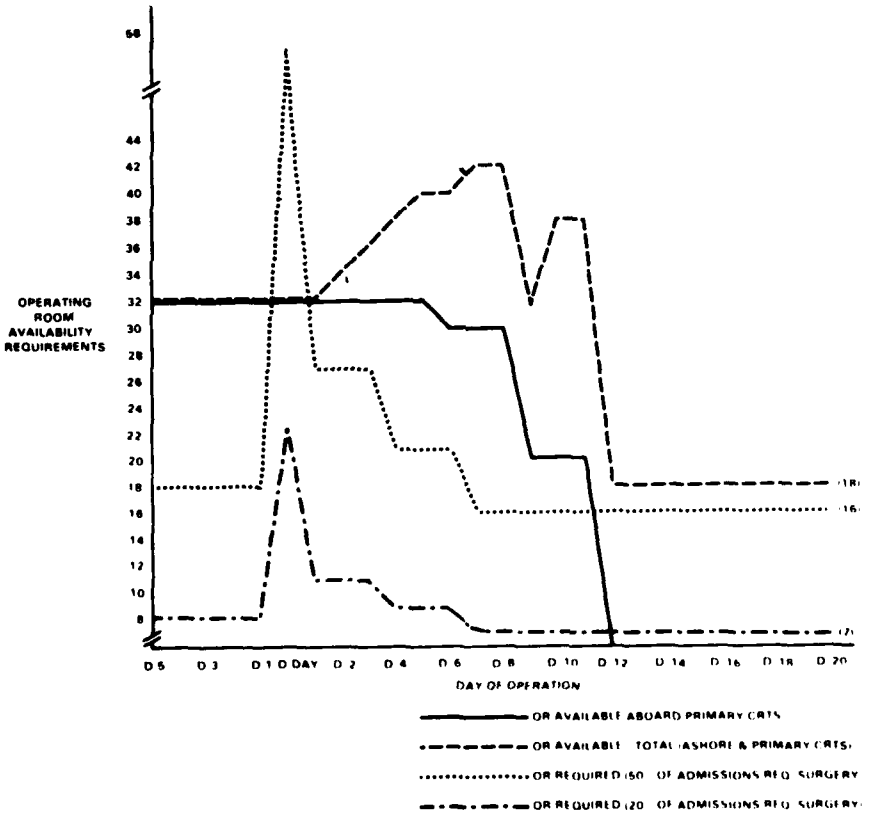


Figure V-20. Operating Room Availability During SYN City Offensive

Medical Support (Continued)

Bed Requirements and Availability

Bed requirements were based on each admission requiring 1.25 beds during the entire course of the seven-day evacuation policy implemented in the AOA. Although patients will be evacuated as soon as their condition stabilizes, the average period of stabilization is three to five days and the maximum bed requirement is realized if patients are retained in the AOA the full seven days. This situation is a reality during the early stages of any amphibious assault when neither time nor suitable transport are available for evacuation of casualties to theater facilities.

For purposes of this analysis, the number of required beds is equal to admissions in "primary care" beds plus admissions in "rehabilitative care" beds times a 1.25 spot factor plus patients awaiting evacuation. Since casualties for the assault echelon begin on D-5, a number of these admissions will still be occupying beds when the actual amphibious assault commences on D-Day.

Bed availability has also been subdivided between primary CRTSs, secondary CRTSs, other shipping, and operational Medical Bn assets. This allocation is shown in the table below. The entire availability on D-day is from amphibious shipping while the bed availability ashore builds to 540 by D+10 once all assets of the Medical Bn have landed. Bed availability is significantly reduced once the AE amphibious shipping completes its phased redeployment on D+12.

TABLE V-14. BED AVAILABILITY IN AMPHIBIOUS SHIPPING

ASSAULT ECHELON VESSELS (QUANTITY)

	LHA(5)	LPH(6)	LPD-1(1)	LPD-4(8)	LCC(1)	LKA(4)	LSD-28(3)	LSD-36(5)	LST-1179(16)
PRIMARY CRTS	1500	888	-	-	-	-	-	-	-
SECONDARY CRTS	-	-	98	96	-	-	-	-	-
OTHER AE SHIPPING	-	-	-	-	23	52	144	225	224
MED BN (AE)	MED CO(4) - 240, H&S Co - 40								
MED BN (AFOE)	MED CO(1) - 60, HOSP Co - 200								

The figure below provides a graphic summary of bed availability versus total demand for beds during the 30-day course of the SYN City offensive. Note that the bed requirement can be satisfied (prior to D+12) only if all available beds are utilized. This utilization will require close monitoring by medical regulating teams and intership shuttling of patients; but the capability is adequate until the bulk of the LHAs and LPHs depart the AOA. When the final AE shipping departs the AOA on D+12, there occurs a bed shortfall of approximatley 1200 beds which remains fairly constant through D+30. Enhancement options to remedy this deficiency will be addressed in paragraphs which follow.

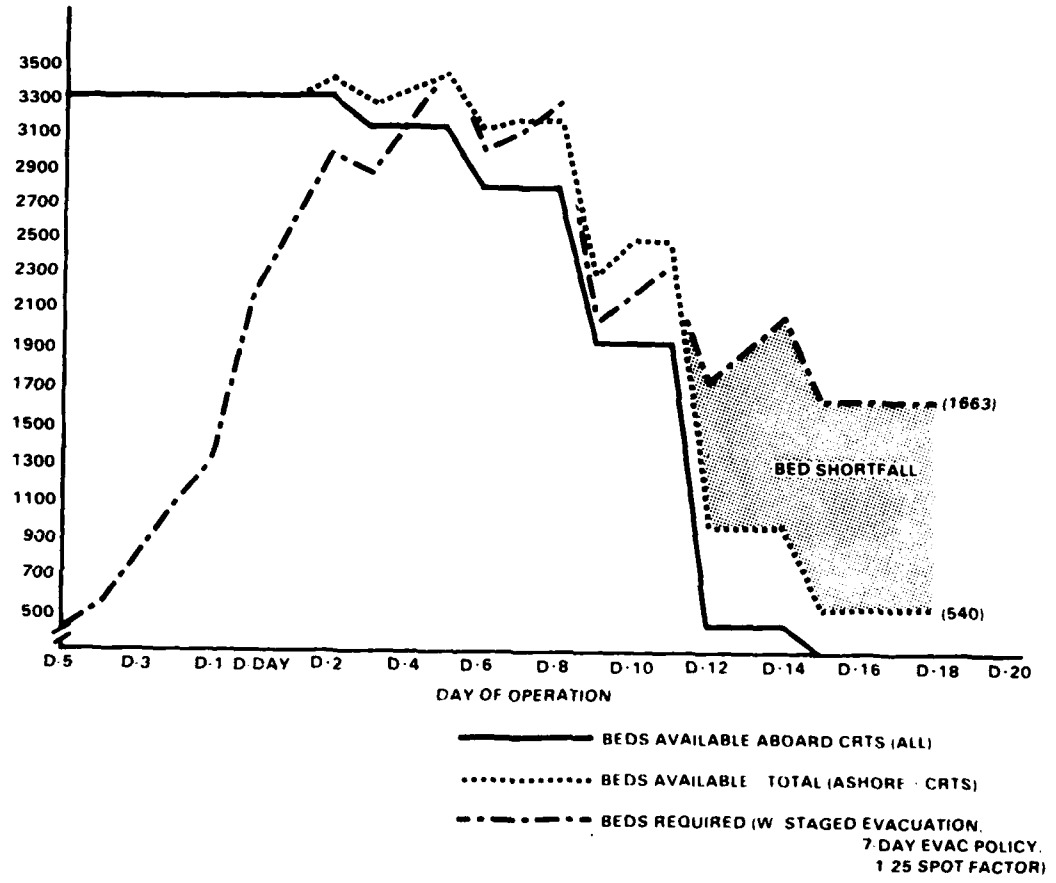


Figure V-21. Bed Availability During SYN City Offensive

Medical Support (Continued)

Evacuation of Casualties

The term casualty evacuation may refer to any of several echelons of patient evacuation during the course of an amphibious assault. Casualty evacuations will occur within the FBH, from the FBH to CRTSs on station in the sea echelon, between medical facilities within the sea echelon, or from the AOA to a nearby theater support facility. Only the last type of casualty evacuation will be addressed in any detail; the other evacuation situations are similar to those in a nonurban environment and only those urban dissimilarities will be noted.

Evacuation of frontline casualties to definitive care facilities will be accomplished by ground transport or designated medevac helicopters. The normal flow would include litter bearers/ground transport to beach evacuation stations (BES) or operational Medical Companies. Should the facilities ashore reach 85 percent of capacity or immediate evacuation to CRTS be required due to severity of wounds, battlefield casualties will be evacuated by helicopter directly from the aid station (or battlefield location) to the CRTS designated by the Medical Regulating Team. The evacuation system in the FBH must be flexible and adaptive to changes induced by variations in combat intensity and availablity of evacuation transport.

Evacuations from the FBH area to CRTSs in the sea echelon will be accomplished by helicopter as the primary means and displacement landing craft (LCM, LCU, LVT) as a backup. As before, the tactical situation ashore will often dictate the evacuation means at any given moment. During the actual amphibious assault on D-day, helicopter assets are fully tasked until the conclusion of L-hour operations and evacuation to CRTSs will be accomplished by secondary means.

Intership evacuations within CRTSs in the sea echelon will be done with helicopters whenever possible to minimize handling and resource utilization. These evacuations can be minimized by efficient medical regulating and preplanned sequencing of ship utilization.

Evacuation to theater support facilities will be accomplished (170 nautical miles distant) by any of several transport means - helicopter, AE shipping once offloaded, or fixed-wing transport from Airfields 1 and 2. Air evacuation of casualties from the AOA to theater airfields will not be possible prior to D+10 at the earliest and most optimistic estimate. Due to enemy denial operations and long-range artillery fires, Airfield 1 is not likely to be operable for fixed-wing aircraft, except VTOL, until after the runway has received major repairs and the Landing Force has established positions up to 25 km beyond the metropolitan limits of SYN City. Thereafter, since air superiority cannot be maintained, the airfield will be subject to additional cratering by

enemy air attack. It is unlikely that suitable air evacuation facilities, including an EAF, can be assured before about D+16. During the periods prior to D+16, evacuations to theater facilities will be accomplished by loading departing AE ships to their bed capacity. If assault shipping is redeployed in convoy serials on D+3, D+6, D+9, and D+12, the evacuation backlog will be eliminated. After D+15, the steady-state evacuation requirement equals 190, which can be handled by 2 C-130s flying one sortie per day and 1 CH-53D flying two sorties per day.

Mass Casualties

Mass casualties are defined as a casualty overload which renders the normal medical regulating procedures ineffective. All casualty treatment facilities would be completely overloaded, and the only method for relieving the situation is by prompt casualty sorting (TRIAGE). The TRIAGE would have as its objective saving as many casualties as possible by concentrating resources on those with the greatest life expectancy. Mortally wounded would be given only the resuscitative and emergency care permitted by available resources. In a nuclear, biological and chemical environment, treatment would be on a first-aid basis rendered by nonmedical personnel with immediate evacuation by all means available. At the same time, normal combat operations would continue.

The threat of NBC warfare will determine the degree of preparation required. In an urban environment with large numbers of enemy civilians present, it is doubtful, although entirely possible, that the enemy would initiate NBC warfare on a large scale unless the destruction of the MAF and subsequent propaganda exploitation were judged to be more important than SYN City itself. However, its selective use outside the city is possible. Hence, in SYN City operations, the full scale of defensive NBC equipment should be carried. This would include:

First Aid Packet with Burn Powder
Gas Masks
Protective Clothing (carried or worn)
G-agent Antidotes
Decontamination Equipment
Detector Sets
Radiac Equipment
Other Defensive Equipment such as Alarms, Signs, etc.

Combat operations will inflict considerable civilian casualties beyond the capabilities of civilian medical care facilities. The MAF should therefore be prepared, as the situation permits, to evacuate and treat civilian casualties. Although this workload is supported by military services/resources, civilians will be cared for if the situation dictates on a second priority basis.

If the threat of NBC is believed to be imminent, mass casualty evacuation capabilities and additional mobile medical TRIAGE teams should be provided to the MAF. Further, Emergency Stand-by Reception/Care facilities should be established afloat and ashore as soon as is feasible.

Medical Support (Continued)

Conclusions and Recommendations

The deliberate assault by VII MAF elements into SYN City will place a heavy burden on medical suport facilities both ashore and aboard amphibious shipping in the sea echelon. Elements of the Medical Bn FSSG will deploy ashore on D-Day and establish beach evacuation stations at BSAs RED and BLUE. Medical companies are expected to be operational beginning on D+2 with the entire battalion being operational by D+10. Assault shipping begins its redeployment on D+3 and is completely absent from the AOA by D+12.

The greatest impact of the urban environment is the potential availablity of suitable facilities and structures for use by medical elements ashore. The availability of structures suitable for medical use cannot be ascertained directly from the SYN City Data Base; it is assumed that these facilities would be located in the beach support areas, but deployment planning should provide for organic shelters for all VII MAF medical elements.

Requirements for operating rooms and definitive care beds can be met as long as the LHAs and LPHs remain in the AOA. Departure of amphibious shipping creates a 1200-bed shortfall which cannot be alleviated through the use of indigenous medical facilities. The following options have been suggested as having possible validity for providing definitive care facilities in lieu of those provided by AE shipping:

- Constructing a new hospital ship.
- Refitting the USS United States as a hospital ship.
- Refurbishing the former hospital ship (AH) USS Sanctuary.
- Utilizing a WWII/Korean War expedient - the LSTH.
- Leasing civilian cruise ships to be refitted as hospitals.

The deficiency of available beds subsequent to the departure of the assault echelon is not a new problem. Whichever solution is selected at the DOD level should provide for a minimum of 1200 beds, as well as a complete medical staff, scheduled for arrival in the AOA by D+10 and operational by D+11.

The mission assigned to VII MAF stated that VII MAF was to be prepared to continue operations to the northwest of SYN City once the metropolitan area had ben consolidated and follow-on forces (unspecified) had arrived. Once VII MAF has been relieved by the follow-on force and begins to deploy

to the northwest, medical facilities organic to the MAF will be phased progressively to new locations and additional medical facilities accompanying the follow-on force will deploy into SYN City. It is anticipated that follow-on forces will institute a 15-day theater evacuation policy and establish theater general hospitals in the SYN City area. It is vital that medical support facilities in SYN City, regardless of their parent unit, be capable of providing continuous definitive care for friendly casualties and civilian casualties should the situation permit.

Principal conclusions and recommendations concerning medical support for Operation BREAKER are shown below.

- A moderate level of casualties is expected in the absence of significant NBC warfare.
- No change is recommended concerning the basic medical systems and operational concepts of FMF medical elements.
- Medical facilities are established progressively ashore while the assault echelon amphibious shipping effects a staged redeployment.
- Operating room availability aboard primary CRTSs is sufficient to handle the surgical load provided that the consolidated percentage of admissions requiring surgery is less than 27.5 percent. Utilization of ORs in secondary CRTSs and other shipping will be required only on a surge basis (D-day) if the surgical percentage exceeds 27.5 percent.
- Bed availability is sufficient to meet anticipated requirements if all beds in the AE are utilized. Departure of the AE vessels creates a 1200-bed shortfall which could be remedied by the D+10 arrival of a dedicated hospital ship.
- Casualty evacuation to theater medical facilities will be accomplished by redeploying AE vessels, helicopters on an emergency basis, and fixed-wing transport once SYN City airfields are able to accommodate such platforms.
- Casualties inflicted by weapons of mass destruction will overwhelm the AOA medical capability. Treatment at definitive care facilities will be on a priority basis determined by initial triage.

Combat Service Support Functions and Requirements

MATERIALS HANDLING

THE CSS FUNCTION OF MATERIALS HANDLING INVOLVES THE PROVISION AND OPERATION OF EQUIPMENT REQUIRED FOR THE MOVEMENT, LOADING AND UNLOADING OF LANDING FORCE EQUIPMENT AND CARGO.

General

Materials handling concepts and requirements are currently undergoing major revisions as a result of the continuing trend towards containerization. Due to the nature of the amphibious assault and the lack of sophisticated MHE available early-on in the landing, the Assault Echelon cargo will be breakbulk in nature in both the current period and the mid-range time period. The full impact of the containerization trend will be realized with the delivery of AFOE cargo and the subsequent resupply of the MAF, in which both echelons of logistic support will be up to 100% containerized by the end of the mid-range time period. Containerization of AFOE and resupply cargoes will facilitate handling, minimize in-transit damage and pilferage, and present a transportation medium compatible with current trends in merchant ship availability.

Containerized AFOE cargo delivered to an Amphibious Objective Area (AOA) will require the efficient handling and storage of approximately 10,600 8' x 8' x 20' container equivalents during the first 20 days of a MAF operation. Currently, assault landings and much of the early logistic resupply will be accomplished using LVTs, displacement landing craft, and helicopters. When the assault phase is completed, breakbulk and containerized cargo carried by Navy amphibious ships and commercial vessels will be delivered to the shore by a variety of transportation means where it will move over the shore (LOTS) or through a port if one is available. The advent of the Landing Craft Air Cushion (LCAC) is expected to revolutionize several aspects of tactical and logistical operations in the amphibious environment. In particular, conventional displacement landing craft of the LCM/LCU type are scheduled to be replaced by LCACs by 1991. The 50-knot speed, 60-ton payload and ability to move short distances inland over suitable terrain will provide opportunities for tactical innovation and rapid resupply. The foreseeable weak link is the number and types of MHE available in the inventory. A second important consideration is the availability of suitable MHE at the required beaches or LZs, BSAs, CSSAs, and other port facilities.

This section will examine materials handling requirements that originate in two distinct phases:

- Landing and initial support of elements in the Assault Echelon.
- Landing of equipment and cargo from the Assault Follow-on Echelon.

Materials Handling Supporting Landing of Supplies-AE

The landing of the assault echelon of VII MAF is supported by materials handling assets that have been task-organized into Shore Party Teams "A" and "B" supporting RED and BLUE Beaches respectively. Materials handling requirements have been estimated for each of the beach support areas based on day of supply (DOS) requirements for units ashore during Period III (D+1 to D+3). Day of supply requirements for individual units were extracted from Logistics Planning Data Reference Book, Volume 1, promulgated for instructional purposes by MCDEC at Quantico, Virginia. The maximum requirement for MHE at the beach support areas was expected to occur during Period III when two days of supply for units ashore in Period III were to be landed and moved to appropriate stockage points within an 18-hour period of time.

The following assumptions were made concerning materials handling operations during the landing of the assault echelon:

- Supplies afloat are loaded into landing craft for the ship-to-shore movement.
- Prior to opening CSSAs, priority for BSA stockage will be devoted to Classes I, III, and V. Classes II, IV, VII, VIII, and IX are mobile-loaded and resupplied from unit mountout.
- All Class I, III, and V supplies are palletized.
  - Class I, V - 2000 lb/pallet.
  - Class III - 4-55 gal drums/pallet.
- Cycle time for MHE is 4 minutes with an additional minute allowed for maintenance, refuel, driver relief, etc.
- Available MHE can lift 2 pallets Class I, 1 pallet Class III, or 1 pallet Class V per lift.
- Pallets are unloaded singly at the issue point.
- MHE availability is based on an 18-hour day with an 80% operational availability factor.

Materials Handling (Continued)

Period III day of supply requirements (2 DOS) and corresponding MHE requirements at the waterline for each beach are summarized below.

	RED BEACH			BLUE BEACH		
	CLASS I	CLASS III	CLASS V	CLASS I	CLASS III	CLASS V
2 DOS*	130	1226	228	50	420	74
MHE Days	.375	7.1	1.33	.15	2.43	.43
MHE Req.	1	8	2	1	3	1

*Expressed in terms of number of pallets.

MHE quantities as expressed in the table represent minimums that must be present at the waterline to accommodate the transfer of resupplies. An equal number would be required at the supply point to transfer cargo from prime movers to applicable supply stockage areas within the beach support areas. MHE requirements at each class of supply issue point can be approximated by 50% of MHE assets at the waterline since only one day of supply is issued per day. In summation, 28 rough terrain forklifts of the 4,000 lb. or 6,000 lb. type would be required in the vicinity of RED Beach and 13 are required at BLUE Beach. This total requirement is well within the organic capability of the H&S Co H&S Bn FSSG and would be structured into the Shore Party Teams.

The movement of supplies from beach landing areas to Beach Support Area supply points will be accomplished by 5T cargo vehicles . The following assumptions were used to calculate the number of cargo vehicles at each beach to be dedicated to the transportation of Class I, III, and V supplies:

- The standard cargo vehicle used is the 5T dropside cargo truck (TAMCN D1035).
- Each vehicle can carry 5 pallets of Class I and III, or 3 pallets of Class V.
- Vehicle speed during the course of transit is 5 mph (8 kph).
- A 10-minute delay time is assessed per round trip for driver relief, maintenance, refuel, etc.
- Vehicle operational availability is 80%.
- Loading times are 5 minutes/2 pallets Class I and 5 minutes/pallet of Class III or V.
- Unload times are 5 minutes/pallet.

Distance factors and corresponding truck transport requirements to achieve the desired supply buildup during Period III are shown below. Additional MHE and transport will be required to move organizational cargo.

	RED BEACH			BLUE BEACH		
	CLASS I	CLASS III	CLASS V	CLASS I	CLASS III	CLASS V
Distance to supply point (km)	2.0	1.75	2.75	3.25	3.0	2.0
# Truckloads	26	246	76	10	84	25
# Trucks(total) (incl 80% factor)		34			14	

Personnel requirements to handle and transport AE supplies have been estimated based on the following considerations:

- MHE and cargo vehicles - 2 equipment operators per equipment item.
- Beach unload points (4 supply unload areas (CL I, III, V, misc).
  - Each unload area has one or more unload points.
  - Each unload point has one checker, one unloading assistant, one movement assistant.
  - Each unload area has one supervisor.
- Supply points - One supervisor per class of supply; inventory control personnel are based on cumulative stockage.

	RED BEACH	BLUE BEACH
Forklift operators	56	26
Truck operators	70	29
Beach unload point personnel	16	16
Supply point personnel	40	33

*includes supervisors

Based on the analysis of assault echelon landings, BDM analysts have concluded that current equipment and personnel densities will be sufficient to handle the materials handling tasks that are generated by the assault echelon landing. The effect of an urban area upon materials handling from beach landing areas to beach support areas is negligible. The most important factor is the availability of suitable resources at the appropriate location and time.

Landing of the AFOE

The section will describe the AFOE landing of supplies and equipment utilizing elements of the Amphibious Logistics System (ALS). The Amphibious Logistics System is intended to provide procedural guidance and equipment requirements to discharge cargo from non-self-sustaining containerships, provide shoreside transfer facilities for the containers, and provide both expedient and long-term discharge means for bulk POL from assault shipping and tankers. The primary source for this discussion is the Initial Definition - Amphibious Logistics System (ALS), prepared for the Naval Facilities Engineering Command in July 1981.

It is not anticipated that the combat requirements of OPERATION BREAKER (or MID-BREAKER) will significantly alter the general composition of VII MAF AFOE cargo. Further, hydrographic and beach conditions in SYN City landing areas should support full implementation of ALS provided that pontoon causeways are available to bridge the offshore channels. The Amphibious Logistics System is designed to interface with the Marine Corps Field Logistic System and provide integrated facilities to move cargo from shipping to the end item user. The Field Logistic System is estimated to be fully operational during the mid-range time frame but many of its components are currently available or could be procured within a short period. This analysis will consider only the situation in which ALS and FLS have been fully implemented. The tables opposite have been extracted from the ALS study and are estimates of the magnitude and composition of AFOE cargo once containerized to the maximum extent practicable under the FLS system.

With the AFOE programmed to arrive in SYN City ready for discharge on D+5, the Amphibious Logistics System must be capable of discharging and moving over 112,900 short tons of dry cargo by D+15. The ALS will also be capable of discharging over 1.5 million gallons of bulk POL per day by the end of that period, although this capability will not be required initially in the SYN City operation due to reduced Class III (W) consumption and the nonavailability of requisite storage facilities available within the metropolitan area. To achieve this result, selected equipment systems must be landed on D+1 so that they are operational by D+5. These systems will be mentioned in greater detail later in this section.

It is outside the scope of this study to completely redesign and recalculate support requirements for the Amphibious and Field Logistics Systems. The analysis will utilize equipment systems and quantities delineated in the ALS Definition and recommend departures and modifications induced by the specific situation presented by SYN City. Since SYN City incorporates a viable port facility (elements of which may be expected to be operational by D+5), the method of cargo discharge may vary depending on whether the cargo is moved over the beach or through the port. Two cases will be presented so that ALS modifications can be seen resulting from the utilization of extant port facilities.

TABLE V-15. CONTAINERIZATION OF MAF AFOE CARGO

Supply Class	Composition	AFOE			Resupply	
		Percent Containerizable	Short Tons	8x8x20 Containers	Short Tons per Month	8x8x20 Containers per Month
I	Subsistence	100	9,100	848	5,600	522
II	Basic Support	100	3,905	441	2,600	294
III	POL, packaged	100	5,471	276	1,089	55
IV	Construction Equipment	85	1,497	78	1,100	57
V	Ammunition	100	52,700	2,703	38,500	1,993
VI	Personal Items	100	658	68	400	42
VII	Major End Items	20	220	55	625	145
VIII	Medical Material	100	387	38	250	25
IX	Repair Parts		3,000	281	3,000	281
	Subtotal		76,938	4,788	53,164	3,414
Non-containerizable						
	Breakbulk		5,000		2,694	
	Vehicles		25,100			
	Other Unit Equipment		5,900			
	TOTAL		112,938		55,258	

*Estimate by Maj. F. Bubenhoffer, USMC, Logistics Plans and Policy Branch, HQMC, as of 22 April 1979 for present period until 1982. These figures support the Strategic Mobility Requirements and Programs study, FY 1983 (SMRP 83), of the Joint Chiefs of Staff.

MAF AFOE FLS CARGO

Item	20-ft Equivalent Units (TEU)*
Four-pack of Quadcons	468
20-ft Rigid Shelters	1,260
10-ft Rigid Shelters	128
Four-pack of 20-ft Knockdown Shelters	420
20-ft Flatracks	888
40-ft Flatracks	816
Service Support Modules (6-con)	1,284
Subtotal	(5,262)
20-ft Containers (All classes of supply)	5,352
TOTAL	10,614

*This report addresses a requirement for 10,614 containers. In reality, there are 9,798 20-ft containers plus 408 40-ft flatracks. This leaves a total of 10,206 mixed container sizes or 10,614 twenty-foot equivalent units (TEUs). Since the AFOE lift requirement is essentially based upon a notional case to begin with and to simplify subsequent explanations, 10,614 is used as the "container requirement."

Source: ALS-Definition

Materials Handling (Continued)

ALS Overview

To meet the anticipated AFOE discharge requirements, the following equipment systems are required:

- Temporary Container Discharge Facility (TCDF) - A T-5 ship hull with two-300 ton ring-mounted cranes. The TCDF will transfer cargo from the non-self-sustaining containership to the lighterage system.

- Powered Causeways (PC/W) - These causeways will be deployed on merchant shipping and will move cargo from the containership to the beach transfer facility. (A viable port would significantly reduce quantity requirements for the powered causeways.)

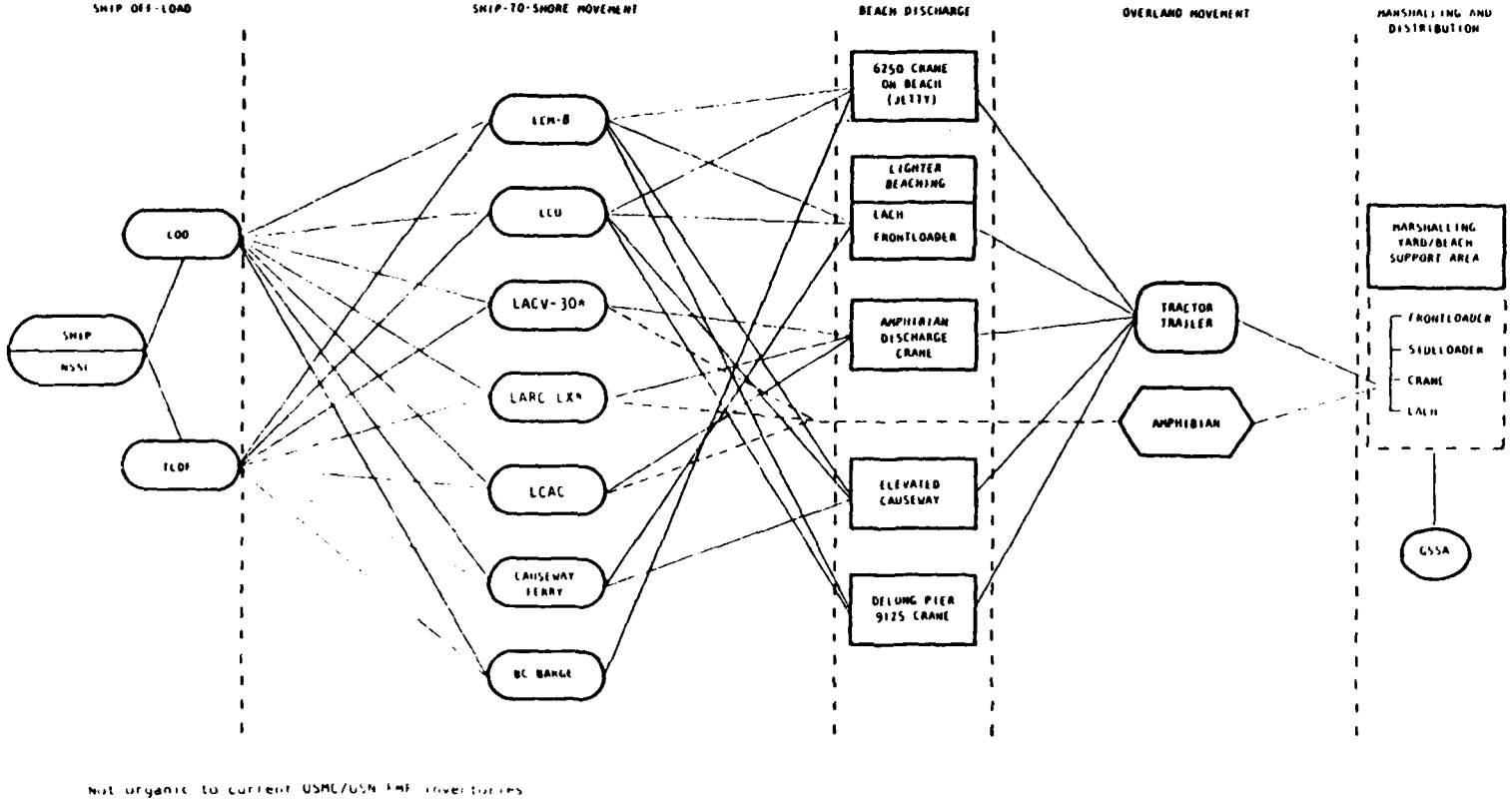
- Elevated Causeways (ELCAS) - Elevated causeways will be used to bridge the offshore gradient and associated surf zone. The ELCAS can be installed in as little as 55 working hours and is projected to throughput 250 containers per day.

- Amphibious Assault Fuel Supply Facility (AAFSF) - This system will be used early-on in the assault operation to offload bulk fuel from LSTs and other assault shipping. The floating 6" diameter hose and associated hardware can be installed in less than 12 hours and would be operational by D+1.

- Amphibious Tanker Terminal Facility (ATTF) - A Single Point Mooring (SPM) bouy and two 8" bottom-laid pipelines are used to offload tankers. This system could be operational by D+10 to D+15 depending on hydrological conditions and available working time.

- Lightweight Amphibious Container Handler (LACH) - The LACH will be used to unload containers from lighters during the unloading of the AE and will augment the ELCAS during the early stages of the AFOE offloading. Once all programed ELCAS are operational, LACHs will be shifted from beach unloading sites to supply storage sites further inland.

Additional information concerning the deployment, installation, and operation of these systems is contained in the ALS Definition study and will not be repeated in this technical report.



Not organic to current USMC/USN FMF inventories

Figure V-22. Container Throughput Operations

Combat Service Support Functions and Requirements

Materials Handling (Continued)

Case 1 - COTS Operations Using ALS

The MAF AFOE throughput requirement was estimated to be 112,938 STONS which, if fully containerized within limitations, would occupy 10,614 twenty-foot equivalent units (TEU). This data was extracted from the Master Implementation Plan for the Marine Corps Field Logistic System, prepared by Northrop Services, Inc. and published in December 1980. If the goal for AFOE offloading is completion by D+15, then an average of 965 containers must be offloaded each day. Each TCDF has a capability to transfer 170 containers per day; each ELCAS handles 250 containers per day; and 12 lighters are required to service each TCDF once station times, delays, and nonavailabilities are assessed. These parameters indicate that with 100% containerization and 6 NSS containerships on station, the throughput goal can be achieved with time-phased use of 6 TCDFs, 72 causeway ferries, and 5 ELCAS. Noncontainerized AFOE square, amounting to almost 410,000 SF, will be offloaded in the normal manner as breakbulk items until other facilities such as mobile ramps for RO/RO ships become available.

The table opposite provides a summary of the Amphibious Logistics System assets required to offload the AFOE over bare beaches during the period D+5 to D+15. The determination of subsystem quantities is based upon the throughput capability per subsystem, the level of containerization, amount of total cargo within the AFOE, and the ALS resources available. This system would be equally applicable to any area of operation with the AFOE being landed over two colored beaches with 10,600 twenty-foot equivalents and favorable hydrographic conditions. The direct influence of an urban area proximate to beach landing areas is minimal with respect to the definition of the Amphibious Logistics System provided that the port facility is not viable for cargo throughput. Indirect influences are not significant and do not materially affect the determination of ALS assets.

ALS assets would be embarked with the AE since installation of subsystems must commence before the arrival of the AFOE within the area of operation. Offloading and installation of ALS elements must begin early on D+1 in order to provide a minimum capability should the SYN City port not be capable of supporting the throughput requirements once damage has been assessed and minor repairs have been completed.

TABLE V-16. FACILITIES AND MAJOR EQUIPMENT TO SUPPORT AFOE CARGO REQUIREMENTS OVER THE BEACH

FACILITY/EQUIPMENT REQUIRED	SUSTAINED THROUGHPUT CAPABILITY EACH ITEM*	NUMBER REQUIRED	TIME REQUIRED TO INSTALL EACH	BEGIN INSTALLATION	INSTALLATION COMPLETE	BEGIN THRCUGHPUT	REMARKS
DRY CARGO							
Temporary Container Discharge Facility (TCDF)	170 CNTNRS/Day	6	N/A	N/A	N/A	D+5	TCDFs may be used easier with LACHs if combat situation permits.
Powered Causeway Section plus one NL causeway section (PE/NL)	6 CNTNRS/Sortie	72 (12 per TCDF)	N/A	N/A	N/A	D+5	Causeway ferry length may vary subject to sea state, beaching requirements and use of LACHs.
Elevated Causeway System (ELCAS)	250 CNTNRS/Day	5	72 hrs	D+1,+2,+4, +5,+7	D+4,+5,+7, +8,+10	D+5,+6,+8 +9,+11	Installation times and throughput vary according to crew availability.
Lightweight Amphibious Container Handler (LACH)	90 CNTNRS/Day	3 to 9	N/A	N/A	N/A	D+5	Used D+5 through D+8 to augment ELCAS productivity. Number required deminishes as more ELCAS become operational.
BULK POL							
Amphibious Assault Fuel Supply Facility							
Amphibious Assault Bulk System (AABFS)	306,000 gal/day	2	10 hrs each	D+1	D+1	D+1	Off-loads LSTs.
AABFS Phase II - shuttle Dracones	440,000 gal/day	2	4 hrs**	D+7**	D+7**	D+7**	Off-loads Dracones
Amphibious Tanker Terminal Facility (ATTF)							
Double 8-inch/SPM buoy	1.6 million gal/day	1	12 days	D+2	D+12	D+13/14	Begin off-loading equipment D+1
Single 8-inch/SPM buoy	800,000 gal/day	1	9 days	D+6	D+15	D+16	Begin off-loading equipment D+6.

* Assumes sea state 1 or better conditions. Rates will diminish subject to worsening conditions.
** Convert AABFS to support discharge of Dracones (floating fuel bladders). Preparations are initiated while LSTs are off-loading cargo fuel. Begins operation when all LSTs have been discharged of cargo fuel.

Source: ALS-Definition

Combat Service Support Functions and Requirements

Materials Handling (Continued)

Personnel requirements to support the AFOE offloading using the Amphibious Logistics System (with the MAF at the maximum level of containerization possible) are shown in the table below. A maximum of 1,202 personnel are used to handle containerized cargo while up to 1,186 personnel are assigned to offload breakbulk items that cannot be containerized. A more detailed breakdown of personnel support requirements is given in the ALS-Definition study.

TABLE V-17. PERSONNEL REQUIREMENTS - AFOE OFF-LOADING

	AFOE DAY OF THROUGHPUT OPERATIONS (NOTIONAL SCENARIO)										
	D+5	D+6	D+7	D+8	D+9	D+10	D+11	D+12	D+13	D+14	D+15
CONTAINER REQUIREMENTS											
Ship Off-loading											
TCDFs Operational	6	6	6	6	6	6	6	6	6	6	3
No. Crewmen (33/TCDF/shift)	198	198	198	198	198	198	198	198	198	198	99
Total Per Day	(396)	(396)	(396)	(396)	(396)	(396)	(396)	(396)	(396)	(396)	(165)
Lighterage Operations											
No. Lighters (12/TCDF)	72	72	72	72	72	72	72	72	72	72	36
Crewmen (4/lighter/shift)	288	288	288	288	288	288	288	288	288	288	160
Total Per Day	(573)	(575)	(576)	(576)	(576)	(576)	(575)	(575)	(576)	(576)	(240)
Shoreside Operations											
No. Elevated Causeways	1	2	2	3	4	4	5	5	5	5	2
Crewmen (23/ELCAS/shift)	23	46	46	69	92	92	115	115	115	115	46
No. LACMs	9	6	6	3	-	-	-	-	-	-	-
Crewmen (4/LACM/shift,Spvsr	40	26	26	13	-	-	-	-	-	-	-
BMU/ACB Beach Crew (shift)	43	29	29	14	-	-	-	-	-	-	-
Total Shoreside Per Day	(212)	(202)	(202)	(192)	(184)	(184)	(230)	(230)	(230)	(230)	(69)
TOTAL CONTAINER SYSTEM PER DAY	1,184	1,174	1,174	1,164	1,156	1,156	1,156	1,202	1,202	1,202	451
ACCOMPANYING BREAKBULK REQUIREMENTS											
Ship Off-loading											
No. Ships Being Worked	3	3	3	3	3	2	2	2	2	2	2
Hatch Crew (87/ship/shift)	261	261	261	261	261	174	174	174	174	174	174
Total Per Day	(522)	(522)	(522)	(522)	(522)	(348)	(348)	(348)	(348)	(348)	(348)
Lighterage Operations											
No. Lighters (15 per ship)	45	45	45	45	45	30	30	30	30	30	30
Crewmen (4/lighter/shift)	180	180	180	180	180	120	120	120	120	120	120
Total Per Day	(360)	(360)	(360)	(360)	(360)	(360)	(360)	(360)	(360)	(360)	(360)
Shoreside Operations *											
Naval Beach Party (40/shift)	40	40	40	40	40	40	40	40	40	40	40
Shore Party,USMC (112/shift)	112	112	112	112	112	112	112	112	112	112	112
Total Shoreside Per Day	(304)	(304)	(304)	(304)	(304)	(304)	(304)	(304)	(304)	(304)	(304)
TOTAL ACCOMPANYING BREAKBULK	1,186	1,186	1,186	1,186	1,186	892	892	892	892	892	892
TOTAL PER DAY ALL SYSTEMS --	2,370	2,360	2,360	2,350	2,342	2,048	2,048	2,094	2,094	2,094	1,343

*Estimated requirements

Source: ALS-Definition

Case 2 - Port Operations Using ALS

Although Aggressor forces may damage or deny a number of SYN City port facilities, the port may still be a viable option for AFOE throughput once the port area itself has been cleared and consolidated, debris has been removed, and repairs have been made to docks and piers suffering a light level of damage. A preliminary reconnaissance should be made of the port area and facilities as soon as practicable but no later than D+1. The reconnaissance party should be composed of personnel drawn from the NMCB, NAVCHAPGRU, and ACB units and include structural engineers, heavy crane operators, G-4 representation, and elements of the Shore Party Group Headquarters as well as other personnel with specialty skills necessary to assess and operate a port.

The following estimates of the level of anticipated damage to port facilities are given in FM 101-10-1 (July 1976) on page 6-17:

FACILITY/AREA	% DESTRUCTION
Permanent wharves, quays	30% very badly damaged-early repair impracticable 30% heavily damaged-much debris, reasonably early repair practicable 40% lightly damaged-little debris, early repair practicable
Port cranes & other MHE	100% destruction
Port warehouses	50% to 100% destruction

This level of damage is well within the capabilities of Aggressor forces within SYN City if aided by prechambering of major piers, sabotage by civilian port workers, and the effects of combat within the port area between D-day and D+3. Aggressor denial operations will be focused on Piers 25 and 29 and any MHE that would be useful to the assaulting forces. Port facilities near the two urban centers and the naval station would be assigned a secondary priority for denial since these areas would be difficult to clear and consolidate until later in the assault operation. Effective enemy resistance in these areas would seriously diminish the utility of such locations for throughput operations. A high priority mission for VII MAF Counterintelligence Teams and other covertly inserted personnel will be to disrupt or neutralize Aggressor denial operations in the main port area.

The following discussion is based on the assumption that Docks 25 and 29 have been heavily damaged and repairs are not possible to substantially upgrade the facilities prior to the arrival of the AFOE. The AFOE throughput goal can be realized only with the simultaneous offloading of 9 merchant vessels. ALS resources would be kept to a minimum if TCDFs and breakbulk vessels could offload directly onto a dock thereby eliminating the requirement for lighters to shuttle cargo between TCDFs and ELCASs.

Combat Service Support Functions and Requirements

Materials Handling (Continued)

All docks in the SYN City port complex are suitable for AFOE offloading provided that the damage is light to nonexistent. To reduce the motor transport burden and the possibility of enemy interaction with port operations, the following locational priorities are assigned with respect to AFOE berthing:

PRIORITY 1 - Docks 25 and 29 (if lightly damaged)

PRIORITY 2 - Docks 23, 24, 26, 27, 28

PRIORITY 3 - Docks 30 through 36 (VIC Old City)

PRIORITY 4 - Docks 13 through 22 (VIC Naval Station)

PRIORITY 5 - Docks 1 through 12 (VIC New City)

The availability of suitable docking areas in the main port by D+5 would eliminate the need to emplace ELCAS #3, 4, and 5 although the resources to accomplish the emplacement and operate the systems have already been embarked aboard LASH or SEABEE vessels. The scheduled start times for installation of these remaining ELCAS begin with D+4 at which time the extent of the tactical situation ashore should be well-known. If suitable docking spaces (docks in good condition and enemy interference negligible) are proximate to the main port area then AFOE vessels (and associated TCDFs) will moor alongside the docks. Powered causeway lighters and the three remaining ELCAS will not be required. If suitable dock spaces are not available then the shortfall will be identified not later than D+1 and additional powered causeways and ELCAS will be utilized. The range of ALS subsystems required to support the AFOE unloading through the SYN City port is shown in the table opposite.

Container Handling Within the Port Area

Once the containerized cargo has been landed via the Amphibious Logistics System elements, the containers and their contents must be loaded onto suitable transportation, moved to a container marshalling area, and offloaded from the transport system. The containers and contents may weigh up to 44,800 lb. and are generally of the 8' x 8' x 20' size. The AFOE throughput goal requires that an average of 965 containers be handled and moved during each day of unloading. Each AFOE unloading day is assumed to have twenty usable hours of working time. Thus, 48.25 containers (rounded to 50.0 for calculation purposes) must be handled per hour.

TABLE V-18. FACILITIES AND MAJOR EQUIPMENT TO SUPPORT AFOE CARGO REQUIREMENTS THROUGH THE PORT

FACILITY/EQUIPMENT REQUIRED	SUSTAINED THROUGHPUT CAPABILITY EACH ITEM*	NUMBER REQUIRED	TIME REQUIRED TO INSTALL EACH	BEGIN INSTALLATION	INSTALLATION COMPLETE	BEGIN THROUGHPUT	REMARKS
DRY CARGO - INFLUENCED BY PORT AVAILABILITY							
TEMPORARY CONTAINER DISCHARGE FACILITY (TCDF)	170 CNTNRS/DAY	6	N/A	N/A	N/A	D+5	TCDFs MAY BE USED EASIER WITH LACHs IF COMBAT SITUATION PERMITS.
POWERED CAUSEWAY SECTION PLUS ONE NL CAUSEWAY SECTION (PC/NL)***	6 CNTNRS/SORTIE	0-72 (12 PER TCDF)	N/A	N/A	N/A	D+5	CAUSEWAY FERRY LENGTH MAY VARY SUBJECT TO SEA STATE, BEACHING REQUIREMENTS AND USE OF LACHs.
ELEVATED CAUSEWAY SYSTEM (ELCAS)***	250 CNTNRS/DAY	2-5	72 HOURS	D+1, +2 (+4, +5, +7)	D+4, +5 (+7, +8, +10)	D+5, +6 (+8, +9, +11)	INSTALLATION TIMES AND THROUGHPUT VARY ACCORDING TO CREW AVAILABILITY.
LIGHTWEIGHT AMPHIBIOUS CONTAINER HANDLER (LACH)***	50 CNTNRS/DAY	0 TO 9	N/A	N/A	N/A	D+5	USED D+5 THROUGH D+8 TO AUGMENT ELCAS PRODUCTIVITY. NUMBER REQUIRED DIMINISHES AS MORE ELCAS BECOME OPERATIONAL.
BULK POL - NOT INFLUENCED BY PORT AVAILABILITY							
AMPHIBIOUS ASSAULT FUEL SUPPLY FACILITY							
AMPHIBIOUS ASSAULT BULK SYSTEM (AABFS)	300,000 GAL/DAY	2	10 HRS EACH	D+1	D+1	D+1	OFF-LOADS LSTs.
AABFS PHASE II -	400,000 GAL/DAY	2	4 HRS**	D+7**	D+7**	D+7**	OFF-LOADS DRACONES.
AMPHIBIOUS TANKER TERMINAL FACILITY (ATTF)							
DOUBLE 6-INCH/SPM BUOY	1.6 MILLION GAL/DAY	1	12 DAYS	D+2	D+12	D+13/14	BEGIN OFF-LOADING EQUIPMENT D+1
SINGLE 6-INCH/SPM BUOY	800,000 GAL/DAY	1	6 DAYS	D+6	D+18	D+18	BEGIN OFF-LOADING EQUIPMENT D+6.

*ASSUMES SEA STATE 1 OR BETTER CONDITIONS. RATES WILL DIMINISH SUBJECT TO WORSENING CONDITIONS.

**CONVERT AABFS TO SUPPORT DISCHARGE OF DRACONES (FLOATING FUEL BLADDERS). OPERATIONS ARE INITIATED WHILE LSTs ARE OFF-LOADING CARGO FUEL. BEGINS OPERATION WHEN ALL LSTs HAVE BEEN DISCHARGED OF CARGO FUEL.

***QUANTITIES VARIABLE DEPENDING UPON AVAILABILITY OF SUITABLE DOCKING SPACES IN THE PORT.

Source: ALS-Definition

Materials Handling (Continued)

The following assumptions must be made concerning the relevant parameters affecting any handling and movement of containerized cargo:

- Rough Terrain Container Handlers (RTCH) handle one container at a time.
- Total cycle time for container handling is 15 min/container.
- Transport movement within the port area is limited to 10 mph (16 kph).
- Availability of equipment is 80%.
- All equipment items are manned by two operators per shift.

The most demanding situation for container handling occurs when the port facilities are not operational and the containers must be offloaded from lighterage onto ELCAS (and bare beach during the D+5 to D+8 period). Transportation resources, with the capability to carry 20' containers, may vary in quantity requirements from 61 tractor/trailer combinations (M915/M871) on D+5 to an average of 47 combinations once all ELCAS are operational. These vehicles would be supplied by the Transport Co MT Bn once their assets have been reconfigured to support container operations.

	START	ELCAS LOCATION	DIST FROM PORT[4]	NET VEHICLES[5]	VEHICLES AT .80 AVAIL
ELCAS 1[1]	D+5	RED BEACH	8 Km	49	61
ELCAS 2[2]	D+6	BLUE BEACH	5 Km	40	50
ELCAS 3[3]	D+8	MAIN PORT	4 Km	37	46
ELCAS 4	D+9	MAIN PORT	3 Km	33	42
ELCAS 5	D+11	MAIN PORT	3 Km	31	39

Note 1 - Augmented by 9 LACH (total)
2 - Augmented by 6 LACH (total)
3 - Augmented by 3 LACH (total)
4 - Represents average distance travelled by majority of vehicles
5 - Assuming all throughput through that ELCAS alone

Rough terrain container handlers (RTCH) with a 50,000 lb. capacity will be required at the container marshalling areas to offload containers from transport vehicles and move the containers to their designated spaces in supply stockage areas. This MHE will also be required at the ASP's to unload ammunition and at the beach landing areas should any of the LACH or ELCAS systems become nonoperational. RTCHs assigned to beach landing areas will be those in excess of requirements at the CSSA and ASPs.

Since an average of 965 containers must be offloaded within a 20-hour period and each container is offloaded once by the RTCH, then 15 container handlers would be required if the offloading process was 15 minutes in duration and the availability of equipment was .8. The container handlers would be distributed between supply points, ASPs and general cargo points based on the respective number of containers at each location and the sequence of AFOE offloading.

Dispersion Is Essential

In peacetime, handling and storage of containers can be accomplished efficiently through uniform organization of the container marshaling yard. Clustering containers in rows, properly spaced to provide access for stuffing or unstuffing, and segregating containers according to their content promote ease in handling and simplified record keeping. The uniformity in organization and high concentration of containers that constitute the most efficient peacetime operations are unsuitable in most combat environments. Container marshaling yards organized in conventional fashion would be easily identified targets for enemy air and artillery attack, and clusters of containers are particularly vulnerable to accurate fires.

A stylized container marshaling yard for a MAF-sized FSSG would require over 34 acres of open and usable space. Generally such a facility would be divided into two separate entities, sufficiently distant from each other to provide against excessive loss in case of catastrophic events. Combat environments make it even more imperative to adapt supply installations to the realities of the terrain and situation.

✸ Approximately 2 acres - for container marshalling

Figure V-23. Container Marshalling and Storage Areas

EMBARKATION

AMPHIBIOUS ASSAULT OPERATIONS DIRECTLY INTO AN URBAN AREA IMPACT ON THE CSS FUNCTION OF EMBARKATION IN THE SAME MANNER AS AN AMPHIBIOUS ASSAULT AGAINST ANY OBJECTIVE: THE CONCEPT OF OPERATIONS ASHORE DICTATES THE LANDING PLAN WHICH IN TURN DICTATES THE PLAN OF SUPPORTING FIRES AND THE EMBARKATION PLAN.

General

FMFM 4-1 describes embarkation as the determination of requirements for air or surface lift of the materiel of the command and the supervision of the loading and unloading of those materiels. As in any amphibious operation, the landing plan for Operation BREAKER is geared to provide an orderly flow of personnel, units, supplies and equipment to execute the tactical plan, maintain tactical integrity, and achieve the degrees of dispersion and concentration required to accomplish the mission. In that sense, the urban objective exerts an influence on assault planning and thereby on the embarkation function.

The notional lift requirement for a MAF assault echelon, as developed in MCDEC letter 0034/JRQ/pdd dated 23 Oct 81, was used as the basis for determination of the lift requirement for VII MAF (composite). Lift requirements for Naval Support Forces were taken from the 1983 MMROP. Lift capacities for shipping in the Assault Echelon were based on data contained in ECP 3-4, Amphibious Ships, Landing Craft, and Vehicles dated 6 May 80.

Personnel Embarkation

The personnel lift requirement for the VII MAF Assault Echelon was compiled from sources noted above. The base MAF AE numbers 31,112 personnel and does not include the additional tank battalion of 989 personnel or Naval Support Forces totaling 2,063 personnel. The total personnel lift requirement during the current time period is the total of the figures above, or 34,164 personnel. During the mid-range time period an additional 1,046 personnel from the Light Armored Assault Battalion must be included in the AE, bringing the total personnel lift requirement to 35,210 personnel.

The total capacity in Assault Echelon shipping for landing force personnel was determined to be 40,538 personnel. The capacity per ship is given in Table V-19 shown on the page opposite. If a 10% loss factor is assessed on total landing force troop capacity so that unit integrity can be maintained, then up to 36,525 landing force personnel can be carried in the Assault Echelon shipping anticipated to be available for this operation. Thus, personnel embarkation will not be a problem during the embarkation phase of the operation.

TABLE V-19. EMBARKATION CAPACITIES - ASSAULT ECHELON

SHIP TYPE	MULTIPLE	TOTAL CAPACITIES								
		LF PERSONNEL	SQUARE[1]	CUBE GEN CGO[2]	CUBE AMMO[2]	BULK FUEL CAPACITY (GAL) MOGAS	DIESEL	AVGAS	JP-5	AVLUBE
LCC-13	1	343	864	-	-	1,000	-	-	120,399	-
LHA-1[8]	5	9,500	97,664	401,250	255,000	50,000	-	-	2,000,000	-
LKA-113	4	996	141,147	218,949	74,271	4,000	-[3]	-	20,000	-
LPD-1	1	931	16,486[6]	-	-	20,000	-	97,440	224,000	4,500
LPD-4	8	7,464	184,595[5]	-	-	175,664	-	778,624	2,805,000	36,000
LPH-2	6	12,546	26,772	256,500[4]	-	39,150	-	141,138	1,596,198	65,634
LSD-28	3	942	70,109[7]	-	7,835	63,750	117,000	-	-	-
LSD-36	5	1,685	139,576[7]	-	3,638	10,000	154,410	-	162,630	-
LST-1179	16	6,176	200,320	17,045[5]	34,080	115,152	4,064,000	2,119,696	-	-
TOTALS	49	40,583	877,534	893,739	344,829	478,716	4,335,410	3,136,898	6,928,227	106,134

NOTES:

1. INCLUDES FOLLOWING LOSS FACTORS FOR SQUARE LOADING: LHA, LKA - 25%, ALL OTHERS 20%.
2. INCLUDES FOLLOWING LOSS FACTORS FOR CUBE STORAGE: ALL CRAFT - 25% DUE TO PALLETIZED CARGO.
3. ADDITIONAL CARGO CAPACITY AVAILABLE FOR 3700 DRUMS FUEL.
4. INCLUDES CUBE AVAILABLE FOR AMMUNITION STORAGE.
5. ADDITIONAL CARGO CAPACITY OF 32,000 TONS AVAILABLE.
6. PLATFORM STORAGE USED FOR SQUARE LOADING.
7. INCLUDES SUPERDECK AND MEZZANINE DECK.
8. TARAWA CLASS LHA.

Embarkation (Continued)

Cargo Embarkation - Square Capacity

The notional MAGTF fingerprint of 23 Oct 80 requires 820,193 square feet to be available for embarkation of the MAF Assault Echelon. An additional 48,000 square feet are required to embark the second tank battalion, and Naval Support Forces require 45,550 square feet. The total requirement for square stowage during the current time period equals 913,743 square feet. The LAA Bn in the mid-range is estimated (82 MMROP) to require 23,000 square feet bring the total mid-range requirement to 936,743 square feet.

The 82 MMROP includes an adjustment to the square requirement to account for an assumed 10% vehicle nonavailability and a 2% adjustment for mobile loading of square equipment. These are both negative adjustments and will reduce the square capacity requirement by 12%. Although these factors do not appear in the earlier lift fingerprints, they are judged by BDM analysts to be valid and will be used to calculate the square requirement. Reducing current and mid-range requirements by 12% gives a net requirement for 804,094 square feet in the current time period and 824,334 square feet in the mid-range time period.

The shipping anticipated to be available for transport of the AE has a capacity of 1,064,982 square feet. This figure represents a maximum capacity which must be reduced by the following broken stowage factors:

LHA,LKA - 25% loss in available square capacity
All Others - 20% loss in available square capacity

Assessing these square loss factors reduces the available square stowage in the Assault Echelon to 877,534 square feet. This available capacity exceeds the anticipated requirement in both the current time period and the mid-range time period.

Cargo Embarkation - Cube Capacity

The lift fingerprint shows a requirement for approximately 1.3 million cubic feet of cargo capacity for a notional MAF AE once square equipment has been loaded to the maximum extent practicable. The second tank battalion requires 37,065 cubic feet of cargo stowage and embarked Naval Support Forces require 211,070 cubic feet. The total cube requirement in the current time period is approximately 1.56 million cubic feet. During the mid-range period, the LAA Bn will increase the total requirement to 1.59 million cubic feet.

Cargo capacities for AE shipping are shown in Table V-19 and include a 25% loss factor due to losses introduced by the stowage of palletized cargo. The available cargo capacity, including both general cargo and ammunition storage, equals 1.24 million cubic feet once loss factors have been assessed.

The required capacity exceeds the available capacity by approximately 320,000 cubic feet in the current time period and 350,000 cubic feet in the mid-range time period. This shortfall must be remedied by the inclusion of additional "gray bottoms" capable of transporting up to 350,000 cubic feet of cargo or the loading of nonessential AE equipment into the shipping allocated for the follow-on echelon. The recommended option is to increase the AE cargo capacity by additional shipping of unspecified type.

The specific requirements of Operation BREAKER affect embarkation planning in several ways. The deployment and posture of the Aggressor MRD forces and their capability to reinforce the MRB within SYN City are such that immediate isolation of the city is essential. In the current period, this can best be accomplished by inserting infantry forces by helicopter. Embarkation planning must provide for the rapid buildup of combat power at key points outside of SYN City.

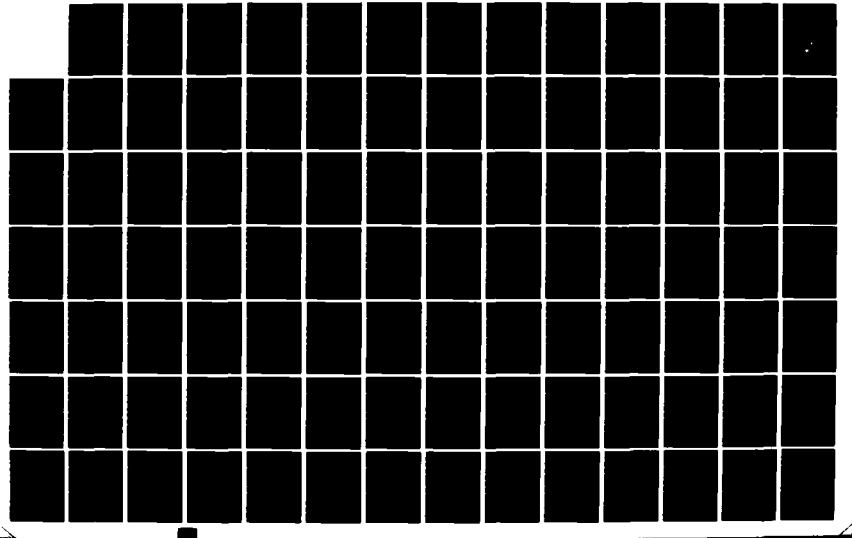
The organization, combat power, and deployment of the MRB (Rein) in the port area make it necessary to bring armor-supported infantry forces against them to destroy or dislodge them. This consideration influences the selection of assault units and their embarkation posture. Similarly, the need to field mechanized combined arms task forces early on D+1 to seize key positions on the FBHL and to defend against the motorized threat outside of SYN City militates in favor of placing both tank battalions in the AE and landing tank elements as early as possible.

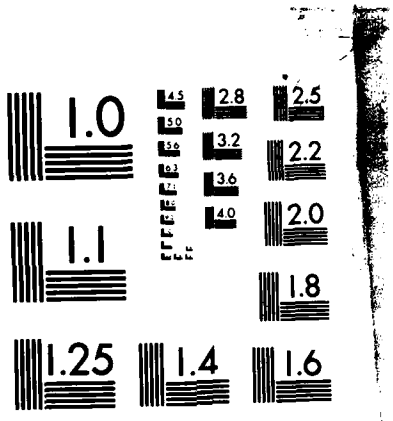
The inability to land displacement landing craft directly ashore on the mainland at suitable locations (due to insufficient water depth between the mainland and the offshore islands) makes it necessary to use LVTs extensively for transfer operations. Landing plans will have to take into consideration the need to establish a transfer line at which support personnel, supplies, and equipment can be shifted from landing craft to LVTs to facilitate the movement of subsequent waves ashore. Transfer operations at the colored beaches will commence upon completion of the LVT tactical lifts and will continue until both scheduled and unscheduled tactical and administrative lift requirements have been satisfied.

The Mid-Range Time Frame

Mid-range plans for an assault into SYN City will have to take into account at least three key improvements in amphibious assault capabilities. the availability of heavy-lift helicopters, LAVs, and LCACs.

AD-A133 162 GENERAL URBAN WARFARE AMPHIBIOUS LOGISTICS APPLICATIONS 4/7
VOLUME 1 TECHNICAL REPORT(U) MARINE CORPS DEVELOPMENT
AND EDUCATION COMMAND QUANTICO VA DE... R J YEOMAN
UNCLASSIFIED 23 JUN 83 BDM/W-81-316-TR F/G 15/7 NL





Embarkation (Continued)

Plans should provide for embarking some LAVs in assault shipping from which they can be helilifted into the FBH (LPD/LHA with ramps and elevators). The organization of the LAV unit, presumably a Light Armored Assault Bn (LAA Bn), is expected to contain 144 LAVs and LAV variants. Considerable spread loading will be required to facilitate a rapid buildup ashore. The ability to lift LAVs deep inland enables the LF commander to pit a light armored unit instead of unmounted infantry against the tank and motorized rifle force at or near Airfield 1. Other LAV units can be landed over the beach , either from LCACs or in LCM or LCU craft, since their (anticipated) swim capability will enable them to negotiate the short distance between the islands and the mainland where the water depths average two meters.

Currently LVTs are dropped out of the stern gate of an LPD or LSD which is moving at about 18 knots along the line of departure, some 6,000 meters offshore. It then takes approximately 45 minutes for the LVTs to swim ashore. Prior to the launch, extensive minesweeping may be required to provide cleared lanes, and this activity eliminates any possibility of tactical surprise.

In the mid-range period it will be feasible to transport three LVTs per LCAC. A flight of four LCACs can lift a reinforced rifle company mounted in LVTs plus a main battle tank. This concept eliminates the mine sweeping requirement and enables the Landing Force to achieve a greater degree of tactical surprise. Using the 17nm distance offshore determined for Operation BREAKER, and a 50-knot speed fully loaded, the flight time for an LCAC would be 20.4 minutes, or 40.8 minutes for a round trip. Allowing five minutes between flights of four, 12 LCACs can land over a numbered beach in 25 minutes. The first flight can pick up a second load (allow 10 minutes) and return to the beach by H+74. LCUs and LCM-8s would take about three hours and six minutes to make a round trip, exclusive of the time required for loading and unloading.

The concept of operations ashore is a command decision, and several configurations are both possible and logical, depending on the specific situation. In the SYN City scenario, it is assumed that 24 LCACs are available to VII MAF in the mid-range period. Twelve craft could be allocated to forces in northern sectors and the remaining 12 could be provided to south of South River. This scheme would avoid the congestion that otherwise might occur, but it would drag out the landing near RED Beach, which is proximate to the key objectives. An alternative is to allocate all 24 LCACs to forces in the northern sector to facilitate a more rapid buildup of combat power in that important area.

	ADVANTAGES	DISADVANTAGES
OPTION 1		
LVTs land assault troops, LCACs follow lifting tanks and high priority vehicles.	Maximum number of troops and tanks land early. Snorkeling not required.	Requires sweeping lanes for LSTs; 45-minute run to the beach for LVTs; sacrifices tactical surprise; requires careful coordination to control movement of slow LVTs and fast LCACs.
OPTION 2		
LCACs lift 3 troop-carrying LVTs each, plus 1 tank to support each platoon. Remaining tanks land in LCACs and landing craft later.	Minimal sweeping; rapid infantry assault; achieves tactical surprise.	Minimal tanks ashore initially; slower buildup ashore by not swimming the LVTs.

TYPICAL BUILDUP ASHORE

	RED BEACH 12 LCAC*	RED BEACH 24 LCAC**
OPTION 1 LVT Assault	• Assault elements of 2 Inf Bns land in LVTs.	• Assault elements of 2 Inf Bns land in LVTs.
	• 11 tanks and high priority vehicles follow, landing in LCACs.	• Tank Co (rein) and several high priority vehicles land in LCACs.
	H-hour to H+31	H-hour to H+46
OPTION 2 LCAC Assault	• 1 Rifle Co in 9 LVTs plus 3 tanks land in LCACs.	• 2 Rifle Cos in 18 LVTs plus 6 tanks land in LCACs.
	H-hour to H+10	H-hour to H+25

* BLUE Beach would have a similar profile using 12 LCACs.
** All LCACs would be used at RED Beach. The landing at BLUE Beach would either precede or follow the RED Beach landing.
*** Allowing 7 minutes between LVT waves, a 10-minute interval between LVT/LCAC waves and 5 minutes between LCAC flights of 4 craft each.

Figure V-24. Assault Operations - Mid-Range Period

Embarkation (Continued)

Helicopter Considerations

The helicopter lift assets used in this investigation are based on the very generous availability reflected in the MARCORPS-1 Study. Included are all five LHAs, six of the seven LPHs, and nine of the fourteen LPDs. This combination of platforms enables the CLF to achieve a rapid buildup of heliborne combat power and seize objectives on the periphery of SYN City, thereby isolating the city. In most situations involving urban warfare, isolation of the village or city is a paramount consideration, and it is particularly important in most of the plans developed for Operation BREAKER. Heliborne units, landed at L-hour, are tasked with the seizure of key objectives and the subsequent isolation of major sectors within the SYN City metropolitan area.

The seizure by heliborne forces of objectives south and west of SYN City presents no unusual problems. Approach and retirement lanes are readily available, and the objectives are not believed to be defended. Reinforced rifle companies and the Recon Bn (-) are fully capable of seizing those objectives.

The principal heliborne objective, Airfield 1, will exact the highest price in casualties. That operation requires landing a BLT virtually in the face of a tank platoon and a motorized rifle platoon. The vast extent of Landing Zone VULTURE, however, provides the BLT with considerable flexibility in adjusting to the Aggressor reaction.

BLT 1/1 commences a silent landing at L-hour, and it must close before L+60, at which time the pre-H-hour fire support begins. With BLT 1/1 embarked in one LHA, assault elements can be delivered in 56 minutes only if some flights are lifted before L-hour to the decks of nearby LHA/LPH platforms, from which they can launch on schedule to arrive in LZ VULTURE at the appointed time. (See Oplan 1-81 in Volume II). The L-hour heliborne assault of ATF Objective 2 by BLT 1/1 requires the exclusive support of three LHAs and two LPHs beginning at L-102 minutes until L+16 minutes. The remaining LHA/LPH platforms support the L-hour heliborne landings of BLT 1/3 (by companies) south of South River and Recon Bn (-) at the western industrial area.

The scheme of maneuver elected for Operation BREAKER requires the support of five LHAs and six LPHs. Any reduction in these platforms would make it necessary to transport helicopters deck loaded in LPDs, a less-than-optimum solution because of the lack of hanger deck space.

In the mid-range period, insertion of LAV-mounted forces by helicopter will depend on the availability and performance characteristics of heavy-lift helicopters. The number and type of helicopter platforms allocated to

HELICOPTER SPOT REQUIREMENTS FOR VII MAF

ACFT	SQNS	AIRCRAFT PER SQN	SPOT FACTOR	CURRENT SPOTS REQD	MID-RANGE SPOTS REQD
CH-46D	8	12	1.0	96	96
CH-53D	4 (3)	16	1.7	109	82
CH-53E	1 (2)	16	2.3	37	74
UH-1N	1	24	0.8	20	20
AH-1T	2	24	0.75	36	36
AV-8	2	20	1.2	48	48
				346	356

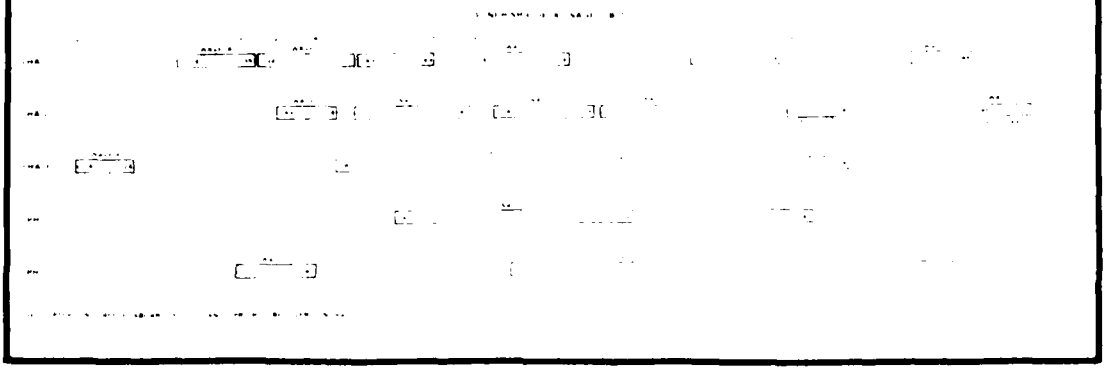
Note: Numbers in parentheses denote squadrons anticipated in the mid-range period.

HELICOPTER SPOTS AVAILABLE

SHIPS	SPOTS	SPOTS WITH 9 LPD
5 LHA/6 LPH	352	406
5 LHA/5 LPH	325	379
5 LHA/4 LPH	298	352
4 LHA/5 LPH	287	341
4 LHA/4 LPH	260	314

Normal operations using maximum number of aircraft while adhering to safety requirements: CH-46 equivalents are: LHA 38 spots, LPH 27 spots, LPD 6 spots.

EXAMPLE - BLT 1/1 L-HOUR LAUNCH REQUIREMENTS OPLAN 1-81



Embarkation (Continued)

the AE and the spots available will be important considerations affecting the concept of operations and embarkation planning.

In a joint operation the Joint Chiefs of Staff normally provide the initial planning guidance and assign the major combat forces and JCS assets required. The cognizant U.S. Unified Commander and his staff then go through the concept development process:

- Analysis of mission and tasks.
- Preliminary planning guidance.
- Preparation of staff estimates.
- Preparation of commander's estimate.
- Preparation of the concept of operations.

Service Component Commanders and their staffs usually participate in the concept development process concurrently, after which they commence the plan development process, each step of which impacts on embarkation planning. The following discussion relates solely to the effect of urban warfare on the CSS function of embarkation during the plan development process in VII MAF.

- Force Planning. Required capabilities:
  - Units trained in urban warfare/house-to-house fighting.
  - Units trained in rapelling.
  - Units trained and equipped for fighting fires.
  - Units trained and equipped for extensive demolition work.
  - Units trained in direct-fire artillery support.
  - Units trained in Civil Affairs matters.
- Deployment Planning. The foregoing units must all be embarked, at least in part, in the AE for early commitment in the FBH. The landing plan will reflect the priority of their landing.
- Support Planning.
  - Determine conventional support requirements for the size force being employed.

- Assess the standard supply usage factors in terms of the unique nature of MOBA, and identify those factors and/or specific items in each Class of Supply which are likely to be affected by MOBA operations.

- Revise support requirements as appropriate.

- Identify CSS tasks that must be performed to accomplish the mission, such as airfield repair or EAF construction.

- Identify CSS tasks that are likely to be required, giving a range of the levels of effort that might be necessary to repair or bypass blown bridges, etc.

- Assess the support capabilities and requirements of target port and airfield complexes and other industrial facilities, using the best intelligence information available, and estimate, within logical ranges, the damage that should be expected to occur and the residual operational capabilities that might be anticipated for facilities and materials handling equipment as a basis for determining the best posture for embarking CSS units and equipment in the LF.

- Identify the structures and land area requirements (acreage) that will be needed by CSS units and equipment. Class V will pose the greatest problem because of the extensive areas required for ammunition dumps. *Identify alternatives* for limiting the amounts of Class V in the FBH and providing regular and emergency resupply from a sea base or theater air facility.

- Combat Engineer Support Planning. See Engineer CSS in this chapter.

- Transportation Planning.

  - Determine lift availability in the ATF and in-house deployment capability of the MAF Aviation Combat Element.

  - Consult the JOPS data support system (TUCHA file) as required for force movement data.

  - Identify shortfalls in lift and either procure additional required lift or adjust the AE, AFOE, Fly-in, and Follow-on echelons in a manner that will still accomplish the mission.

IN THE FINAL ANALYSIS, EMBARKATION PLANNING FOR MOBA OPERATIONS IS PRECISELY THE SAME AS FOR ANY AMPHIBIOUS OPERATION; THE EMBARKATION PLAN MUST SUPPORT THE CONCEPT OF OPERATIONS.

Combat Service Support Functions and Requirements

SUPPLY

THE URBAN ENVIRONMENT OF SYN CITY IMPOSES MAJOR CONSTRAINTS ON THE STORAGE AND DISTRIBUTION OF SUPPLIES ASHORE DURING THE ASSAULT, OPERATIONS ASHORE, AND CONSOLIDATION PHASES OF THE OPERATION. THESE CONSTRAINTS NECESSITATE THE DECENTRALIZATION OF STORAGE ASHORE, PARTIAL USE OF MOBILE AFLOAT SUPPLY SUPPORT, AND THE APPLICATION OF OTHER SUPPLY SUPPORT EXPEDIENTS.

The function of supply is the procurement, distribution, storage, maintenance in storage, and salvage of materiel to include requirements determination (FMFM 4-4).

Requirements Determination

The FMF units' operational sustainability will be dependent on the accuracy with which supply requirements are determined in planning an amphibious operation in a MOBA environment and the ready availability of combat-essential high-usage items.

The degree of supply readiness of FMF units is based upon planning for the availability of supply levels to meet the requirements of various contingency plans. The determination of supply requirements is an integral part of the contingency planning process. In determining the requirements for each contingency, the following factors are considered:

- Mission
- Threat
- Environment
- Concept of Operations
- Forces to be Supported

Stocks of supplies for Fleet Marine Force units are maintained as follows:

- Allowance Items - Maintained in using units in accordance with published allowances and Tables of Equipment (T/E). Unit commanders make specific recommendations covering types and quantities of material and equipment required to support a specific tactical operation, such as MOBA/MOUT.

- Operating Stocks - Held in the account of the supported activity supply system (SASSY) and at the issue point of the units. Generally, SASSY operates on a supply/demand basis with automatic cyclic replenishment. However, stockage levels of these operating stocks can be established at unit levels if operations dictate.

- Mount Out - A selected segment of the PWRMS is held as mount-out stocks (FMFM 4-1). In general a mount-out level of supplies is maintained at the SASSY management unit which can be "pushed" to a unit just prior to mount-out. This level is maintained to provide quick supply reaction, and is influenced by item usage rates or replacement factors, repair parts prescribed load lists (PLL), and other stock lists, MCOs, and directives.

- Landing Force Operational Reserve Material (LFORM) - Prepackaged contingency supplies prepositioned in amphibious warfare ships to reduce loading time. Generally they are positioned in the ships of the amphibious ready group (ARG). LFORM supplies normally consist of Class I, III (A) & (W), IV (field fortification material), and V (A) & (W). Prepositioning of other items would be accomplished as directed by the force commander.

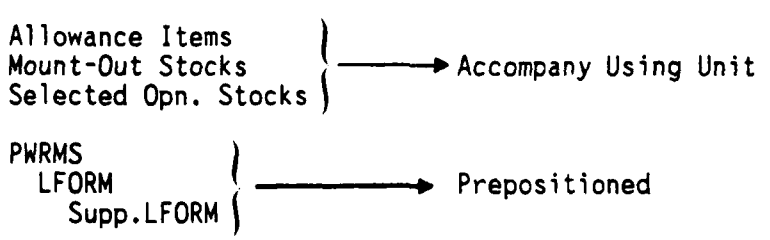
- Supplemental LFORM - Preloaded supplies aboard LSD/LST type ships to ensure that embarked troops have on hand those supplies required to initiate contingency operations prior to the landing of LFORM assets carried on larger ships. These supplies will normally consist of one day of Class I and a basic allowance of Class V. These supplies will be debarked by the deployed unit.

- Navy-Furnished, Aviation-Peculiar supplies - Managed in accordance with US Navy policies and procedures. These supplies will be maintained at theater airbases and aboard ship until aviation units phase ashore.

- Prepositioned War Reserve Materiel Stocks (PWRMS) - Those supplies held by the Marine Corps to meet mobilization training and combat operation requirements. Mount-out stock levels are included within PWRMS.

In a MOBA operation, specific supply requirements would be determined after considering the factors discussed above and after considering the factors determining the probable impact that the unique nature of MOBA would have on each class of supply.

DISTRIBUTION OF SUPPLIES



Combat Service Support Functions and Requirements

SUPPLY SUPPORT - OPERATION BREAKER

THE INITIAL SUPPLY SUPPORT OF VII MAF IN THE SYN CITY OPERATION WILL BE ACCOMPLISHED BY DETACHMENTS FROM THE SUPPLY BATTALION, FSSG. THIS FORCE STRUCTURE IS BASED UPON NOTIONAL MAGTF REQUIREMENTS DEVELOPED FOR THE MARINE CORPS MID-RANGE OBJECTIVES PLAN (MMROP).

The Supply Battalion, 7th FSSG provides all functions incident to the supply of all classes of supply, except bulk fuel, to the VII MAF. Initially these functions will be accomplished by commodity-area detachments which include the following:

Det. Supply Bn, FSSG	PERSONNEL			
	MO	ME	NO	NE
Det. H & S Co	5	80	0	0
Det. Ammo Co	16	313	0	0
Det. Ration Co	1	37	0	0
Det. Supply Co	4	142	0	0
Det. Med Log Co	0	0	0	10
TOTAL	26	572	0	10

To provide supply support, the assault supply organization for Operation BREAKER will be divided into two separate task elements, one initially supporting elements operating in the old city and the main port area, the other in support of RLT 3 which is deployed south of South River. Supply elements will be established initially on the landing beaches under the direction and control of the Shore Party Team commander. (See section concerning Landing Support Operations.) The austere supply sections will build to 360 personnel in BSA RED and 240 personnel BSA BLUE by the end of Period II (D-day). In subsequent periods Supply Battalion personnel will increase to about 460 in CSSA 1, which will absorb the CSS functions previously provided at BSA RED, while BSA BLUE expands geographically to become CSSA 2 but with approximately the same strength of 240 in Period VI (D+11 to D+30).

Concept of Supply Operations

The Landing Force Shore Party Group will be comprised of Shore Party Task Groupments and Helicopter Support Task Groupments. Beach support areas (BSA) will be established at Beaches RED and BLUE and Helicopter Support Teams (HST) will be employed in helicopter landing zones Vulture, Hawk, Eagle (Falcon and Sparrow), and Condor. Landing Zone Support Areas (LZSA) will not be established in view of the early linkup anticipated; instead, HSTs will facilitate the landing and movement of personnel, equipment, and supplies within the LZs and the evacuation of casualties and POWs

from the LZs. HSTs at LZs Sparrow, Condor, and Falcon will be disbanded upon linkup, while HSTs at LZs Vulture, Eagle and Hawk will remain viable through Period III (D+1 to D+3). BSAs will be disestablished on order of CG, 7th FSSG when CSSAs 1 and 2 become operational.

Each individual and unit will carry a prescribed load of supplies and equipment which will serve as the first echelon of supply support in the FBH. Unit commanders will be responsible for maintaining prescribed load levels and ensuring that the level and type of material in the prescribed load is appropriate to the tactical situation and the mode of combat transport into the FBH. For example, Class V (W) requirements are significantly different for LVT-mounted elements than for heliborne elements.

Prepositioned emergency supplies will consist of one DOS of Classes I, III, and V and will be loaded aboard landing craft, ships, and amphibious vehicles. LVTs designated as floating dumps will report to the primary control ship after the H-hour landing of personnel and equipment of supported units. Units requiring emergency delivery of resupplies will coordinate the request through their RLT TACLOG via the appropriate Shore Party Team Commander who will either fill the request through landed supplies in the BSA or request delivery by floating dump LVTs or helicopters in the case of units proximate to an LZ.

Initially, until CSSA 1 is established, LVT floating dumps of Class I, III, and V will be in the vicinity of designated control ships off RED Beach. These floating dumps will be responsive to the resupply requirements of RLT 2. When deemed practical by the Shore Party Team Commander at RED Beach, the mobile stocks (LVT floating dumps) will be moved into previously reconnoitered temporary parking areas in the suburbs north of the old city. After CSSA 1 is uncovered and made secure, commodity supply points will be established and RED Beach BSA will be disestablished and supplies stocked there will be drawn down.

CSSA 2 will be established south of South River to support RLT 3 and to assure maximum dispersion of CSS installations during the early phases of Operation BREAKER when the Landing Force is most vulnerable to NBC attack.

TABLE V-20. SUPPLY STOCKAGE OBJECTIVES DURING OPERATION BREAKER

STOCKAGE AREA	SUPPLY CLASSES	PERIOD II	PERIOD III	PERIOD IV	PERIOD V	PERIOD VI
HLZ VULTURE	I, III, V[1]	3 DOS	3 DOS	Disestablished	NA	NA
EAGLE	I, III, V[1]	3 DOS	Existing Drawn-Down	Disestablished	NA	NA
HAWK	I, III, V[1]	3 DOS	3 DOS	Disestablished	NA	NA
BSA RED	All Classes	3 DOS	3 DOS	Existing Drawn Down[2]	NA	NA
BSA BLUE	All Classes	3 DOS	3 DOS	Becomes CSSA 2	NA	NA
CSSA 1	All Classes			4 DOS	4 DOS	4 DOS
2	All Classes			4 DOS	4 DOS	4 DOS[3]

NOTE: 1 = Others as [illegible] stocked at Supporting BSA

2 = [illegible] storage facilities are left intact as [illegible] are drawn down

3 = [illegible] stocked at CSSA 1

Combat Service Support Functions and Requirements

SUPPLY PROCUREMENT, MAINTENANCE, AND SALVAGE

THE SUPPLY SUBFUNCTIONS OF PROCUREMENT, MAINTENANCE AND SALVAGE ARE AFFECTED DIFFERENTLY BY THE UNIQUE DEMANDS AND OPPORTUNITIES ENCOUNTERED IN AMPHIBIOUS LOGISTICS IN A MOBA ENVIRONMENT.

Procurement

During the planning phase of an amphibious operation involving MOBA, procurement actions must be initiated to obtain those items identified as being peculiar to MOBA and required in greater quantities than in conventional operations such as wall-breaching demolitions, grappling hooks, building reinforcement materials, etc. (See section entitled MOBA PWRMS Requirements for additional details.) An estimate should be made of indigenous assets which might be available for use by the Landing Force. In the absence of reliable information concerning the Threat force's doctrine, plans, and capability to deny use of such indigenous assets, estimates should consider worst-case situations and procurement actions should be taken accordingly.

Procurement is influenced by peculiar requirements imposed by urban warfare rather than by anticipation of using large quantities of captured supplies and material. The large indigenous population will pose heavy requirements for support, and, in the interest of controlling a hostile population, most of the subsistence-type supplies seized in SYN City will be used for civilian support. Logistic augmentation requirements for the indigenous populace will be addressed in the Civil Affairs section.

Construction materials, however, will be exploited to maximum advantage by the Landing Force. Although it must be assumed that the POL storage tanks in the port area and at Airfield 1 will be destroyed and distribution systems damaged, some stocks of POL should be available at local gasoline service stations, motor transport operations facilities, and railroad locomotive servicing areas. These stocks will be used by the Landing Force after testing for contamination and quality. The availability of local POL supplies will not materially reduce the quantities required to be brought ashore unless major storage sources can be seized intact. This unlikely possibility should not be anticipated. The determination of POL supply requirements must be based on delivering the total quantity required to support operations in the FBH.

Maintenance

Supply maintenance enroute to the AOA and within logistic support areas will be largely unaffected by MOBA requirements and peculiarities. Care in storage and preparation for shipment will be accomplished according to Navy and Marine Corps standing operating procedures.

Salvage

The expeditious collection, evacuation and disposal of salvage material will make available for reissue equipment and supplies, thus reducing the resupply burden on the Landing Force. In a SYN City type operation this is an important means for maximum utilization of supplies and equipment, particularly during the critical amphibious assault phase of the operation when supply levels are low and reserves are limited.

The early establishment of salvage collecting points and the retrograde of salvage material from operating units will make available additional supply sources. Salvage collecting points operating in conjunction with maintenance units will be able to repair unserviceable items expeditiously. In an urban environment, collection will offer major problems. Civilian acquisition of abandoned material will complicate collection efforts. Further, when major weapons or equipment become casualties, the relatively slow and deliberate rate of advance in MOBA often delays salvage attempts and subjects the items to additional damage. Threat forces make a practice of creating killing zones to cover avenues of approach for opposing tracked vehicles and other weapon systems to damage the systems, destroy accompanying troops, and entrap units attempting to salvage damaged systems. Great care must be taken, therefore, to protect personnel involved in salvage operations in MOBA. The actual salvage team should include both supply and maintenance personnel operating as a contact team, equipped with general tool sets and vehicle retrievers.

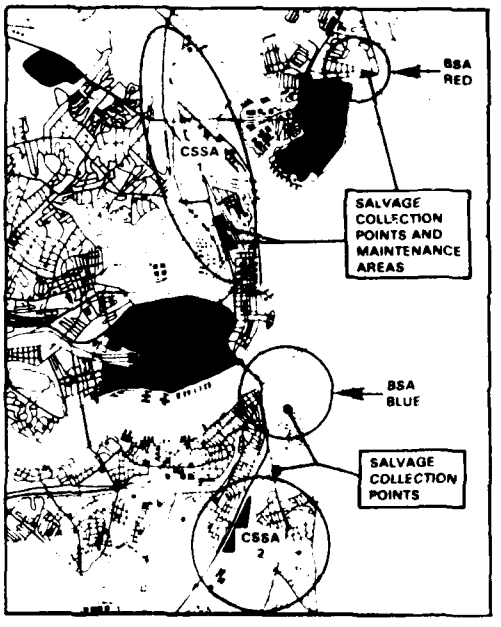


Figure V-25. Locus of Salvage Activities Within SYN City

Combat Service Support Functions and Requirements

SUPPLY STOCKAGE AND DISTRIBUTION - OPERATION BREAKER

THE BUILDUP OF SUPPLY STOCKAGE LEVELS IN BEACH SUPPORT AREAS (BSA) AND COMBAT SERVICE SUPPORT AREAS (CSSA) WILL REQUIRE CAREFUL COORDINATION IN THE USE OF FLOATING DUMP AND MOBILE-LOADED LVTs, IN THE REHABILITATION AND USE OF THE MAIN PORT AREA, AND IN THE SELECTION AND USE OF BUILDINGS AND FACILITIES WITHIN THE DESIGNATED LOGISTIC AREAS.

Appendix 1 (Concept of Combat Service Support) to Annex P (Combat Service Support) to VII MAF Operation Plan 1-81 sets forth the supply requirements within the FBH for each phase of Operation BREAKER. The total volume of supplies to be landed, stored, and issued is as follows:

TABLE V-21. DAY OF SUPPLY REQUIREMENTS BY PERIOD FOR OPERATION BREAKER

SUPPLY CLASS	PERIOD II	PERIOD III	PERIOD IV	PERIOD V	PERIOD VI	PLANNING FACTOR[5]
CLASS I	39.37	77.27	92.39	112.93	132.46	6.24
CLASS II	2.92	5.73	6.85	8.38	9.83	0.463
CLASS III(A)[2]	2,526	11,865	55,850	72,562	127,936	8.2
CLASS III(W)	79,253	155,530	185,957	227,305	266,611	6.28
CLASS IV	13.58	26.65	31.86	38.95	45.68	2.152
CLASS V(A)[2]	-[3]	9.65	45.43	59.02	104.07	13.34
CLASS V(W)	193.02	378.8	452.9	553.60	649.33	30.59
CLASS VI	20.26[4]	39.75	47.53	58.09	68.14	3.21
CLASS VII	49.09	96.34	115.19	140.8	165.17	7.78
CLASS VIII	7.62	14.24	17.03	20.81	24.41	1.15
CLASS IX	11.99	23.53	28.13	34.09	40.33	1.9
STRENGTH ASHORE	12,620	24,766	29,611	36,195	42,454	

NOTES 1 - ALL DAY OF SUPPLY (DOS) STOCKAGES, EXCEPT CLASS III, EXPRESSED IN SHORT TONS. CLASS III EXPRESSED IN GALLONS.
2 - BASED ON MAW STRENGTH ASHORE (PERSONNEL).
3 - MAJORITY OF AVIATION REARMING IS ACCOMPLISHED ABOARD SHIP.
4 - LOW PRIORITY - WILL NOT BE BROUGHT ASHORE IN THIS PERIOD.
5 - CURRENT PLANNING FACTORS FOR MODERATE INTENSITY CONFLICT AS GIVEN IN TABLE 1 TO TAB D TO ANNEX B TO THE JSCP. EXPRESSED IN LB/MAN/DAY EXCEPT CLASS III (GAL/MAN/DAY).

The calculation of Class III(A) and Class V(A) day of supply requirements was based on the JSCP moderate intensity planning factors multiplied by the MAW personnel strength ashore. This method was presented by HQ USMC staff personnel in both the Logistics and Joint Matters Branches. Further investigation of relevant planning factors has revealed that an alternate computation method may be more accurate in terms of supply planning factors when MAW composition (in terms of aircraft squadrons) is known for each period under consideration.

The phasing of aviation ashore, within the SYN City metropolitan boundary, is predicated upon the availability of suitable landing surfaces, rearm and refuel capabilities, and the expansion of the consolidated area within the FBHL. During Period II and the early stages of Period III, embarked VSTOL assets will be staged and logistically supported from LPHs and LHAs in the Sea Echelon. Rearm and refuel points will be established late on D-day to provide for emergency capabilities. Maintenance will continue to be performed aboard ship. VSTOL assets are phased ashore in Period IV after a rearm and refuel capability exists ashore and the bulk of SYN City has been seized and consolidated.

Fixed-wing aviation assets, embarked aboard the carrier task force or deployed from theater facilities, are not phased ashore until D+10 when essential repairs to Airfield 1 are anticipated to be complete. However, Class III(A) and Class V(A) stocks are built up to 3 DOS in Period V (D+7 to D+10) in anticipated of the fixed-wing redeployment.

Aviation assets staged or supported ashore, day of supply stockage goals, and Class III(A) and V(A) day of supply stockage requirements during each period are shown in the table below. Basic consumption data per aircraft was taken from the MAGTF Lift Model, and in particular, the Logistics Planning Reference Vol I for Class III(A) and Table G-5 from the MAGTF Lift Validation for Class V(A). Storage facilities have been programmed for the quantities below rather than the requirements generated by using personnel strengths and a general planning factor.

TABLE V-22. AVIATION FUEL AND AMMUNITION REQUIREMENTS AND STOCKAGES ASHORE

PERIOD	AVIATION BASED ASHORE	STOCKAGE GOAL ASHORE	DAY OF SUPPLY REQUIREMENT	
			CLASS III(A)	CLASS V(A)
II	$\frac{2\ HMA}{4\ HMH} + \frac{1\ HML}{2\ VMA} + \frac{4\ HMH}{(1)}$	1.5 DOS	159,756	[illegible]
III	[illegible]	1.5 DOS	159,756	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

Supply Stockage and Distribution - Operation BREAKER (Continued)

D-day Operations

- During the assault phase, LVTs are the only suitable craft for landing supplies on the mainland. At RED Beach, landing craft can be used effectively only after a causeway has been installed between the island and the mainland about H+4. At BLUE Beach, LVT resupply will be necessary until the tactical situation permits landing craft to use GREEN Beach.

- Adequate MHE will be required on the beaches and at supply points, provided by the MT/Equip Plt of the Shore Party Team and the Supply Section.

- Sufficient vehicular lift will be needed ashore to transfer supplies from beach areas to supply points and to using units; LVTs initially, wheeled vehicles after MSRs have been secured.

- Adequate storage space with easy access and suitable interior dimensions will be essential:

  - The BSAs include selected suburban structures which will be cleared of indigenous personnel and used whenever possible to provide covered storage. These evacuated personnel will be housed at schools, hotels, and public buildings with large interior areas. Temporary resettlement camps will be established only as a last resort. Those buildings selected must provide easy access for MHE and be capable of supporting the dead load of accumulated supplies and live load of MHE, transfer vehicles, and personnel.

  - In the BSAs ammunition will be stored in open areas under trees or camouflage nets or immediately adjacent to paved roads. At least 100 feet will be allowed between stacks. Engineer equipment will be used to construct berms where appropriate. (Most hard-surface areas in the BSAs will be roads and/or parking lots. These areas will not be used to store Class V due to the increased threat from fragmentation and other competing requirements for hard-surface areas, i.e., transportation, equipment parks, maintenance.)

- Supply stockage in a MOBA amphibious environment will be more effective if selected supplies are kept in a mobile configuration in LVTs or wheeled vehicles to the maximum extent possible, particularly in support of units engaged in heavily populated areas. This action contributes to security and safety and minimizes materials handling and distribution problems.

  - To maintain one DOS of Class I and V in a mobile configuration would require approximately 46 LVTs. This number can be made available after BLT 3/2 has landed at H-hour and does not require the full assets of an AAV Company to accomplish its mission in Old City.

  - At BLUE Beach LVTs will be required as floating dumps initially, but later on D-day they will have to make repeated resupply trips from ship to shore and therefore cannot be maintained ashore in a mobile-loaded configuration.

Post- D-day Operations

- The port area on North River will be pressed into service at the earliest opportunity. Usable piers, docks, and MHE will be identified and protected against damage by enemy sappers and civilians. Shortfalls in MHE requirements will be made up by landing appropriate MHE to service landing craft in the port area. It is anticipated that this port area will serve as the main throughput area for establishing and maintaining CSSA 1.

- As CSSA 1 and 2 are established maximum use will be made of industrial warehouses, municipal-type buildings and facilities, and port warehouses consistent with security and access requirements.

- Although industrial-type buildings and port warehouses offer good cover and concealment for supply storage, such facilities will probably be occupied by indigenous stocks and material during the initial amphibious assault phase and will require time to clear and make them available for military use.

- CG, 7th FSSG will carefully control the stockage levels in CSSA 2 to prevent overstocking prior to closing it out once the FSSG commences the establishment of a FCSSA within the FBHL.

KEY CONCEPTS FOR INITIAL SUPPLY STORAGE AND DISTRIBUTION

- Seizure of port area and indigenous MHE.
- Use of floating dumps and progressive build up of BSAs.
- Use of pontoon causeway at RED Beach, LVT ferries at BLUE Beach.
- Mobile-loaded Class V supporting RLT 2 and RLT 3.

SUPPLY - MOBA PWRMS REQUIREMENT

MILITARY OPERATIONS IN BUILT-UP AREAS COULD BE FACILITATED BY ESTABLISHING PREPACKAGED CONTINGENCY STOCKS OF SUPPLIES AND EQUIPMENT THAT WOULD NOT NORMALLY BE STOCKED IN SUFFICIENT QUANTITIES TO SUPPORT A MOBA OPERATION.

An examination of materiel usage during the course of a combat operation in an urban environment indicates that the uniqueness of some supply requirements could justify the establishment of a prepackaged special reserve which could be a portion of Prepositioned War Reserve Materiel Stocks (PWRMS). This reserve would be a Project Stock for use in contingencies involving urban warfare operations.

This Project Stock would include the following general types of supplies and equipment:

- Items not in the current inventory but useful in MOBA.
- Items currently in the inventory but suffering a greater loss or use in MOBA vice conventional operations.

The figure below provides a list of selected items that should be prepositioned as MOBA PWRMS. This listing is not all-inclusive and is subject to revision based on future developmental efforts and USMC procurement decisions.

Class V Items (Current Inventory)

Ctg, rifle, sniper
Ctg, shotgun
Ctg, M203, M433 (HE DP) and M651 (CS)
Ctg, mortar, illuminating (M83A3 and M301A3)
Ctg, tank, 105 mm, M393A2 (HEP-T)
M494 (APERS)
Ctg, howitzer, 105 mm, M314A3 (Illum)
M84A1 (HC Smoke)
Demolition materials, all
Grenade, hand, frag M67
offensive MK3A2
smoke HC
Projectile, flame weapon
breaching weapon
Fuse, delay (concrete piercing)

Figure V-26. MOBA PWRM Items

Class II Items (Current Inventory)	Class IV
Armor, body	Barbed wire, 350' spool
Armor kit, vehicle	Bag, burlap
Batteries, mine detector	Barbed wire, concertina
Bayonet	Barbed tape, GPBTO
Belt, safety, industrial	
Breathing apparatus, oxygen gen.	
Cable, coaxial	Class VII
Cable, tele WD-1/TT	
Climbers, pole	Breaching weapon, man-portable
Demo equip set, individual	Detector, mine
Flashlights (and batteries)	Dispenser, RCA
Glove shells, black	Firefighting equip
Pistol, individual	Flame weapon, man-portable
Rifle, individual	Generators, smoke
Rifle, sniper	Public address sets
Retransmission kit, radio	Radio antennas
Rope, 1" manila or sisal	Radio set, PRC-77
Seal, strapping	Seismic instrusion sets
Shotgun	Telephone set, TA-1/PT
Sight, night vision, individual	Telephone set, TA-312/PT
Sign painting set	
Stencil sets	
Tablet, water purification	Class II Items (Non-inventory)
Tag, blank, asst. colors	
Tape, insulating, electrical	Eavesdrop equip, electronic
Tape, engineer	Ladder, STABRU
Tarpaulin	Mirror kit, w/poles
	Transformer, step-down, 220/110

Figure V-26. MOBA PWRM Items (Continued)

SUPPLY PROBLEM AREAS

Aside from the problems inherent in Logistics Over The Shore (LOTS) operations, the most persistent problem to be encountered is the selection of multiple sites for accumulated storage of supply stocks. Existing and relatively undamaged structures and covered storage areas sited in tactically favorable locations may be used to store breakbulk stocks exclusive of bulk POL and Class V IF internal storage space is available and not otherwise required to store and safeguard indigenous supplies that will be needed to support the local population. Square footage requirements for covered storage are discussed in the section entitled "Engineer Vertical Construction" in this chapter. Pre-landing medium altitude photographic reconnaissance may be used to analyze suitability of particular urban and suburban structures for breakbulk storage. This photo interpretation capability is not organic to the MAF GCE and must be supplied by either Wing assets or assets outside the Marine Corps structure. All initial storage facilities will be expedient in nature, requiring minimal engineer preparation prior to occupation

Class V Stocks

Tactical dispersion of Class V stocks remains a problem within the SYN City environment until the FBHL is expanded from the suburban area inland. Class V stocks are extremely vulnerable to hostile fires from enemy troops and civilians; these stocks must be dispersed as much as possible to ensure survivability for at least seventy-five percent of the stored items. Due to the heavy taskings upon engineer resources during the first ten days of Operation BREAKER, ammunition will be stored by the area concept in accordance with Q-D requirements set forth in US Army TM 9-1300-206. ASP land area requirements in Period VI, for a 15 DOS stockage objective, total to 1533 acres of which 686 acres are required for Class V(W) and 847 acres for Class V(A). (A more detailed discussion with ASP locations noted is included in the Engineer-Horizontal Construction section.) Although small stocks of Class V can be stored adjacent to suburban areas, the majority of Class V stocks should be stored at least 1/4 mile from key facilities and densely populated areas.

BDM analysts have concluded that while adequate areas can be found to store a 15 DOS stock of all Class V items using the area storage concept, storage of greater than 15 DOS within the metropolitan area necessitates employing the modular barricaded storage concept with a greatly increased horizontal construction requirement. Elements of the NCR will be tasked to construct these modular ASPs once port and airfield facilities have been rehabilitated. The remainder of the MAF Class V mount-out will remain in storage aboard ammunition ships in the Sea Echelon. Once the MAF commences preparations for movement to the northwest and a FCSSA has been established outside of SYN City, the remainder of mount-out stocks can be landed and transported to new ASP locations.

SUPPLY CONCLUSIONS AND RECOMMENDATIONS

- Commodity area detachments will be included in both Shore Party Teams and two offshore HSTs to provide initial supply support. Current personnel manning levels and organizational concepts are adequate in the urban context.

- Supply facilities ashore should be progressively established at logistic suport areas. Floating dumps will be utilized on D-day to provide flexible and responsive Class V support.

- Calculation of day of supply requirements should use the greater of the conventional or MOBA planning factors to place an upper bound on the volume of supplies to be landed, moved, and stored.

- Planning for aviation-unique fuel and ammunition should be based upon consumption factors per aircraft in the FBH rather than generalized lb/man/day factors multiplied by the appropriate personnel strength.

- A MOBA Project Stock of selected items should be included as a special reserve within PWRMS.

- Area storage is the preferred method for Class V during the early stages of an amphibious assault provided that no more than 15 DOS are stored within the SYN City metropolitan boundary. As engineer resources or additional land areas become available, modular storage concepts or increased Class V stockages can be contemplated.

Combat Service Support Functions and Requirements

TRANSPORTATION

TRANSPORTATION RESOURCES ALLOCATED TO VII MAF AE AND AFOE ELEMENTS MUST BE SUFFICIENT TO ENSURE THE REQUISITE PROJECTION OF COMBAT POWER TO AND INTO THE SYN CITY BEACHHEAD. ONCE ASHORE, TRANSPORTATION REQUIREMENTS WITHIN THE CITY SHOULD BE SLIGHTLY LOWER THAN NORMAL, WHILE THE NEED FOR HELICOPTER AND TRACKED VEHICLE TRANSPORTATION OUTSIDE THE METROPOLITAN AREA WILL BE GREATER THAN NORMAL TO PROVIDE FOR RAPID AND SUSTAINED ISOLATION OF THE CITY.

General

There are two distinct combat service support functions relating to transportation. Passenger and freight transportation, function number 18 in FMFM 4-1, relates to management operations that provide for the receipt, shipment, and forwarding of materiel and personnel. The strategic mobility, embarkation and external transportation planning requirements associated with this CSS function are the responsibility of the ACofS G-4. Because this investigation is concerned principally with the logistic sustainment of a MAF in an urban environment, the passenger and freight transportation function accomplished in CONUS or other staging areas is not dealt with in detail. External support is referred to in the Oplans, however, and no peculiar requirements or subfunctions were identified in this regard. The CSS function of transportation, function number 3 in FMFM 4-1, has direct relevance to Operation BREAKER because it deals with the determination, coordination, assignment and control of transportation resources and the tasks of combat logistics and support logistics. Internal transportation and traffic management are the responsibility of CG, FSSG.

During the course of an amphibious operation, the CSS function of transportation involves planning for and executing the movement of all personnel, equipment, and supplies. All available modes of transportation are considered including:

- Supersurface modes
  - Rotary-wing aircraft
  - Fixed-wing aircraft
  - Lighter-than-air systems (under development)
- Surface modes
  - Shipping via oceans, inland waterways, and navigable rivers
  - Railroads
  - Wheeled and tracked vehicles
- Subsurface modes - Submarine

Transportation Responsibilities - Planning and Coordination

CLF

- Transportation planning pertaining to movement of LF units and assault supplies to embarkation areas.
- Plans for, in coordination with CATF, employment of helicopters, landing craft and ships, and assault amphibians in the ship-to-shore movement.
- Once ashore, plans for the balanced employment of all means of transportation, including trucks, helicopters, assault amphibians and the bulk fuel system.
- Establishes priorities for movement and ensures adequate movement and traffic control within the LF area of responsibility.

CATF

- Schedules movement of shipping to embarkation points according to loading schedules developed in coordination with CLF.
- Plans for movement of assault shipping to objective area.
- Provides the Navy means for the ship-to-shore movement and schedules the movement of ships between the sea echelon and the transport area to support the landing plan and the plan for landing supplies.
- Coordinates requirements for transportation support from outside the objective area, including the AFOE, any subsequent follow-up echelon, and the FIE.
- Plans for control of shipping within the objective area and ensures that sufficient lighterage to unload it is available.

Source: FMFM 4-1, CSS, HQ USMC, 21 Sept 81, pg. 2-35 and 2-36.

Transportation (Continued)

The overall transportation system is developed from requirements levied by the character of combat operations being supported and the composition of cargo to be delivered into and within the amphibious objective area. The system established ashore for support of the Landing Force will often influence the deployment and disposition of other CSS elements in the objective area. Transportation planning must be fully integrated with planning for embarkation, surface and vertical landing, and the full range of combat service support functions to provide adequate and timely resources for completion of the MAF mission.

The utilization of transport resources to accomplish the MAF mission can be divided into four distinct phases. Phase I involves the use of transport to move Landing Force units, equipment, and supplies to the embarkation area(s) within CONUS or at theater support facilities. The existence of an urban environment at the amphibious objective area indirectly influences the use of Phase I transport by inducing specific but minor modifications to the embarkation plan. While the timing of arrival at embarkation areas may be altered for specific MAF elements, the overall transportation requirement to move the MAF to the embarkation area is not significantly altered.

Phase II of the transportation function involves the movement of the AE (and AFOE, FIE) from the embarkation area(s) to the Amphibious Objective Area. US Navy assault shipping assets are the primary means for moving the AE, while Military Sealift Command (MSC) and commercial shipping is generally utilized to move the AFOE. Fly-in echelons (FIE) are transported by MAW fixed-wing transport aircraft in the VMGR squadrons augmented by USAF MAC aircraft as necessary. Assault shipping is divided into several movement groups to allow for differential movement rates between ships, requirements for self-defense against attack, and dispersion of Landing Force assets. The surface movement of the Assault Echelon, once embarked, is influenced to a greater degree by tactical and logistic considerations of the movement route rather than the environment anticipated at the conclusion of the movement. Movement of the FIE to the AOA, however, depends heavily on the availability of suitable landing surfaces at the final destination. Since the air facilities in SYN City are anticipated to be primary targets for enemy denial efforts once the intentions of VII MAF are known, the arrival of Fly-In Echelons at these facilities is not programmed until D+10 at the earliest with the actual arrival date flexible and dependent upon rehabilitative efforts at Airfields 1 and 2.

Phase III of the transportation function involves the ship-to-shore movement of the Assault Echelon. This transportation phase is extremely complex and all transport must be coordinated and integrated in order to achieve the requisite combat buildup ashore in the face of a determined and active defense. The ship-to-shore movement is planned down to the last

detail and all elements of the Assault Echelon are broken down into movement serials and/or waves. Threat disposition, key facilities, area topography, and the MAF mission will place constraints and parameters on the ship-to-shore movement, and the deliberate assault into SYN City is no exception. Key facilities will be seized at L-hour using vertical assault techniques, while the remaining divisional elements (2 RLT(-)) will employ a surface assault at H-hour over the only viable beach landing areas in or near SYN City. Prior planning for this critical transport phase must also include the loads carried in each vehicle during the landing as well as the transport resources that are themselves landing with the assault units.

Phase IV of the transportation function is the transport network developed once the assault units have landed. This network extends from the sea echelon to the landing beaches, through Beach Support Areas, down to the individual units being logistically supported. The planned assignment of transport responsibilities and elements to Landing Force units is realized during this transport phase as modified by the actual combat conditions encountered once the Assault Echelon has landed. Traffic control measures for air and surface transport modes are implemented to reduce congestion in landing areas and Beach Support Areas.

The remainder of this section will highlight influences upon the transportation function (Phases III and IV) which are induced by the urban environment of SYN City. Transport Phases I and II are largely unaffected, with the exception of minor modifications to the embarkation sequence and associated loading plans, by the nature of the urban battlefield and will not be addressed in any greater detail than that already presented.

PHASE I - MOVEMENT OF LF TO EMBARKATION AREAS*
PHASE II - MOVEMENT OF ASSAULT SHIPPING TO OBJECTIVE AREA*
PHASE III - SHIP-TO-SHORE MOVEMENT OF ASSAULT ECHELON●
PHASE IV - MOVEMENT WITHIN OBJECTIVE AREA (FBHL)●

* INDIRECTLY AFFECTED BY URBAN ENVIRONMENT

● DIRECTLY AFFECTED BY URBAN ENVIRONMENT

Figure V-27. Transportation Phases During Operation BREAKER

Transportation (Continued)

Amphibious Assault Implications - SYN City

The disposition of major units of the Aggressor MRD defending southern Aggressorland is such that a landing force could not feasibly seize the metropolitan area in the face of even moderate resistance without first isolating the city proper. The helicopter provides the only transportation means by which assault elements of a landing force can be delivered quickly and in sufficient strength to seize key positions or LOCs and effectively isolate SYN City before the Aggressor forces can react decisively. Heliborne operations, therefore, assume great importance in Operation BREAKER. Emergency on-call resupply of critical items to peripheral units will also depend upon helicopter lift through D-day and D+1.

Offshore islands block the approaches to the only suitable mainland beach areas in SYN City. The best vehicles for conducting an assault landing are amphibian tractors. Tanks can also negotiate the 2-meter water depths between the islands and the mainland, but wheeled vehicles will have to land over a causeway at RED Beach until the port area has been secured and causeways or piers are available to receive them. At BLUE Beach, wheeled vehicles will have to be ferried from the islands to the mainland until tactical conditions permit landing directly over GREEN Beach inside the breakwater. The restrictive influence of the islands makes it necessary to use amphibian tractors for mobile dumps after H-hour as soon as LVTs can be released by one of the assault battalions at each beach.

In the mid-range period the heavy-lift helicopter will have a prominent role in any amphibious operation, but it will be particularly important when isolation of an objective area is paramount. The ability to lift light armored assault vehicles (LAV) will make it possible to insert combined arms forces deep within the FBH where they can attack LOCs, logistic installations, and reserve units, thereby isolating the battlefield more quickly and effectively than is now possible.

Surface craft, such as the LCAC, will carry other essential weapon systems to and over the beach at great speeds from long distances. In combination, the two capabilities are expected to enhance amphibious assault operations to a marked degree. The CSS implications of the LCAC are also very important. Heavy equipment, supplies, POL, and other critical material can be delivered ashore quickly, often directly to inland dumps. Handling and vulnerability can be minimized as a result.

TRANSPORT EQUIPMENT ITEM	ASSAULT ECHELON									AFOE
	TRUCK CO, HQ BN, MARDIV	AAV BN, MARDIV	TRANSPORT CO, MT BN, FSSG	MTV CO, MT BN, FSSG	TRUCK CO, MT BN, FSSG	MOTOR TRANS SQDN, MWSG, MAW	TRANSPORT CO, MT BN, FSSG	TRUCK CO, MT BN, FSSG	MOTOR TRANS SQDN, MWSG, MAW	
SEMI-TRL, 5000G., M970			5				15			42
SEMI-TRL, 40T LOW, M870 *			2				1			
SEMI-TRL, 25T LOW, M172A1			2				1			14
SEMI-TRL, 12 1/2T STAKE, M127A2C *			60			4	60			22
SEMI-TRL, 7 1/2T REEFER			2				5			
TRAILER, 2 1/2T 4-WHEEL										30
TRAILER, 1 1/2T, M105A2	57				40			32		67
TRAILER, 400G., M149A2	13									40
TRUCK, 10T TRACTOR, M123A1C *			4				2			
TRUCK, 5T TRACTOR, M52A2 *			44			4	36			55
TRUCK, 5T CARGO, M54A2C *					105			46		
TRUCK, 5T DUMP, M51A2 *						5				18
TRUCK, 2 1/2T DROP, M35A2C *	100					10				86
TRUCK, 1200G., M49A2C *						2				12
TRUCK, 1000G., M50A2 *										12
CARRIER, FT AMPHIB, M116A1 *				35						
CARRIER, FT AMPHIB, M733 *				10						
LANDING VEHICLE, FT AMPHIB, LVTP7 *		187								

NOTE:

1. ONLY VEHICLES WITH CARGO CAPACITY OF ≥2 1/2T LISTED
2. REPRESENTS DELINEATION OF CURRENT ASSETS AS GIVEN IN LFOSS-79

* VEHICLE SYSTEM MODIFICATION OR REPLACEMENT ANTICIPATED BY MID-RANGE TIME PERIOD; NOT ALL-INCLUSIVE

Figure V-28. Echeloned Ground Transport Resources During Operation BREAKER

Transport Utilization During the Amphibious Assault (Phase III)

The deliberate assault of SYN City during the current time period involves a vertical assault by two BLTs at L-hour followed by the surface assault by 2 RLT(-) at H-hour. The assignment and employment of transport assets to achieve this build-up of combat power ashore is detailed within Appendix 3 (Landing Plan) to Annex R (Amphibious Operations) to OPLAN 1-81. Pertinent TABs within Appendix 3 include:

- TAB C - Amphibious Vehicle Employment Plan
- TAB D - Serial Assignment Table
- TAB H - Helicopter Employment and Assault Landing Table

The initial waves containing surface assault elements will be transported from LSTs to prescribed landing areas by LVTs. Each of the first three waves will be composed of 22 LVTP7s landing over each colored beach. By the completion of the first three waves, a total of six reinforced rifle companies will have been landed at RED and BLUE beaches. Upon completion of tactical lifts, approximately fifty LVTP7s will be made available for use as floating dumps with emergency resupplies of Classes V(W), III(W), VIII, and IX. These assets will have the capability to provide temporary storage and transport for up to 250 ST per lift.

Landing craft of the LCM and LCU type will be used to transport non-amphibians to beach landing areas once floating causeway sections have been emplaced between the mainland and the offshore islands. Additional causeway sections are required on the seaward side of the offshore islands due to the mild gradient anticipated in these areas. M60A3 tanks will use snorkelling equipment; the channel depth is less than four meters.

The ship-to-shore movement of heliborne force serialed waves is supported by two squadrons of CH-46E helicopters and up to one squadron of CH-53D helicopters. Utility helicopters (UH-1N) will be used to lift BLT command sections at the discretion of the BLT CO. Helicopter evacuation of initial casualties to CRTSs will also be accomplished by utility helicopters. Vertical lift assets used in the transport role will be escorted by elements of the HMA squadron.

TABLE V-23. AMPHIBIOUS VEHICLE EMPLOYMENT

ORIGIN	NUMBER AND TYPE AMPHIBIOUS VEHICLES LVTP-7	LVTC-7	LVTR-7	WAVE	DESTINATION	REMARKS
LST-1179	11			1	RED Beach	Co A (Rein), BLT 2/2
LST-1183	11			1	RED Beach	Co D, BLT 3/2
LST-1187	11			1	Beach BLUE 1	Co G (Rein), BLT 3/3
LST-1191	11			1	Beach BLUE 2	Co L, BLT 2/3
LST-1180	11			2	RED Beach	Co B, BLT 2/2
LST-1184	11			2	RED Beach	Co E, BLT 3/2
LST-1188	11			2	Beach BLUE 1	Co H, BLT 3/3
LST-1192	11			2	Beach BLUE 2	Co M, BLT 2/3
LST-1181	11			3	RED Beach	Co C, BLT 2/2
LST-1185	11			3	RED Beach	Co F, BLT 3/2
LST-1189	11			3	Beach BLUE 1	Co I, BLT 3/3
LST-1193	11			3	Beach BLUE 2	Co N, BLT 2/3
LST-1182	9			4	RED Beach	1st Plat (-), 1st AT Co, 1st Tank Bn (-)(+)
LST-1186	5			4	RED Beach	2nd Plat (-), Co A, 1st Cbt Engr Bn Comm Plat (-), BLT 3/2
LST-1190	9			4	Beach BLUE 1	2nd Plat (-), 1st AT Co, 1st Tank Bn (-)(+)
LST-1194	5			4	Beach BLUE 2	3rd Plt (-), Co A, 1st Cbt Engr Bn Comm Plat (-), BLT 2/3
LST-1182		1			RED Beach	CO, BLT 2/2*
		1				FSC LNOs, BLT 2/2*
		1				XO, BLT 2/2*
	1					CO, Co A, 2nd Aslt Amphib Bn*
	1					NBC Officer, BLT 2/2*
						Elms, Co A, 2nd Aslt Amphib Bn*
LST-1186		1			RED Beach	CO, BLT 3/2*
		1				FSC LNOs, BLT 3/2*
		1				XO, BLT 3/2*
	1					CO, Co B, 2nd Aslt Amphib Bn*
	1					NBC Officer, BLT 3/2*
						Elms, Co B, 2nd Alst Amphib Bn*
LST-1190		1			Beach BLUE	CO, BLT 2/3*
		1				FSC LNOs, BLT 3/2*
		1				XO, BLT 3/2*
	1					CO, Co C, 2nd Aslt Amphib Bn*
	1					NBC Officer, BLT 3/2*
						Elms, Co C, 2nd Aslt Amphib Bn*
LST-1194		1			Beach BLUE 2	CO, BLT 3/3*
		1				FSC LNOs, BLT 3/3*
		1				XO, BLT 3/3*
	1					CO, Co D, 2nd Aslt Amphib Bn*
	1					NBC Officer, BLT 3/3*
						Elms, Co D, 2nd Aslt Amphib Bn*
SECOND TRIP						
4th Plat (-) CoA, 2nd Aslt Amphib Bn	9				Transfer Line RED	Embark troops as directed
4th Plat (-) Co C, 2nd Aslt Amphib Bn	9				Transfer Line BLUE 1	Embark troops as directed
Co D, 2nd Aslt Amphib Bn	11				PCS BLUE 1	Embark troops for subsequent tactical lift on or about D+1
Co E, 2nd Aslt Amphib Bn	11				PCS BLUE 1	Embark troops for subsequent tactical lift on or about D+1
Elms, 4th Plat Co B, 2nd Aslt Amphib Bn	4				PCS RED	Floating Dumps, BLT [illegible]
Elms, 4th Plat Co D, 2nd Aslt Amphib Bn	4				PCS BLUE 1	Floating Dumps, BLT [illegible]
Elms, 4th Plat Co B, 2nd Aslt Amphib Bn	4				PCS RED	Floating Dumps, BLT [illegible]
Elms, 4th Plat Co D, 2nd Aslt Amphib Bn	4				PCS BLUE 1	Floating Dumps, BLT [illegible]
Co B, 2nd Aslt Amphib Bn	43	3			LST-1183 LST-1184 LST-1185 LST-1186	Upon completion of tactical lifts, Co B [illegible] loaded with PWRM and other supplies as directed, reports to PCSs and is utilized as floating dumps for the Landing Force [illegible]
Elms, Co B 2nd Aslt Amphib Bn					Transfer Line RED	Assist in beach [illegible]
LPD-4		3				Elms [illegible] 2nd Aslt Amphib Bn [illegible] prepared to transport elms of Landing Force Reserve as directed and [illegible] order

*Indicates Free Boat

TABLE V-24. SERIAL ASSIGNMENTS

SER NO	UNIT	PERS	MATERIAL EQUIPMENT VEHICLES	CRAFT NUMBER TYPE	SHIP	REMARKS
	BLT 2, RLT 2 (201-208)					
201	Co A (Rein)	251	8 M4[illegible]	11 LVTP-7	LST 1179	1st Wave, Beach RED
202	Co B (Rein)	247	8 M4[illegible]	11 LVTP-7	LST 1180	2nd Wave, Beach RED
203	Co C (Rein)	245	8 M4[illegible]	11 LVTP-7	LST 1181	3rd Wave, Beach RED
204	1st AT Plat (-), 1st AT Co, 1st Tank Bn Elms, 1st Plat (-), Co A 1st Cbt Engr Bn	32	8 M[illegible]1A2/M220A1	9 LVTP-7	LST 1182	4th Wave, Beach RED
[illegible]	Co A, 1st Tank Bn Elms, 1st AT Plat, 1st AT Co, 1st Tank Bn 1st Engr Plat (-), Co A, 1st Cbt Engr Bn Elms Comm Plat, H&S Co, BLT 2/2 Elms Hq Plat, H&S Co, BLT 2/2	155	1 M[illegible] 2 M[illegible]A1 W/[illegible] 15 M60A1 4 M[illegible]1A2/GME 4 M[illegible]1A2/M416 2 M[illegible]/M125 1 AN MRC-109 1 AN MRC-83A 1 AN MRC-135 1 AN MRC-87A 6 M[illegible]1A2 2 M[illegible]/M121A1	6 LCU	LHA 1 LHA 2	5th Wave, Beach RED
206	Bn Hq Sec, BLT 2/2 Elms Hq Sec, Co A, 2nd Aslt Amphib Bn	72	1 M[illegible]1A2	3 LVTC-7 2 LVTP-7 1 LVTR-7	LST 1182	Free boats, Beach RED
207	Elms Bn Hq, BLT 2/2 Comm Plat (-), H&S Co, BLT 2/2	64		1 LCM-6	LHA-1	Nonscheduled, Beach RED
208	Elms Trk Co, MT Bn 7th FSSG Elms Serv Plat, H&S Co, BLT 2/2 S&TA Plat, BLT 2/2	67	3 M[illegible]1A2/M416 M880 3 M[illegible]A1/M131	2 LCU	LHA 1 LHA 2	Nonscheduled, Beach RED
209	81mm Mort Plat, Wpns Co, BLT 2/2	80	4 M[illegible]1A2/M416 10 M274A5/M29	2 LCM-8	LHA 1 LHA 2	On call, Beach RED
	BLT 3, RLT 2 (210-216)					
210	Co D	231		11 LVTP-7	LST 1183	1st Wave Beach RED
211	Co E	234		11 LVTP-7	LST 1180	2nd Wave Beach RED
212	Co F	232		11 LVTP-7	LST 1181	3rd Wave Beach RED
213	2nd Plat (-), Co A, 1st Cbt Engr Bn Elms Comm Plat, BLT 3/2	65		5 LVTP-7	LST 1186	4th Wave Beach RED
214	Bn Hq Sec, BLT 3/2 Elms Hq Sec, Co B 2nd Aslt Amphib Bn	72	1 M[illegible]1A2	3 LVTC-7 2 LVTP-7 1 LVTR-7	LST 1186	Free boats, Beach RED
215	Elms Hq Sec, BLT 3/2 Elms Serv Plat, BLT 3/2 S&TA Plat, BLT 3/2 Elms Comm Plat, BLT 3/2	68	1 AN MRC-109 1 AN MRC-83A 1 AN MRC-135 1 AN MRC-87A 9 M[illegible]1A2/M416 5 M[illegible]1A2 [illegible] M880 2 M561	1 LCU 1 LCM-6	LPD 5	Nonscheduled, Beach RED
216	81-mm Mort Plat, Wpns Co	80	4 M[illegible]1A2/M416	2 LCM-8	LSD-28	On call, Beach RED
	Hq CO, RLT 2 (217)					
217	Hq Co (-)	193	2 M[illegible]1A2 5 M[illegible]1A2/M416 1 M[illegible]A1 1 AN MRC-87A 1 AN MRC-83A 1 AN MRC-110 1 AN MRC-135	1 LCU	LSD 23	Nonscheduled, Beach RED
	LFSPG (-) (317)					
317	SPT A (Rein)	307	1 M880 1 M[illegible]1A2 2 M[illegible]1A2/M416 [illegible] 1 AN MRC-109 1 AN MRC-134 1 AN MRC-135 1 M886 1 M[illegible]2 1 M[illegible] 1 M[illegible]50 1 [illegible] MP 2 [illegible] Farm, M67-HC 1 M[illegible]4A2C/M149A1 [illegible] [illegible] 4000 [illegible]	3 LCU	LSD 29	Nonscheduled, Beach RED

TABLE V-24. SERIAL ASSIGNMENTS (CONTINUED)

SER NO	UNIT	PERS	MATERIAL EQUIPMENT VEHICLES	CRAFT NUMBER TYPE	SHIP	REMARKS
			BLT 2, RLT 3 (218-226)			
218	Co G (Rein)	251	8 M4[illegible]	11 LVTP-7	LST 1187	1st wave, Beach BLUE [illegible]
219	Co H (Rein)	247	8 M4[illegible]	11 LVTP-7	LST 1188	2nd wave, Beach BLUE [illegible]
220	Co I (Rein)	245	8 M4[illegible]	11 LVTP-7	LST 1189	3rd wave, Beach BLUE [illegible]
221	2nd AT Plat (-), 1st AT Co, 1st Tank Bn Elms, 2nd Plat (-), Co A 1st Cbt Engr Bn	32	8 M151A2/M220A1	9 LVTP-7	LST 1190	4th wave, Beach BLUE [illegible]
222	Co B, 1st Tank Bn Elms, 2nd AT TOW Plat, 1st AT Co, 1st Tank Bn 1st Engr Plat (-), Co A 1st Cbt Engr Bn Elms Comm Plat, H&S Co, BLT 2/3 Elms Hq Plat, H&S Co BLT 2/3	155	1 M[illegible] 2 M[illegible]A1 W/E 15 M[illegible]A1 4 M151A2/GMF 4 M151A2/M416 2 M561/M125 1 AN/MRC-109 1 AN/MRC-83A 1 AN/MRC-135 1 AN/MRC-87A 6 M151A2 2 M561/M121A1	6 LCU	LHA 3 LHA 4	5th wave, Beach BLUE
223	Bn Hq Sec, BLT 2/3 Elms Hq Sec, Co C, 2nd ASH Amphib Bn	72	1 M151A2	3 LVTC-7 2 LVTP-7 1 LVTR-7	LST 1190	Free boats, Beach BLUE
224	Elms Bn Hq, BLT 2/3 Comm Plat (-), H&S Co BLT 2/3	64		1 LCM-6	LHA 3	Nonscheduled, Beach BLUE
225	Elms Serv Plat, H&S Co, BLT 2/3 Elms Hq Plat, H&S Co, BLT 2/3 Elms H&S Co Hq Sec, BLT 2/3	61	3 M151A2/M416 1 M8[illegible]	1 LCM-8	LHA 3	Nonscheduled, Beach BLUE [illegible]
226	81mm Mort Plat, Wpns Co	80	4 M151A2/M416 10 M274A5/M29	2 LCM-8	LHA 3 LHA 4	On call, Beach BLUE [illegible]
			BLT 3, RLT 3 (227-233)			
227	Co L	231		11 LVTP-7	LST 1191	1st Wave, Beach BLUE 2
228	Co M	234		11 LVTP-7	LST 1192	2nd Wave, Beach BLUE 2
229	Co N	232		11 LVTP-7	LST 1193	3rd Wave, Beach BLUE 2
230	3rd Plat(-), Co A, 1st Cbt Engr Bn Elms Comm Plat, BLT 3/3	65		5 LVTP-7	LST 1194	4th Wave, Beach BLUE 2
231	Bn Hq Sec, BLT 3/3 Elms Hq Sec, Co D, 2nd Aslt Amphib Bn	72	1 M151A2	3 LVTC-7 2 LVTP-7 1 LVTR-7	LST 1194	Free Boats, Beach BLUE
232	Elms Hq Sec, BLT 3/3 Elms Serv Plat, BLT 3/3 Elms Comm Plat, BLT 3/3 S&TA Plat, BLT 3/3	68	1 AN/MRC-109 1 AN/MRC-83A 1 AN/MRC-135 1 AN/MRC-87A 7 M151A2/M416 5 M151A2 1 M8[illegible] 2 M[illegible]	1 LCU 3 LCM-6	LPD 6	Nonscheduled, Beach BLUE 2
233	81mm Mort Plat, Wpns Co	80	4 M151A2/M416 10 M274A5/81mm Mort	2 LCM-8	LSD 30	Nonscheduled, Beach BLUE 2
			HQ CO, RLT 3 (234)			
234	Hq Co (-)	193	2 M151A2 5 M151A2/M416 1 M[illegible]A1 1 AN/MRC-87A 1 AN/MRC-83A 1 AN/MRC-110 1 AN/MRC-135	1 LCU	LSD 30	Nonscheduled, Beach BLUE 2
			SPT B, LFSPG (318)			
318	SPT B (Rein)	301	1 M[illegible] 1 M151A2 2 M151A2/M416 1 M56 1 AN/MRC-109 1 AN/MRC-134 1 AN/MRC-135 1 M886 1 M79[illegible] 1 M7[illegible] C MC[illegible] 50 1 M1150 1 72-[illegible] MP 2 Tank Farms, M67 HC 2 M54A2C 1 M54A2/M149A1 1 [illegible]A 2 MK 4000 1 M[illegible]A1	3 LCU	[illegible]	Nonscheduled, Beach BLUE 2

TABLE V-25. HELECOPTER EMPLOYMENT DURING ASSAULT LANDINGS

Wave	Unit and Flight No	Number and Model A/C	From Carrier (Origin)	To Report (Load)	Time Load	Time Launch	Time Land	Destination LZ	Destination LS	Troop Unit, Equipment, and Serial External Loads
					L-hour Landings					
1	CHISEL 100 AXLE	16 CH-46E	LHA-1	LHA-1	L-20	L-16	L-hour	VULTURE		Co A (*), BLT 1/1 Elms AT, 81mm Mort Plats, WPNS Co HST Advance Pty FAC Pty, H&S Co, BLT 1/1 Ser No 101
	SCRAPER 100 SANDER	16 CH-46E	LHA-4	LHA-4	L-18	L-14	L-hour	FALCON		Co A (*), BLT 1/3 Elms 2nd AT ((TOW)) Plat, AT ((TOW)) Co, 1st TKBN Elms AT Plat, WPNS Co Elms MGL Sec, H&S Co Elms 8 Engr Plat (-), Co A, 1st Cbt Engr Bn Ser No 110
	EDGER 100	9 CH-53D	LHA-5	LHA-5	Preload	L-15	L-Hour	EAGLE		Co B (*), BLT 1/3 Elms HST Advance Pty Elms AT, 81mm Mort Plats, WPNS Co Elms MGL Sec, H&S Co Elms 2nd AT ((TOW)) Plat, AT ((TOW)) Co, 1st TKBN Elms 2nd Engr Mat(-), Co A, 1st Cbt Engr Bn Elms FAAD Sec, 2nd FAAD Plat, FAAD Btry MACG-18 Ser No 117
	ORILLER 100	8 CH-53D	LPH-3 LPH-4	LHA-3 LHA-3	L-73 L-50	L-13 L-13	L-hour L-hour	SPARROW SPARROW		Co C (*), BLT 1/3 HST(-) WPNS Co (-) FAAD Sec (-), 2nd FAAD Plat, FAAD Btry MACG-18 2nd AT ((TOW)) Plat (-), AT ((TOW)) Co, 1st TKBN Elms Engr Plat (-), Co A, 1st Cbt Engr Bn Ser No 122
	NOTE Each flight of 4 CH-53D s returns to either LPH-3 or LPH-4 for assault launch at L-13									
	SMASHER 100	4 CH-53D	LPH-5	LPH-5	L-24	L-17	L-hour	HAWK		Co A (*), 3rd Recon Bn Elms 3rd AT ((TOW))Plat, AT ((TOW)) Co, 1st TKBN FAC Pty, H&S Co Ser No 130
2	ANVIL 200 HAMMER	16 CH-46E	LHA-2	LHA-1	L-54	*L-8	L+8	VULTURE		Co B (*), BLT 1/1 Elms AT, 81mm Mort Plats, WPNS Co HST(-) Elms 1st Engr Plat, Co A, 1st Cbt Engr Bn FAAD Sec (-), 1st FAAD Plat, FAAD Btry, MACG-18 Ser No 20
	SCRAPER 200 SANDER	16 CH-46E	LHA-4	LHA-4	L+36	L+42	L+57	SPARROW		BLT 1/3 Hq Sec (-) Elms Service Plat, H&S Co Elms WPNS Co Elms AT ((TOW)) Plat (-), AT ((TOW)) Co, 1st TKBN Elms Comm Plat, H&S Co Elms Medical Plat (-), H&S Co Ser No 211
	SMASHER 200	4 CH-53D	LPH-5	LPH-6	Preload	*L-4	L+13	HAWK		Co B (*), 3rd Recon Bn FAAD Sec (-), 2nd FAAD Plat, FAAD Btry, MACG-18 MGL Sec, H&S Co Elms 3rd Engr Plat, Co A, 1st Cbt Engr Bn Ser No 221
3	CUTTER 300	4 CH-53D	LHA-1	LHA-1	Preload	*L-hour	L+14	VULTURE		Elms 1st AT ((TOW)) Plat (-), AT ((TOW)) Co, 1st TKBN 81mm Mort Plat (-), WPNS Co, BLT 1/1 Elms S&TA Plat (-), H&S Co, BLT 1/1 Elms Btry A, 1st D/S Bn, 11th Marines Ser No 301
	SMASHER 300	4 CH-53D	LPH-5	LPH-5	L-1	L+6	L+23	HAWK		Co C (*), 3rd Recon Bn Elms Serv Plat, H&S Co Elms Comm Plat, H&S Co Ser No 321
4	DIGGER 400 POUNDER	16 CH-46E	LHA-3	LHA-1	L-99	*L+4	L+20	VULTURE		Co C (*), BLT 1/1 Elms HST 1st Engr Plat (-), Co A, 1st Cbt Engr Bn Ser No 401
	SMASHER 400	4 CH-53D	LPH-5	LPH-5	L+24	L+31	L+48	HAWK		1st Recon Bn Hq Sec (-) Elms Serv Plat Elms FAAD Sec, 2nd FAAD Plat, FAAD Btry, MAGC-18 Elms 3rd AT ((TOW)) Plat, AT ((TOW)) Co, 1st TKBN Elms 3rd Engr Plat, Co A, 1st Cbt Engr Bn Elms Medical Sec, H&S Co Ser No 421
5	CUTTER 600	6 CH-53D	LHA-2	LHA-2	+H	L+21	L+35	VULTURE		Btry A (-), 1st D/S Bn, 11th Marines 6 M101A1 HOW (External) Ser No 501

TABLE V-25. HELICOPTER EMPLOYMENT DUIRNG ASSAULT LANDINGS (CONTINUED)

Wave	Unit and Flight No.	Number and Model A/C	From Carrier (Origin)	To Report (Load)	Time			Destination		Troop Unit, Equipment, and Serial External Loads
					Load	Launch	Land	LZ	LS	
					L-hour Landings					
6	CUTTER 600	4 CH-53D	LPH-2	LPH-2	L-55	*L+31	L+45	VULTURE		Elms Btry Hq Sec, Btry A, 1st D/S Bn, 11th Marines Elms Comm Plat, H&S Co, Blt 1/1 Ser No 601
7	CHISEL 700 AXLE	16 CH-46E	LHA-1	LHA-1	L+31	L+38	L+54	VULTURE		Elms Blt 1/1 Hq Sec Elms Comm Plat, H&S Co Elms Serv Plat, H&S Co Elms Med Plat, H&S Co Ser No 701
Free Helo	EYELID 001	1 UH-1N	LHA-1	LHA-1	L	L+4	At discretion of Sr man aboard or CO, Blt 1/1	VULTURE	RED	Blt Cmd Sec (-), Blt 1/1
Free Helo	CRANKCASE 001	1 UH-1N	LHA-4	LHA-4	L+3	L+9	At discretion of Sr man aboard or CO, Blt 1/3	SPARROW	BLUE	Blt Cmd Sec (-), Blt 1/3
Free Helo	SLUGGER 001	1 UH-1N	LPH-5	LPH-5	L+7	L+11	At discretion of Sr man aboard or CO, Recon Bn	HAWK	GREEN	Recon Bn Cmd Sec (-), 1st Recon Bn
All remaining L-hour flights are non-scheduled										
					H-hour Landings					
1	DIGGER 100 POUNDER	16 CH-46E	LHA-3	LHA-3	H-22	H-15	H-hour	CONDOR		Co A (+), Blt 1/2 Elms AT, 81mm Mort Plats, WPNS Co MST Advance Ptry FAC Pty, H&S Co Ser No 151
2	ANVIL 200 HAMMER	16 CH-46E	LHA-2	LHA-3	H+6	*H+10	H+25	CONDOR		Co B (+), Blt 1/2 Elms AT, 81mm Mort Plats, WPNS Co MST(-) Elms, 1st Engr Plat, Co B, 1st Cbt Engr Bn Ser No 251
3	EDGER 300	9 CH-53D	LHA-4	LHA-3	H-28	*H+21	H+30	CONDOR		Elms 3rd AT (TOW) Plat, AT (TOW) Co, 1st TkBn 1st Engr Plat (-), Co B, 1st Cbt Engr Bn 81mm Mort Plat (-), WPNS Co, Blt 1/2 Elms Blt Hq Sec (-), Blt 1/2 Elms Comm Plat, H&S Co, Blt 1/2 Elms Serv Plat, H&S CO, Blt 1/2 Ser No 351
4	DIGGER 400 POUNDER	16 CH-46E	LHA-3	LHA-3	H+33	H+37	H+52	CONDOR		Co C (+), Blt 1/2 Elms 81mm Mort Plat, WPNS Co Elms 1st Engr Plat (-), Co B, 1st Cbt Engr Bn
Free Helo	SHAFT 001	1 UH-1N	LHA-3	LHA-3	H+11	H+15	At discretion of Sr man aboard or CO, Blt 1/2	CONDOR	WHITE	Blt Cmd Sec (-), Blt 1/2

All remaining H-hour flights are non-scheduled

* Pre-assault launch aircraft, troops, equipment transfer to assault launch ship

Transportation Ashore (Phase IV)

MOBA Implications - SYN City

Isolating SYN City and defending it against the armor reinforcements available to the Aggressor forces will require the use of mechanized task forces. This will increase the demand for transportation assets, such as the LVT and tactical trucks, in areas outside the city and between the BSAs or CSSAs and the deployed units.

Enemy defenses in urban and suburban areas, coupled with congestion and rubble normally associated with MOBA, will slow the rate of advance in those areas. Transportation usage (kilometers per day) will be substantially less than in a conventional non-MOBA operation. During the initial stages of the assault, D-day and D+1, it will be desirable to keep resupply stocks (principally Class V(W)) in a mobile configuration, preferably in LVTs which afford a greater measure of survivability than trucks.

Mechanized task forces can be employed to move around densely populated areas and through suburban areas rapidly to establish positions on the western fringe of SYN City prior to undertaking MCATF operations beyond the metropolitan limits out to the FBHL. Similarly, wheeled and tracked vehicles will be used to supply those task forces, using routes that avoid Aggressor concentrations and areas in which the indigenous population might create problems.

The urban environment, especially in the older sections of the more densely populated areas, may pose constraints to the use of tractor-trailer combinations for the movement of supplies. Cargo vehicles of 5T capacity or less will be able to negotiate sharper corners, narrow streets, and some hasty obstacles caused by rubbling. LVTs will also be used for transport in constricted areas. Typical building patterns found in most cities provide numerous protected positions which can be used by Aggressor forces or hostile civilians to attack ground transport vehicles. While LVTs have aluminum armor which can prevent penetration from small arms fire, none of the wheeled cargo vehicles are armored in any way and provide no ballistic protection for the operator or cargo. It is recomended that a program be initiated to identify lightweight armor which can be applied rapidly to the standard families of wheeled logistic vehicles.

Vertical lift assets must be utilized judiciously within the confines of the metropolitan area due to the threat posed by man-portable antiair missile systems, man-made obstructions to navigation, and fires from automatic weapons. During the initial periods of the amphibious assault (Periods II and III), helicopters will be used to deliver emergency supplies to peripheral units until ground LOCs have been seized and consolidated.

MOBA TRANSPORTATION CONCLUSIONS AND RECOMMENDATIONS

- The presence of an urban environment within the Amphibious Objective Area does not significantly alter transportation requirements prior to embarkation or during the ship movement to the AOA.

- The arrival of Fly-In Echelons (FIE) depends on the availability of suitable landing surfaces within the AOA. Rehabilitative efforts to Airfields 1 and 2 within SYN City should provide suitable facilities to land C-130 and C-141 aircraft on or about D+10.

- The ship-to-shore movement is planned to provide for a rapid build-up of combat power and isolation of the city by the end of D-day. This transport phase is heavily influenced by topography and hydrography within the landing areas and zones.

- Helicopters will be the key for initial resupply and subsequent emergency resupply of units not proximate to BSAs.

- LVTP7 amphibious vehicles will be used extensively for floating dumps and transfer operations until causeways have been established at RED and BLUE Beaches.

- Transport requirements within the metropolitan boundary of SYN City will be of the same magnitude as requirements generated by a deliberate assault into a nonurban area of similar land area.

- Logistics vehicles will be more susceptible to sabotage and irregular tactics by indigenous civilians and remnants of the MRB. It is recommended that a lightweight armor system be developed to provide a greater level of protection for those vehicles operating regularly within the built-up areas.

- As operational corridors within the built-up areas are secured, ground transport vehicles will assume a greater logistic burden freeing helicopters for support of MCATF operations northwest of SYN City.

- Logistic support of the MCATF (Task Force "A") will place significant demands for transport resources outside SYN City.

- Transport resources anticipated for the mid-range period must be compatible with containerization concepts. Procurement of sufficient M871 and M872 container transport semi-trailers is necessary to move containers. (M127A2C 12 1/2T stake semi-trailers will not accommodate containers loaded to their maximum gross weight of 44,800 lb.)

LANDING SUPPORT OPERATIONS

TASK-ORGANIZED MAF AND SUPPORTING NAVAL ELEMENTS WILL PROVIDE ASSISTANCE FOR THE LANDING OF PERSONNEL, EQUIPMENT, AND SUPPLIES ACROSS COLORED BEACHES AND AT HELICOPTER LANDING ZONES. THESE TEAMS WILL ALSO EVACUATE CASUALTIES AND POWS, ESTABLISH SUPPLY DUMPS, AND MAINTAIN A CURRENT STATUS OF LANDED ASSETS.

The Landing Force Shore Party Group Provides all combat service support for the Landing Force during the initial stages of the surface assault. The CLF is responsible for developing task-organized groupments whose operation and composition are based on consideration of:

- The overall landing plan.
- Enemy situation and activity.
- Topographic and hydrographic conditions.
- Types of available landing craft.
- Available naval support.
- Quantity and type of material to be unloaded.

The amphibious assault of SYN City will require two Shore Party Teams and four Helicopter Support Teams (HSTs), to provide adequate support for all landed forces in the Assault Echelon. Although Beach BLUE consists of two numbered beaches, only one Shore Party Team has been organized due to the narrow width of the landing site, the limited quantity of supplies to be landed (3 DOS), and the desire to keep beach support personnel and congestion to a minimum. The Shore Party Teams are under the control of an austere Shore Party Group Headquarters consisting of thirty personnel whose main responsibility is to maintain communications, control, and perform liaison between the two Shore Party Teams and the CLF, as well as the HSTs.

Shore Party Teams are organized from elements of 7th MarDiv, 7th FSSG, and Naval Support Forces. The basic organization of the Shore Party Teams supporting VII MAF is given in FMFM 4-3, Shore Party and Helicopter Support Team Operations. Specific team composition is heavily dependent on the anticipated level of support rendered to the landed forces. The nucleus for each landing support groupment is an element of the Landing Support Battalion. The allocation of Landing Support Battalion assets to provide these nuclei is shown on the opposite page. Personnel strengths and parent units are given for all sections within the Shore Party Team. The Beach Party Team is comprised solely of Navy personnel while the remainder of the Shore Party Team is composed of Marine personnel.

ORIGINS OF SPT "A"

	PARENT UNIT		HPNS	EQUIPMENT
129	(4,125)	H & S CO LS BN	10 P, 119 R, 1 M60, 3 M2	COMM- 12 1/4T, 2 1/4D, MHE-28, 18 CRANE ENGR- 3 GRADER, 5 MC1150, 1 MRS100, 1 LOADER, 2 FLIFT
31	(1,30)	LS CO LS BN	3 P, 28 R, 2 M60	1 1/4T
70	(3,70)	MED BN	48 P, 22 R	2 1/4T
34	(1,33)	MP CO MARDIV	5 P, 5 SHOT, 29 R, 3 M203	2 1/4T
58	(1,55)	SUPPLY BN	5 P, 51 R, 1 M60	1 1/4M, 1 ST
31	(0,31)	MAINT BN	3 P, 28 R, 1 M60	2 MC1051, 2 ST
71	(1,70)	ENGR SUPT BN	4 P, 67 R, 1 M60	10 SCRAP, 10 TEREX, 1 GRADER, 3 GEN, 2 ST, 1 1/4T, 1 MC1051
70	(1,69)	MT BN	3 P, 67 R, 4 M60, 5 M2	34 ST
492	(12,480)		81 P, 5 SHOT, 401 R, 3 M203, 10 M60, 8 M2	18 1/4, 2 1/4D, 1 1/4M, 30 MHE, 18 CRANE, 31 ENGR CONST, 3 MC1051, 39 ST, 3 GEN

ORIGINS OF SPT "B"

	PARENT UNIT		HPNS	EQUIPMENT
103	(4,98)	H & S CO LS BN	8 P, 95 R, 1 M60, 3 M2	COMM- 12 1/4T, 2 1/4D, MHE-13, 12 CRANE ENGR- 3 GRADER, 5 MC1150, 1 MRS100, 1 LOADER, 2 FLIFT
62	(2,60)	LS CO LS BN	6 P, 58 R, 4 M60	2 1/4T
70	(3,67)	MED BN	48 P, 22 R	2 1/4T
34	(1,33)	MP CO MARDIV	5 P, 5 SHOT, 29 R, 3 M203	2 1/4T
49	(1,48)	SUPPLY BN	4 P, 45 R, 1 M60	2 MC1051, 2 ST
29	(0,29)	MAINT BN	3 P, 26 R, 1 M60	1 1/4M, 1 ST
71	(1,70)	ENGR SUPT BN	4 P, 67 R, 1 M60	10 SCRAP, 10 TEREX, 1 GRADER, 3 GEN, 2 ST, 1 1/4T, 1 MC1051
29	(0,28)	MT BN	1 P, 28 R, 1 M60, 2 M2	14 ST
447	(12,435)		79 P, 5 SHOT, 368 R, 3 M203, 9 M60, 5 M2	18 1/4, 1 1/4M, 2 1/4D, 15 MHE, 3 GEN, 31 ENGR CONST, 3 MC1051, 19 ST, 12 CRANE
+ LFSPG 30	(20,10)	H & S CO LS BN	20 P, 10 R	1 1/4T, 1 GEN

0027/82 AA.

Figure V-29. Support Requirements for Shore Party Teams

Landing Support Operations - SP Team (Continued)

The Reconnaissance Party, composed of Command, Liaison, Communications, and Beach Party Sections, is a temporary groupment of selected Shore Party Team elements and has the mission to conduct early beach reconnaissance, establish communications, and mark landing sites, zones of responsibility, and dump locations before the remainder of the Shore Party Team lands. The Shore Party Team and Beach Party Team commanders land with the Reconnaissance Party and liaison personnel land with the BLT Command Section. Personnel in the Recon Party revert to the control of the various team elements as they are landed.

The Shore Party Team Headquarters consists of the following sections:

- Command
- Communications
- Evacuation
- Security
- Military Police

Elements of this headquarters not included in the Reconnaissance Party will land on call. The team headquarters will be located in the vicinity of the center of the beach and will set up an information center to assist personnel to locate their parent unit. The MP Section will be tasked to collect POWs and civilian internees from engaged units as well as provide traffic control in the beach area. POW enclosures will be constructed as required. The Security Section will organize the overall defense of the BSA and assign defense sectors to various elements of the Shore Party Team. In the course of organizing the defense of the BSA, the Security Section will man the ground defense weapons organic to the Shore Party Platoon and assign defensive positions for individual and crew-served weapons. The Medical/Evacuation Section will be located towards the center of the beach and be responsible for receiving and evacuating casualties. Austere facilities will be provided to give protection from enemy action and climatic elements.

The Shore Platoon, consisting of a Command Section and a Beach Section, will be tasked to organize and operate facilities for cargo unloading at the water's edge and the subsequent movement of material to an appropriate storage or operational area. Personnel in the Shore Platoon will be drawn from the Landing Supt Co. Equipment required will consist of materials handling equipment (MHE), wheeled logistics vehicles and portable communications equipment. The Shore Platoon will also be tasked to construct beach exits, and lateral roads, assist with the unloading of material, and assist the Beach Party as required. This element will be loaded in LCU-type landing craft and will land on order from the Shore Party Team commander.

TABLE V-26. ALLOCATION OF LS BN ASSETS

	LS PLT				B&P OPS CO				H&S CO			
LOCATION	PII	PIII	PIV	PV	PII	PIII	PIV	PV	PII	PIII	PIV	PV
BEACH RED	1 PLT	1 PLT	1 PLT	PORT	NL	PORT	PORT	PORT			PORT	PORT
BEACH BLUE 1	1 PLT	1 PLT	1 PLT	PORT	NL	PORT	PORT	PORT			BLUE	BLUE
BEACH BLUE 2	1 PLT	1 PLT	1 PLT	1 PLT	NL	PORT	PORT	PORT			BLUE	BLUE
SPG	-	-	PORT	PORT	NL	PORT	PORT	PORT			PORT	PORT
HST A (AF1)*	1 PLT	1 PLT	PORT	PORT	NL	PORT	PORT	PORT	6 COMM 2 WIRE 13 MT/MHE	6 COMM 2 WIRE 13 MT/MHE	PORT	PORT
B (AF2)	1/2 PLT	PORT	PORT	PORT	NL	PORT	PORT	PORT	6 C 2 W	BLUE	BLUE	BLUE
C (PORT)	1/2 PLT	PORT	PORT	PORT	NL	PORT	PORT	PORT	6 C 2 W	PORT	PORT	PORT
D (IA1)*	1 PLT	1 PLT	PORT	PORT	NL	PORT	PORT	PORT	6 C 2 W 13 M/H	6 C 2 W 13 M/H	PORT	PORT

NL - NOT LANDED

Landing Support Operations - SP Team (Continued)

The Service Platoon is composed of a Command Section from the H&S Co LS Bn, a Dump Section from personnel assigned to the Supply Bn FSSG and H&S Co LS Bn, and a Maintenance/Salvage Section drawn from assets of the Maint Bn FSSG. This platoon is responsible for organizing and operating dumps and maintenance/salvage areas within the BSAs. Materials handling equipment and selected light maintenance gear will be attached to the Service Plt to facilitate supply movement within the dump areas and accomplish expedient maintenance tasks prior to the landing of the remainder of the Maint Bn FSSG. Close coordination must exist between the Shore Plt and the Service Plt to ensure rapid and timely delivery and storage of landing force supplies. Dump areas in the vicinity of RED Beach will be located in a suburban area while the majority of storage at BLUE Beach will be in an open area.

The Motor Transport/Heavy Equipment Plt is composed of personnel and equipment drawn from the H&S Co LS Bn organized into a Cmd Sec, Motor Transport Sec, and Equipment Sec. Additional personnel and equipment that may be required will be furnished by CS and CSS units. This platoon furnishes motor transport and heavy engineer equipment assets to the remainder of the Shore Party Team. Operators and equipment from this platoon will work in direct support of the various elements of the Shore Party Team until the team is established ashore, after which all motor transport and equipment operators will be consolidated and revert to control of the motor transport/heavy equipment platoon commander.

The Beach Party Team, composed of naval personnel and commanded by a Navy officer, is organized into the following sections:

- HQ Section with Beach Party Team Commander, communications, and administrative personnel.
- Visual Communciations Section, with enlisted personnel operating signal lights and flags to direct the landing of amphibious craft.
- Broadcast Section using public address systems to provide voice communications for direction of personnel and vehicles within the beach area.
- Radio Communication Section with mobile radio equipment to maintain communications with LFSP elements on other beaches and with naval forces afloat.
- Salvage Section composed of personnel and equipment from the Amphibious Construction Bn (PHIBCB) and Beach Master Unit (BMU of the Naval Beach Group. This section assists with the landing and retraction of landing craft, minor beach improvements, and

salvage of landing craft and amphibious vehicles. Equipment required consists of cranes with surf capability, tracked bulldozers, and various amphibious craft.

- Boat Repair Section with personnel from the Assault Craft Unit (ACU) and equipment including electrical and engine repair kits to perform emergency repairs of landing craft in the beach area. Landing craft that cannot be satisfactorily repaired are towed back to parent ships or designated repair ships.

- Traffic Control Section composed of personnel from the BMU with signal devices to designate unloading slots and direct the beaching and retraction of landing craft.

- Hydrographic Section normally composed of UDT personnel with the mission of marking and removing obstacles up to the high water mark, conducting hydrographic surveys, improving seaward approaches, and marking navigational hazards and corresponding channels. Once UDT tasks have been completed and these teams return to their parent units, administrative functions accomplished by this section will be performed collaterally by personnel in the HQ Sec of the Beach Party Team.

- Pontoon Causeway Section provides trained personnel to operate barges and construct/position causeway sections. One causeway will be required at RED Beach; causeways will be used at BLUE Beach dependent upon water depth and beach gradient characteristics. Once the causeway is secured to the beach it comes under the operational control of the beach party commander and part of the shore party.

- Bulk Fuel Element composed of PHIBCB personnel is responsible for installing ship-to-shore fuel transfer lines and related pumping, floating, and mooring devices. Prior to completion of the installation this element is under the control of the transport group commander. Once installation of components is complete this element comes under the direction of the Beach Party Team commander and a part of the Shore Party Team.

The Beach Party Team will land in four echelons:

1st Echelon - Command Section which lands with Recon Party.

2nd Echelon - Beach Party Team CP equipment including commo gear.

3rd Echelon - Salvage Section landed from LCU and LARC-V amphibious craft.

4th Echelon - Remainder of the Beach Party Team lands as an on-call serial with the remainder of Shore Party Team.

SHORE PARTY TEAM TASKS - MARINE ELEMENT

- Maintain radio communications with RLT 2 CP, RLT 2 TACLOG Group, and Shore Party Team at BLUE Beach. Visual signaling means will be utilized for communications between the Shore Party Team CP and control personnel on the offshore islands. Wire will be laid between the CP and dump sites to supplement radio communications. This wire will be laid by a liaison section landed with RLT 2 Hq.

- Select favorable location (VIC E12.7-N11.5) for pontoon causeway at RED Beach and report location ASAP to Pontoon Causeway Sec of Beach Party Team. Formulate requirements for surface matting based on beach condition and composition. (Beach sand will reportedly support up to 6 tons/SF when in a compacted and confined state.)

- Mark limits of beach unloading points and site unloading point markers for wheeled vehicles, tracked vehicles, and supplies. Coordinate movements of supply-carrying amphibious vehicles from offshore islands to appropriate dump locations in the BSA.

- Locate and establish multi-class beach dumps IAW Enclosures 1 and 2 to TAB A to Appendix 2 to Annex P (CSS). Maintain continuous and comprehensive records of all landed equipment and supplies.

- Provide local security and defense of the BSA and establish an integrated system for warnings in event of NBC attack, air attack, and ground attack by enemy troops or indigenous civilians. Lookouts may be posted in buildings with commanding view of the BSA. Remove or neutralize hazardous obstacles (including contaminated areas) in beach landing areas and BSAs.

- Control BSA and beach traffic by establishing traffic control points and one-way roads as necessary. All civilian traffic will be restricted in these areas. Perform expedient repairs to existing road net for sustained logistic movement. Pre-operation aerial reconnaissance will give a better indication of road capacities and restrictions than available data in the SYN City data base.

- Evacuate casualties to appropriate medical facilities offshore. Provide graves registration services as directed. Site and construct temporary POW enclosures and provide security.

- Establish and operate information centers to assist units with beach movement. Operate straggler collection points and assist individuals with location of parent unit.

- Improve helo landing sites within the BSA by matting, clearing, and marking. Load helicopters with Classes II, IV, VI, VII, VIII, IX as required for delivery farther inland to other LZs.

SHORE PARTY TEAM TASKS - NAVY ELEMENT

(BEACH PARTY TEAM)

- Install pontoon causeway at RED Beach NLT H+4. Be prepared to construct and operate pontoon ferry at BLUE Beach if hydrographic conditions between island and mainland beach are favorable. One tank dozer will remain vic RED Beach to assist with causeway positioning and beaching until engineer equipment is landed over the causeway.

- Install one bouyant fuel transfer line at each colored beach NLT H+6. Coordinate with bulk fuel element to tie transfer line into AAFS components. Install one bottom-laid fuel transfer line at each colored beach by end of D+1.

- Improve and mark beach approaches from seaward by providing and installing navigation aids; mark or remove underwater obstacles that present a hazard to amphibious vehicles. Major underwater obstacles are located at E14.1-N12.1, E12.5-N9.9, E11.1-N8.4, and E14-N5.5.

- Control waterborne traffic near beaches and direct the beaching and retraction of landing ships and craft. Broadcast systems, visual signals, and radio communications will be used simultaneously to ensure that all elements approach the beach in an orderly and efficient manner.

- Assist with local security of the BSA and ensure that assets are available for the evacuation of casualties and POWs. Evacuation points will be established near the center of each colored beach.

- Provide equipment and personnel to accomplish emergency repairs of landing craft including dewatering, salvage, and firefighting operations. Inoperative landing craft, amphibious vehicles, and ground support vehicles will be collected at a salvage point at each colored beach. Salvaged items suitable for reissue will be moved to the appropriate logistic area at each BSA.

- Advise Shore Party Team commanders of ships' dispositions, naval activities in the beach areas, and suitable locations for the landing of equipment, supplies, and personnel.

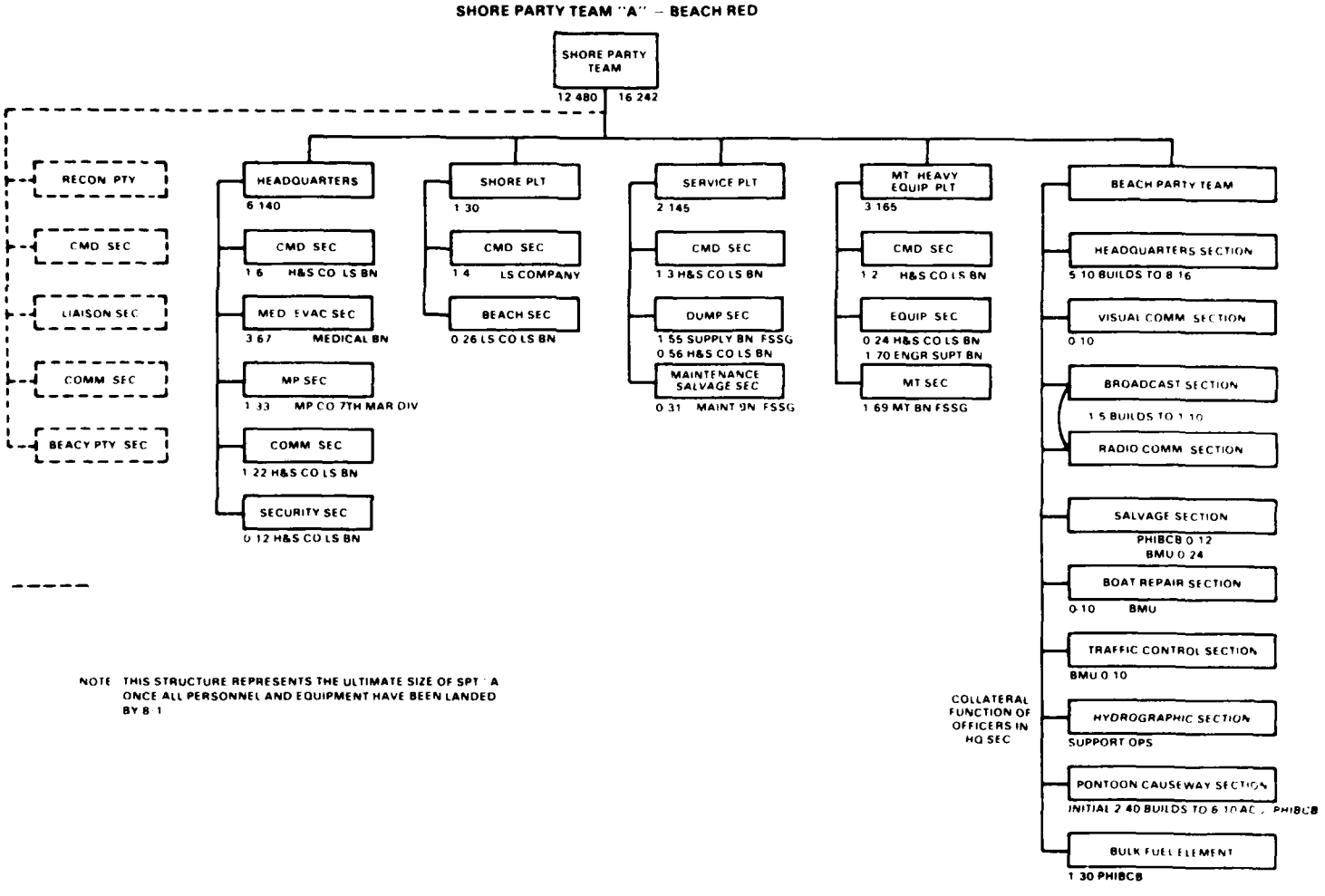


Figure V-30. Shore Party Team "A" - Beach RED

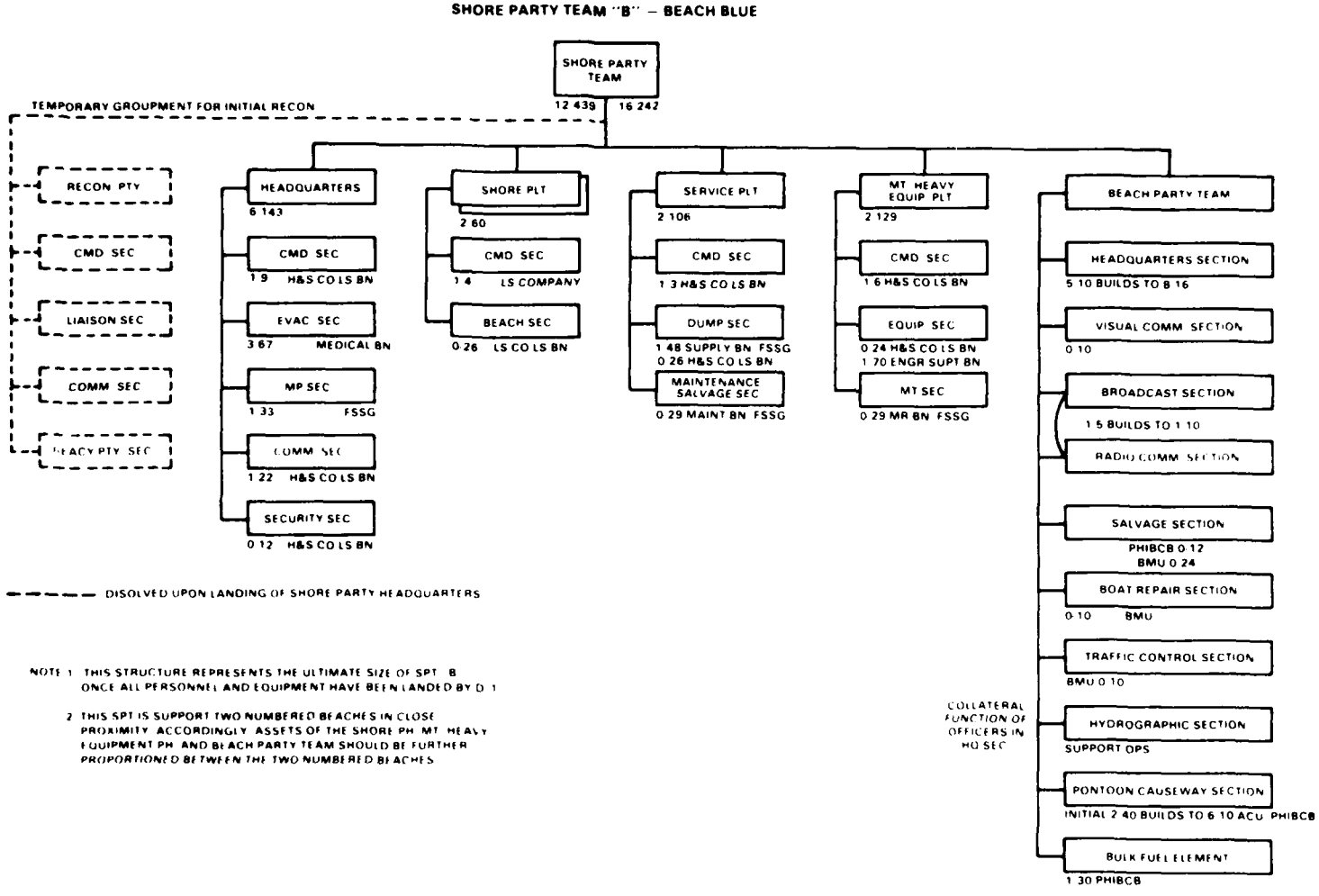


Figure V-31. Shore Party Team "B" - Beach BLUE

Combat Service Support Functions and Requirements

Landing Support Operations - HSTs

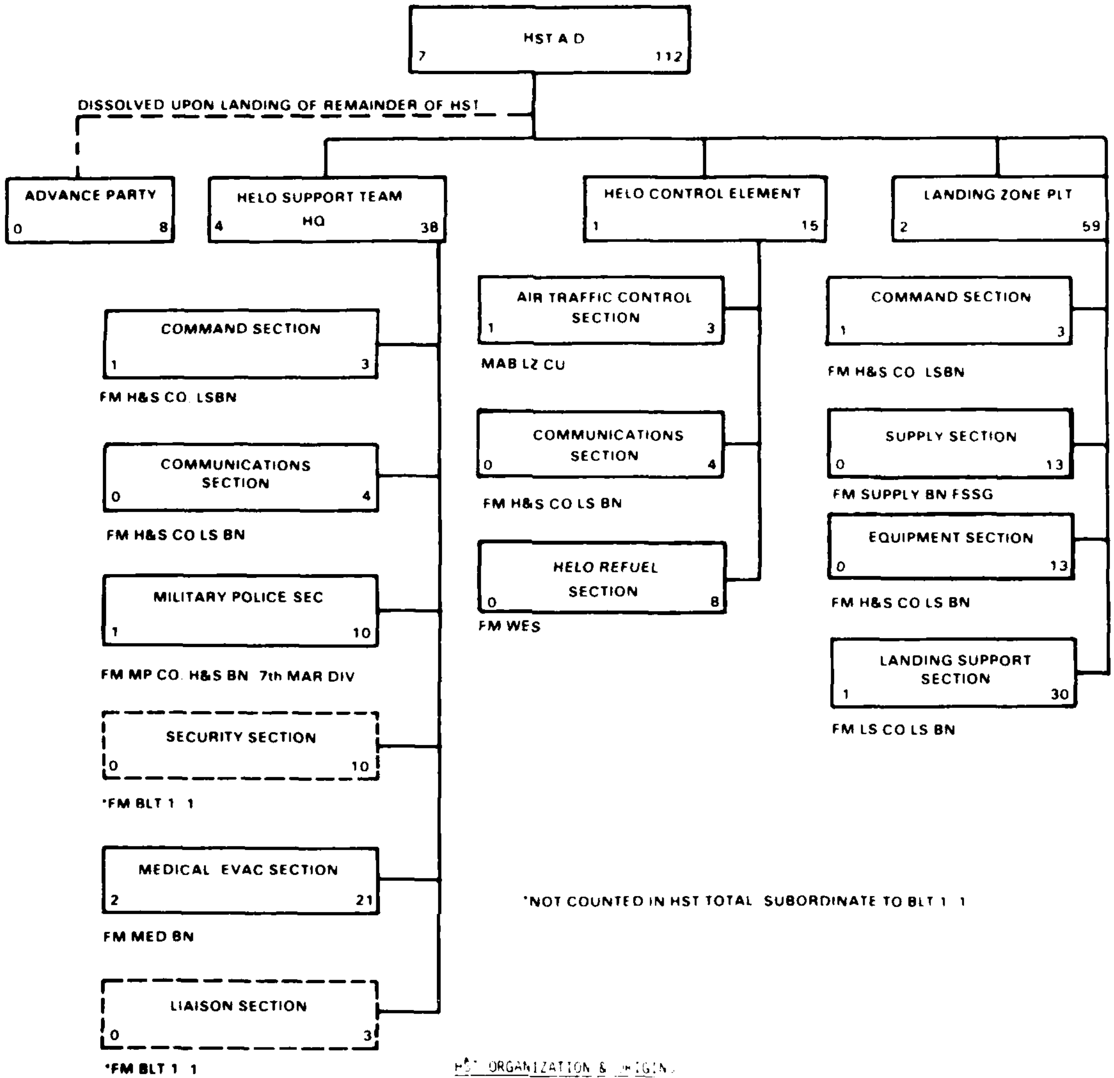
Four Helicopter Support Teams (HSTs) have been organized from personnel and equipment from the heliborne forces and augmentation from other specialty units as required. The mission of the HSTs is to facilitate the landing and subsequent movement of heliborne forces, equipment, and supplies; and to evacuate casualties and POWs to beach support area collection points. The HSTs have been task organized based on principles of economy of resources and flexibility of action and are temporary groupments of resources which are dissolved as the tactical situation permits. Four helicopter support team elements have been organized to provide support in each of the four primary landing zones -Sparrow, Falcon, Vulture, and Eagle. Figure V-32 shows the organization of the helicopter support team elements providing support to heliborne forces.

Each Helicopter Support Team element consists of a Helo Support Team, a Helo Control Team, and a Landing Zone Platoon. Since only a limited logistic buildup (3 DOS) is planned in HLZs Vulture and Hawk, the nucleus of the HST is drawn from the service-oriented elements of the heliborne unit. The Advance Party contains personnel from all elements of the HST and provides initial communications and terminal guidance until the remainder of the HST element lands at which time the Advance Party is dissolved and personnel revert to control of the parent element. Reconnaissance is conducted to locate positions for the various sites within the landing zone. Communications is maintained with the heliborne unit TACLOG, division TACLOG, the ground tactical unit, the Shore Party Team, adjacent HSTs, and the heliborne force.

The Helo Support Team Headquarters is composed of the following sections:

- Command Section - from H&S Co LS Bn
- Communications Section - from H&S Co LS Bn
- Military Police Section - from MP Co, H&S Bn, 7th MarDiv
- Security Section - from supported BLT
- Evacuation Section - from Medical Bn
- Liaison Section - from supported BLT

The majority of the personnel and equipment for this headquarters is drawn from the supported BLT and the Landing Support Battalion. Functional responsibilties of the various sections remain basically the same as for the headquarters element of the Shore Party Team.



HST ORGANIZATION & ORIGIN

ELEMENT	"NORMAL"	HST A	HST [illegible]	HST [illegible]	HST [illegible]	EQUIPMENT*	WEAPONS*
H&S LS CO	29: 6 COMM, 2 WIRE, 13 MT/MHE, 8 COMMAND	29	14	14	[illegible]	4 MHE, [illegible]	[illegible]
LS CO	31 - 1 LS PLT	31	16	16	31	[illegible]	[illegible]
WES	8 - HERS SECT	8			[illegible]	HERS, [illegible] GEN, [illegible] ENGR NONE	[illegible] NONE
MAB LZCO	4	4	4	4	4	[illegible]	[illegible]
MP CO H&S BN MARDIV	11	11	-	-	11	[illegible] NONE	[illegible] NONE
SUPPLY BN	13: 3 RAT, 3 AMMO, 3 SUPPLY, 4 H&S FIRE-FIGHTERS	13	-	-	[illegible]	[illegible] NONE	[illegible] NONE
MED BN	[illegible]: 1 EVAC PLT [illegible], 1 [illegible]	[illegible]	-	-	[illegible]	[illegible] NONE	[illegible] NONE
TOTAL		[illegible]	34	[illegible]	[illegible]	[illegible]	

*MAJOR EQUIPMENT ITEMS NOTED FOR BOTH TYPES OF HSTs.

Figure V-32. Helicopter Support Teams A, D

Landing Support Operations - HST (Continued)

The Helo Control Element is composed of an Air Traffic Control Section drawn from the Marine Air Base Squadron Landing Zone Control Unit (MAB LZCU) and a Communications Section from the H&S Co LS Bn. The Helo Maintenance and Refuel Section has been included only for HSTs at LZs Vulture and Hawk. The control element is tasked to establish and operate navigational guidance aids and control helicopter operations within the landing zone. All four landing zones are in large relatively clear areas and will necessitate minimal navigational aids due to local topographic conditions in the vicinity of the landing zones.

The Landing Zone Platoon nomally has a Command Section, Supply Section, Equipment Section and a Landing Support Section. Personnel in the Command Section are drawn from the H&S Co LS Bn. The Supply Section is manned by BLT troops and is tasked to provide the labor for unloading helicopters, organizing supply stocks, maintaining comprehensive lists of all supplies, and loading helicopters for the return trip to sea-based platforms. The Equipment Section will be at zero strength initially since equipment requirements will be minimal and limited to the internal movement of supplies within the HLZ. Light materials handling equipment will be landed at primary LZs as helicopter lift becomes available. The Landing Support Section, consisting of a Landing Support Platoon(s) from the LS Co, will be responsible for providing additional equipment and personnel to facilitate the landing, movement, and cataloging of suppies.

Elements of the HST will land in the following sequence:

(1) Advance Party

(2) Helo Control Element

(3) HST Hq

(4) LZ Plt (Personnel)

(5) LZ Plt (Equipment)

These HST elements will land with scheduled waves; terminal guidance for initial waves will be provided by Force Recon personnel inserted into the AO prior to L-hour. These personnel will remain at the HLZs until the Advance Party and Helo Control Element are firmly established and operational. Priorities for advance HST elements will be to accomplish site reconnaissance, place landing site markers, and establish communications.

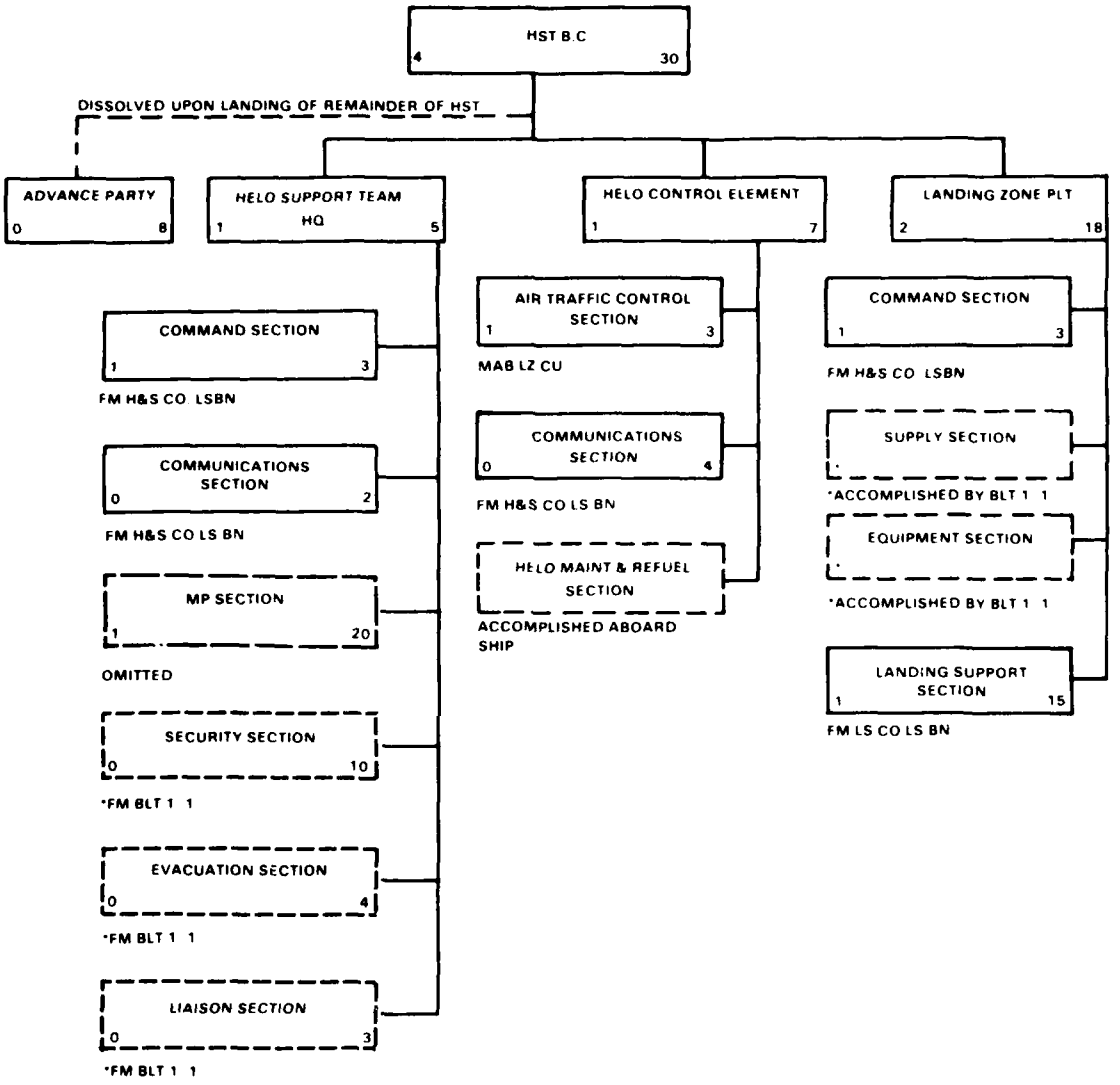


Figure V-33. Helicopter Support Teams B, C

NONTACTICAL COMMUNICATIONS

THE URBAN ENVIRONMENT OF SYN CITY WILL IMPOSE LIMITATIONS ON THE USE OF RADIO-TRANSMITTED NONTACTICAL COMMUNICATIONS NECESSITATING THE INCREASED USE OF ALTERNATE MEANS OF COMMUNICATIONS AND MODIFYING EXISTING METHODS OF EQUIPMENT EMPLOYMENT.

General

Nontactical communications include those communication means (messengers, couriers, and telecommunications) used both within and external to the landing force to support the personnel, logistics, and combat service support functions. (FMFM 4-1)

The MAF G-4 will coordinate internal, nontactical communication support with CG 7th MAW, MAF G-1, and the CEO to ensure that adequate communication networks will be established within the FBH. Messengers, couriers, and telecommunication support within BSAs and CSSAs and external to such areas will be provided by headquarters elements of subordinate units to the FSSG and LFSPTs with augmentation provided by the Communication Battalion VII MAF as required. Regularly scheduled courier flights will be provided for by elements of embarked aviation (7th MAW Forward) once suitable MAW assets have been phased into the FBH.

Environmental Considerations - SYN City

The urban environment of SYN City poses special problems for all communications operations. The majority of radio transmissions made by elements of landing force and supporting agencies will emanate from FM and VHF radios. Several environmental limitations will affect communications emanating from FM and VHF equipment. They are as follows:

- Spectrum utility
- Line of sight
- Penetration
- Multi-path effects
- Noise

Military net radio systems generally operate in the lower end of the VHF band, i.e., 30-76 MHz. In the SYN City scenario the television station and common carriers operate in the same frequency band which could increase the potential for communications interference especially in proximity to CSS areas. FM and VHF radio sets require line-of-sight between antennas. Line of sight between antennas in the BSAs, CSSAs, and in establishing LOCs

between CSSAs and assault unit headquarters may be degraded since buildings and private dwellings will obstruct signal paths between antennas. "Experience in the development of communications systems for the land mobile service in urban areas (including police, taxis, and paging systems) has demonstrated that frequencies in the low VHF band, used by most current U.S. military tactical radios, exhibit poor performance in the ability to penetrate multi-story buildings."[1] Consideration must be given to antenna locations, within CSSAs and BSAs, to facilitate radio-transmitted communications because of building penetration factors. Communications signals in urban areas are subject to reflections from flat surfaces caused by nearby and distant structures and alternate paths which would delay and distort signals or produce multipath effects on communications within CSSAs and BSAs. Man-made noise caused by impulses from automobile ignition, high voltage power lines, and welding machines and Radio Frequency Interference (RFI) caused by other signals in the same spectrum will further degrade communications within and between CSSAs and assault units.

Hostile Actions

In analyzing the enemy tactical situation in the SYN City scenario, it has been postulated that forces will initially engage the landing force in a defensive posture until their positions are threatened. Aggressor forces will then revert to conducting a series of delaying actions as they withdraw into the more populated urban areas. Indigenous telecommunications and power sources that could be utilized by the landing force are likely targets for sabotage in an effort to disrupt command, control, and communications and impede the advance of assault units and/or the establishment of logistic support facilities. It can be anticipated that Aggressor Radio Electronic Combat (REC) elements will conduct ECM operations within the FBH. Aggressor ECM operations will likely be directed at communication nets meeting one or more of the following criteria:

- Where signals are weak.
- Where there is natural background interference.
- Where there is some atmospheric disturbance.
- Where large communication nets are operating and an atmosphere of confusion exists.
- Where communication nets exhibit high priority electronic signatures.

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1. Communications Operations in Built-up Areas, Final Report; GTE Sylvania Electronics Systems Group Western Division, 30 June 1973.

Nontactical Communications (Continued)

Considering the large volume of communications traffic that occurs in rear or CSS areas, it can be anticipated that jamming and deception operations will be conducted against nontactical communication networks. Aggressor forces have deployed long-range artillery and nuclear rocket units within range of FBH which can deliver NBC warheads within rear or CSS areas.

Concept of Nontactical Communications Support-BSAs

During initial assault operations, elements of Landing Support Battalion FSSG, will develop nontactical communications systems within BSAs established in proximity to or in the midst of formerly densely populated areas. Shore Party Teams (SPTs) and the Shore Party Group will use a variety of telecommunications and physical communications within the BSA to control beach traffic, facilitate the buildup of supplies and equipment, and establish and maintain communications with assault units. Each SPT will establish communications with RLT headquarters elements, the TACLOG serving each RLT, the Shore Party Group, and internal communications. Normally the SPT will be transported ashore in three increments with each succeeding increment building on the communications systems of its predecessor.

UNIT	LANDS	ESTABLISHES
Liaison Team	After assault element has landed and established temporary CP.	Wire circuits from assault element headquarters to beach landing zones.
Advance Party	After assault element command group has been transported ashore.	SPT communications network to include telephone terminals for wire circuits layed by Liaison Team and Shore Party Control Net.
Balance of Team	As soon as situation permits.	Sufficient circuits to complete SPT communications system.

The LFSPG headquarters element will land at Beach BLUE after the balance of each team has landed and established a communications network which will serve the entire group. The following communications systems will be established to satisfy command and control requirements within each BSA and external to each BSA:

SYSTEM	EXTERNAL	INTERNAL
Radio	Landing Force CSS Net (HF) FSSG Command Net (HF)	Landing Force Support Party Net (VHF) Beach Shore Party Control Nets (VHF) Shore Party Team Local Nets (VHF)
Multichannel Radio	Circuits established between each colored BSA and CSSAs once established ashore.	
Wire	To the extent practicable trunklines are layed to assault unit headquarters from BSAs and the CSSAs during the buildup ashore.	Trunklines laid between numbered beaches.

Helicopter Landing Zones

Helicopter Support Teams (HSTs) will be employed in Helicopter Landing Zones (HLZs) to assist in landing support operations during the vertical assault and subsequent tactical/nontactical lifts in the SYN City scenario. HSTs will require the establishment of communication networks between the HLZ and TACLOG, helicopters transporting assault units, and internal communications with subordinate elements. The following graphic depicts both internal and external communication networks established by each HST with augmentation from the infantry unit being supported as required.

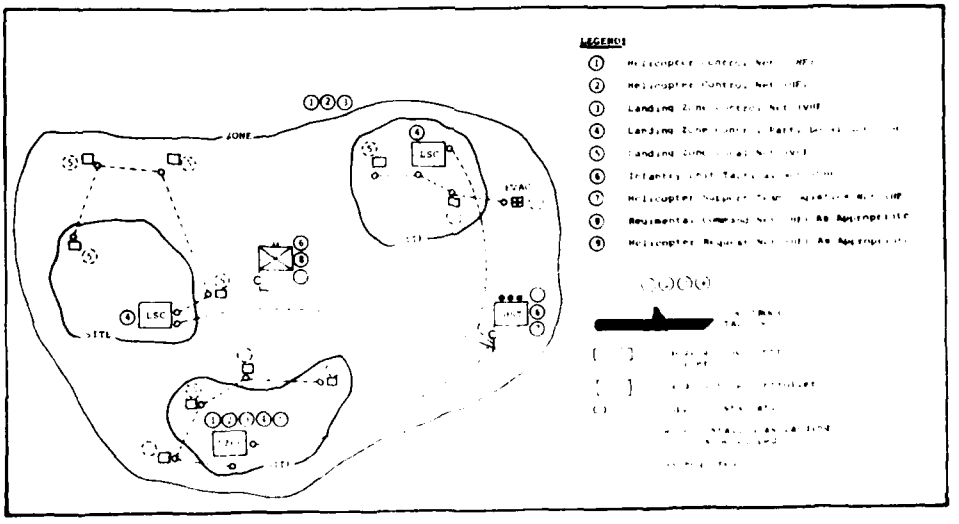


Figure V-34. Communications Network at HLZs

Nontactical Communications (Continued)

CSSAs

Once sufficient areas within the FBH have been seized and on order, the FSSG will deploy ashore in the SYN City scenario. The FSSG will initially depend on the LFSPG for communications within the BSAs until each CSSA has been established and while command, control, and communications elements are being phased ashore. The FSSG and detached elements of the FSSG will have the following communication system requirements:

TABLE V-27. COMMUNICATION SYSTEM REQUIREMENTS - FSSG

UNIT	SYSTEM	EXTERNAL	INTERNAL
H&S Bn., FSSG	Radio	Landing Force Command Nets (1,2) (HF) Landing Force Alert/Broadcast Net (HF) Landing Force Intelligence Net (VHF) Landing Force HST Request Net (HF) Landing Force CSS Net (HF) Landing Force Medical Regulating Net (HF) Landing Force Comm. Coord. Net (VHF/HF)	FSSG Command Nets (1,2)(HF) FSSG Comm Coord. Net (VHF/HF) CSSA Local Nets (VHF) CSSA Security Nets (VHF) CSSA Request Nets (VHF/HF)
	Multichannel Radio	With augmentation from the Comm. Bn., VII MAF, multichannel radio terminals are established for entry into VII MAF wire-multichannel communications system with internal links to unit TAORs and elements of 7th MAW Forward deployed ashore.	Multichannel radio links will be established between the H&S Bn., FSSG, and CSSA 1 & subordinate headquarters elements at CSSA 2, and between each CSSA and assault units that are directly supported by CSSA>.
	Wire		Direct access telephone lines and switching facilities will be established within each CSSA for communications between the FSSG and subordinate headquarters elements
	Teletypewriter	An independent DCS entry terminal will eventually be established at the FSSG headquarters within CSSA 1 and later at the FCSSA. Initial services will be provided for a theater airbases.	Message centers with radio teletypewriter nets will be established at the FSSG headquarters and at subordinate headquarters as required

TABLE V-27. COMMUNICATION SYSTEM REQUIREMENTS - FSSG (CONTINUED)

UNIT	SYSTEM	EXTERNAL	INTERNAL
Engr Spt Bn.	Radio	FSSG Command Net (HF) FSSG Alert/Broadcast Net (HF) FSSG Damage Control Net (HF)	Engr Spt Bn Command Net (HF) Engr Company Command Nets (VHF) Bridge Company Command Net (VHF)
	Wire		Trunklines laid to headquarters element by FSSG at CSSA 1 and by detached elements of H&S Bn FSSG to detached elements of Engr Spt Bn at CSSA 2
M.T. Bn.	Radio	FSSG Command Net (HF) Landing Force Convoy Control Net (VHF) FSSG Alert/Broadcast Net (HF) FSSG Damage Control Net (HF)	M.T Command Net (HF) Convoy Control Nets (VHF)
	Wire		Trunklines laid to headquarters elements by FSSG at CSSA 1 and direct access lines laid from detached H&S Bn. headquarters elements to detached M T elements at CSSA 2.
Medical/Dental Bns.	Radio	Landing Force Medical Regulating Net (HF) FSSG Command Net (HF) FSSG Alert/Broadcast Net (HF) FSSG Damage Control Net (HF)	Medical Bn. Command Net (HF) MEDEVAC Ground Net (VHF/HF) MEDEVAC Air Net (VHF/HF)
	Wire		Trunklines laid to Medical Bn headquarters by elements of FSSG at CSSA 1 and from detached elements of H&S Bn. FSSG, to detached elements of Medical Bn at CSSA 2
Supply Bn.	Radio	FSSG Command Nets (1,2) (HF) FSSG Comm. Coord. Net (HF) CSSA Local Nets (VHF) CSSA Security Nets (VHF) CSSA Convoy Control Nets (VHF) Landing Force Alert/Broadcast Net (HF) Landing Support Bn. Control Net (VHF) Landing Support Bn. Local Net (VHF)	
	Wire		Trunklines laid to Supply Bn and elements thereof by FSSG in each CSSA
Maintenance Bn.	Radio	FSSG Command Nets (1,2) (HF) FSSG Comm. Coord. Net (HF) CSSA Local Nets (VHF) CSSA Convoy Control Nets (VHF) Landing Support Bn. Control Net (VHF) Landing Support Bn. Local Nets (VHF) Landing Support Bn. Command Net (HF) Landing Force Alert/Broadcast Net (HF)	
	Wire		Trunklines laid to Maintenance Bn and elements thereof by FSSG in each CSSA
Landing Support Bn	Radio	FSSG Command Nets (1,2) (HF) FMF Mobile Command (HF) FSSG Comm. Coord. Net (HF) CSSA Local Nets (VHF) CSSA Security Nets (VHF) CSSA Convoy Control Nets (VHF) LF, FSSG Damage Control Nets (HF) Landing Force HST Log Nets (VHF) Landing Force HLZ Local Nets (VHF) LF, FSGG Alert/Broadcast Nets (HF)	Landing Support Bn Control Nets (VHF) Landing Support Bn Local Nets (VHF) Landing Support Bn Command Net (HF)
	Wire		Trunklines laid to Landing Support, Bn and elements thereof by FSSG in each CSSA as required

Communications in NBC Environments

For the SYN City scenario, Aggressor forces are capable of delivering NBC warheads within rear areas including logistic support areas. The presence of chemical contaminants in these areas significantly increases communication difficulties for the following reasons:

- Organic and attached communication elements may be unable to move out of contaminated areas due to operational constraints.
- Chemical protective clothing decreases equipment operating and work efficiency.
- Equipment maintenance difficulties increase because decontamination requirements increase.

For the SYN City scenarios the following measures should be taken to prevent or reduce communicating difficulties and the effects of contaminants on communications-electronic equipment:

- Wiremen and radio operators will be required to work slower, take frequent breaks, and be more deliberate in equipment operation.
- Smaller communication-electronics equipment can be placed in waterproof bags.
- Indigenous vaults and sealed basement areas can be decontaminated and used as sanitized communications equipment maintenance areas.
- Larger communications equipment can be decontaminated by washing exterior surfaces with hot, soapy water and forcing hot air on internal components. (FMFM 10-1, pg. 4-24)

Aside from the communication-electronics facility hardening measures that must be taken to reduce the effects of nuclear detonations within or in proximity to CSSAs and BSAs, the effects of electromagnetic pulse (EMP) and nuclear blackout must be taken into account in communications planning. Communications equipment damage from EMP is a result of the introduction of excessive electrical energy into radio equipment which overloads internal circuitry. Carriers of this energy that cause the actual damage to radio equipment are antennas, wire systems and other components that are good electrical conductors. The following measures will be employed in the SYN City scenario to reduce the effects of EMP:

- For a nuclear threat environment, less efficient antennas will be utilized more heavily than in a nonnuclear environment.

- Given sufficient warning of an impending nuclear attack and if feasible, handsets, remotes, power cables, and antennas will be disconnected and equipment will be placed in transit cases until damaging EMP has ceased.

- Multichannel radio systems will be adjusted to operate on the highest frequencies possible and antennas will be horizontally polarized.

Within CSSAs and BSAs, the following practical measures will be taken to reduce the effects of EMP:

- The lengths of cable and wire will be kept to a minimum because the amount of energy collected by cable and wire is in proportion to the length of these conductors.

- Every effort will be made to bury cable and wire used by communications equipment to transmit or receive traffic and for power generation purposes.

- Correct lengths of wire and cable must be used, as excess wire and coiled cable that remains connected to equipment can increase the effects of EMP; i.e., coiled cable conducts more energy than straight.

- Common grounds will be used for all communications equipment at an operating site.

- Antenna guy lines will be insulated so as not to act as conductors of EMP.

- Maximum use will be made of organic and attached power sources as communications cannot depend on indigenous power sources which will be extremely susceptible to EMP.

Nuclear bursts will cause signal degradation or absorb signals creating communication blackout conditions. The following extract from FMFM 10-1 illustrates the estimated effects of nuclear blackout conditions on communications.

TABLE V-28. IMPACT OF NUCLEAR EFFECTS UPON COMMUNICATIONS SYSTEMS

BURST REGION	AFFECTED MODE OF PROPAGATION	FREQUENCY BANDS	BLACKOUT SOURCE	ESTIMATED DURATION OF BLACKOUT
Near Surface	Line of Sight	VHF, UHF, SHF	Dust/Fireball	Few seconds to a few minutes
Near Surface	Satellite Relay	UHF, SHF	Dust/Fireball	Few seconds to tens of seconds
Low Altitude	Troposcatter	UHF, SHF	Dust/Fireball	Few seconds to tens of seconds
Low Altitude	HF Groundwave, Skywave	HF, VHF	Fireball	Negligible to a few seconds
High Altitude	Troposcatter	UHF	Ionized Region	Few seconds to minutes
High Altitude	HF Skywave	HF	Ionized Region	Minutes to many hours
High Altitude	Satellite Relay	UHF, SHF	Ionized Region	Few minutes to hours

Nontactical Communications (Continued)

The following measures will be taken to reduce blackout time in CSS areas as well as through the FBH:

- Wire will be used extensively within TAORs, BSAs, and CSSAs because blackout conditions do not directly affect wire communication systems.
- Alternate routing and physical communications (i.e., messengers, couriers) will be used to reroute or bypass blackout areas.
- Provisions will be made for the use of alternate frequencies in the event of nuclear bursts to adapt to blackout conditions.

Communications Within Built-up Regions of CSSAs, BSAs

For the SYN City scenario, the presence of building structures in CSSAs and BSAs will require that special provisions be made to adapt communication networks to reduce the effects of line-of-sight loss, multipath effects, noise and RFI, and Aggressor force/civilian sabotage efforts. The following measures will be taken in each BSA, CSSA, and in establishing communication links external to these areas:

- Antennas will be concealed on such indigenous structures as water towers, radio and television antennas, and church steeples.
- Antennas will be located on roofs or structure slopes away from known enemy concentrations. Directional antennas will be fixed below rooftop level.
- Wire will be used extensively in controllable areas. Trunklines will be buried and maximum use will be made of culverts and ditches. External wire service can be facilitated by using subsurface conduits in the new city while lines can be collocated with telephone and power lines where still erect.
- Indigenous minor communications systems can be requisitioned to augment tactical and nontactical communication systems.

Actions Taken During Periods of Severe ECM or NBC Effects

Elements of 7th MAW Forward will provide for air courier service, and aircraft can act as temporary retransmission stations until ground LOCs can be established, maintained, or regained. Messengers and couriers will be used extensively within BSAs and CSSAs; however, due to the anticipated dispersion of enemy pockets of resistance and the unknown reaction of the indigenous population to friendly units, external communications via messenger or courier will be limited. Visual and sound communications within BSAs will be used extensively in beach traffic control and HLZ operations. Visual signals require a great deal of coordination but can be used extensively in CSSAs during blackout conditions and are an alternate means of communicating in an ECM environment. Broadcasted sound signals will be relatively ineffective within each BSA and CSSA after initial scheduled waves have landed and during general unloading because of ambient noises from the city and suburban areas and the added noise of combat within these areas.

Recommendations - Urban Warfare

- Antennas should be located to maximize line-of-sight and mimimize reflections causing distortion and multi-path interference.
- Established procedures should be followed with respect to communications during periods of REC or NBC warfare.
- Communications networks at logistic support areas (BSAs, CSSAs) should be established in accordance with normal sequences.
- Indigenous communication facilities should be used to augment organic equipment, broadcast information to the populace, and provide control for civilian emergency and firefighting units.
- Extant structures should be used to conceal communications equipment and antennas, provide supplemental locations for maintenance activities, and provide protection against hostile fires and NBC weapons.
- Wire should be used to the maximum extent consistent with the local threat posture and means for deploying the wire.

Combat Service Support Functions and Requirements

MAINTENANCE

IN A MOBA AMPHIBIOUS OPERATION, MAINTENANCE WILL BE LIMITED INITIALLY TO ORGANIZATIONAL AND LIMITED INTERMEDIATE MAINTENANCE.

Maintenance is the action taken to keep material in a serviceable condition or to restore it to serviceability. (FMFM 4-4)

Maintenance management and operations include a number of related steps, of which only the more basic functions can be accomplished in an amphibious MOBA environment. The more detailed functions generally must be relegated to maintenance units in general support of the Landing Force. Maintenance management and operations include the following:

- Inspection
- Testing, including calibration
- Servicing
- Classification as to serviceability
- Repair
- Overhaul
- Rebuilding
- Reclamation

Maintenance operations in the Fleet Marine Forces are divided into three categories: organizational, intermediate and depot maintenance. This applies not only to ground equipment but also to Navy-furnished aviation equipment. There are slight differences however in responsibilities between ground and air material maintenance.

Ground Maintenance

Maintenance categories for ground equipment are as follows:

First Echelon - Organizational (Operator/Crew)

Essential in MOBA

Inspecting
Cleaning
Servicing
Lubricating
Preserving

Second Echelon - Organizational (Specially Trained Personnel in User Organization)

Essential in MOBA

Inspecting
Minor Parts Replacement

Third Echelon	-	Intermediate Level
Essential but constrained in MOBA		Field Maintenance performed by specially trained units of FSSG in Direct Support of using organizations
Fourth Echelon	-	Intermediate Level
Not feasible in assault phase - requires evacuation		Major overhaul or rebuild of major end items, components or subassemblies normally accomplished in fixed facilities in depots or base maintenance facilities in CONUS or overseas.

Aviation Equipment

Aviation equipment maintenance categories are:

- Organizational - Performed on a day-to-day basis by the operating unit. Essential in MOBA.
- Intermediate - A responsibility of a maintenance unit in direct support of an operational unit. Essential in MOBA. This includes:
  - Calibration, repair, or replacement of damaged unserviceable parts, components or assemblies.
  - Emergency fabrication of unavailable parts within capabilities.
  - Technical assistance to using units.
- Depot - Includes overhaul, major repair, and modification of aircraft or components and related equipment in fixed industrial facilities, either government or contractor operated. Depot maintenance is a U.S. Navy responsibility. This level of aviation maintenance cannot be performed by the Marine Aircraft Wing. Aircraft would require evacuation to appropriate facilities outside of the AOA.

Maintenance (Continued)

Maintenance Policies and Procedures

Maintenance activities will be altered in urban warfare, particularly in an amphibious environment. Major items of VII MAF equipment that cannot be repaired quickly by technical contact teams will be evacuated, cannibalized, or abandoned after being rendered useless by demolitions or other methods of denial. Replacement end items and components must be provided for in greater numbers than would be required for conventional land warfare or amphibious operations for those items that will be used extensively in urban fighting. Combat active replacement factors (CARF) listed in the USMC Table of Authorized Material (TAM) are a guide, but the determination of specific requirements for a given operation is a command responsibility. Chapter VII of this technical report, Logistic Planning Factors and Usage Rates, provides an analysis of the impact of urban warfare on usage rates and replacement factors for selected items.

Many weapons and items of equipment are not fully suitable for urban fighting, and their decreased employment will reduce the total maintenance load. Further, since an early evacuation policy is recommended, much of the more difficult and technical maintenance will likely be performed at support facilities outside the FBH. After departure of the ATF, however, fully functioning maintenance capabilities will be required of the FSSG Maintenance Battalion.

Aviation maintenance is expected to be limited in the FBH initially. Helicopters and the Harrier V/STOL aircraft will be able to perform the routine maintenance tasks aboard LHAs and LPHs for at least four days. Fixed-wing aircraft will operate from theater airfields, where they will have good-to-excellent facilities available. Adequate expeditionary facilities will be provided at Airfields 1 and 2 prior to the deployment of 7th MAW (Rear) aircraft into the FBH.

Maintenance in the BSAs

Maintenance areas have been designated in the suburban fringe just off the beaches in both RED and BLUE Beach BSAs. The SYN City data base does not provide specific information on the nature and types of the structures in these areas, but, in the absence of commercial-type facilities, gasoline stations, garages, storage buildings, warehouses, or hardstand areas can be used by maintenance personnel. The BSAs are not expected to function beyond D+4, at which time the functions of BSA RED will be satisfied by facilities at CSSA 1, while the BSA proximate to Beach BLUE will remain viable throughout the course of Operation BREAKER. Specific allocation of space within the CSSAs will be based upon detailed reconnaissance, during which the unique requirements of each of the combat service support units will be considered. In the interim, the maintenance areas are adjacent to salvage areas and are served by adequate road nets to facilitate repair, cannibalization, or evacuation.

Maintenance in the CSSAs

Tentative locations for maintenance areas within the CSSAs are shown in Appendix 2 (CSS Overlay) to Annex P (Combat Service Support) to Operation Plan 1-81 (Operation BREAKER), in Volume II of this report. The Maintenance Battalion Headquarters will be assigned space in one of the warehouses in the dock area, assuming that undamaged facilities are available or can be rehabilitated in a reasonable period of time. Maintenance areas are again served by good roadnets in both CSSA 1 and 2 and local water will be readily available from indigenous sources or field water points.

Maintenance in an Amphibious MOBA Environemnt

The SYN City scenario, viewed in the context of Operation BREAKER, could result in seizure of the port area in a relatively undamaged condition. That likelihood is remote, however, when Threat forces doctrine is considered. A serious effort to capture the port would, in all probability, cause the defenders to implement a policy of deliberate destruction of all facilities that might possibly be of use to the attacking force. The general situation developed for this examination suggests that the Aggressor forces have been present in the city for a considerable period of time, and that hostilities have existed with the US for several weeks. That period of time would enable the defenders to plan and prepare for an elaborate denial operation. Such an operation would be aided by the indigenous population which is friendly to the Aggressor military forces. In such an event, there would be little usable in the way of facilities. Local power sources would not be available. Areas that would otherwise serve adequately for storage, billeting, office and working spaces, would be minimal.

Under the circumstances depicted above, the CSS function of maintenance would be impaired to a marked degree. Evacuation to theater airbase areas (some 170nm away) would depend on the schedule and availability of surface ships to make the transit, further adding to the delay in accomplishing critical maintenance. A large, nonself-propelled barge, fitted out as a maintenance facility, could be towed to the AOA where it could be served by causeways or landing craft of the LCU/LCM type, or the barge could be tied up at one of the docks or in North or South River. A barge dedicated to maintenance should have its own power source, air conditioned shelters for delicate work, billeting and sanitary spaces, a crane, and machine shop equipment with sufficient variety to be able to perform maintenance on tanks, LVTs, helicopters, wheeled vehicles, etc. In the mid-range time frame, a barge maintenance facility should have the full capability for servicing the new family of light armored vehicles.

GRAVES REGISTRATION

THE URBAN ENVIRONMENT OF SYN CITY AND THE ANTICIPATED TACTICAL SITUATION DURING THE INITIAL STAGES OF ASSAULT OPERATIONS WILL LIMIT GRAVES REGISTRATION FUNCTIONS TO THE COLLECTION, IDENTIFICATION AND EVACUATION OF THE DECEASED AND PERSONAL EFFECTS.

Graves registration consists of providing for the search, recovery, identification, and burial of deceased allied and enemy personnel and certain civilian personnel; the proper recording of such burials; the care and maintenance of the place of such burials until other arrangements have been made for disposition of the remains; and protection of the dead from looting and souvenir hunting.

The SYN City environment will place unique restrictions on graves registration operations within the confines of the FBH. The functions of collection, identification, and evacuation of the deceased will not be restricted and may be enhanced due to the location of TAORs in proximity to BSAs, HLZs, and CSSAs. The utilization of isolated and/or temporary cemeteries will be severely restricted for a number of reasons. In selecting either isolated or temporary interment sites, the following factors, noted in ECP 1-1, should be considered:

- Screened from hostile ground observation and beyond hostile artillery fire.
- Located in open fields where ground is well-drained and easy to excavate.
- Out of sight of roads traveled by troops or civilians.
- Served by a good road net.
- Minimum interference with use of adjoining land.

The majority of these considerations cannot be met due to existing physical and environmental limitations in SYN City. Very few if any areas within the metropolitan boundary can be concealed from direct observation of the civilian populace, which is to be considered hostile, and friendly units. The majority of open areas in proximity to rear echelon units are surrounded or flanked by urban centers and/or the suburban sprawl. Aggressor long-range artillery and surface-to-surface missile systems are within effective range of the entire metropolitan boundary. Competition for open space between supply and equipment storage, the deployment of assault units, and civilian use limit the size of areas that can be allocated for interment purposes. Interment sites would require extensive security preparation because of the location of open areas in proximity to population centers and the hostile character of indigenous populace.

Concept of Graves Registration Operations

The Graves Registration Platoon, Medical Battalion, 7th FSSG will conduct graves registration operations in support of Landing Force operations within the FBH. It consists of a headquarters section (one officer, two Marines, and three Navy enlisted) and four graves registration sections (ten Marine enlisted each). The Graves Registration Platoon will perform the following functions within the FBH:

- Receive remains at collecting points.
- Verify and record the identity of the remains and other information as required with the assistance of the parent unit.
- Supervise any temporary burials and evacuation of the remains and/or personal effects.

Initially, registration sections will be deployed to collection points in proximity to Airfield 1 and each BSA to facilitate the early collection and disposition of the deceased. Once the central collection point has been established within CSSA 1, the graves registration section at BSA RED will be relocated to the central collection point, while sections at Airfield 1 and CSSA 2 (formerly BSA BLUE) continue to support the Landing Force from their original collection points. The remains and personal effects of the deceased will be identified, recorded, and safeguarded at above mentioned locations prior to further evacuation. Isolated and/or temporary burials will be avoided unless the tactical situation prohibits immediate evacuation (within one day) of the deceased to designated collection points. The remains will later be disinterred and moved to collection points for further evacuations. Security assistance will be provided by elements of BLT 1/1 at Airfield 1, elements of the LFSPTs at the BSAs, and later by elements of the 7th FSSG at the central collection point in the vicinity of CSSA 1. The remains and personal effects of the deceased will be extracted by helicopter from HLZs in proximity to Airfield 1, from BSAs either by surface or helicopter means, and by surface or helicopter means from the central collection point within CSSA 1 and evacuated to designated ATF shipping. The remains and/or personal effects of the deceased will subsequently be evacuated, by the most expeditious means available, to theater airbase facilities for final preparation and transportation to CONUS.

Contingent upon authorization from NCAs, in such instances as death resulting from NBC weapons contamination, indigenous crematoriums or other expeditious cremation measures should be provided to eliminate the contamination hazard and prepare the remains (ashes) for evacuation. Priority of indigenous funeral and interment facilities will be for the use of the local populace. If, however, civilian requirements would not be impaired by the use of facilities by forces in the vicinity, then isolated and/or temporary interment areas will be utilized for remains until subsequent evacuation to designated collection points can be accomplished.

Graves Registration (Continued)

During the mid-range period, it may be feasible and practicable to modify ISO containers with refrigeration equipment and internal framework to provide a means for temporary storage and evacuation of the dead. Use of this method would reduce, if not eliminate, the need for temporary interment and provide sanitary reusable containers to move the deceased. These refrigerated containers would reduce the visibility of the graves registration operation and the requirement for engineer equipment support. It is estimated that each 8'x8'x20' container would provide space for up to 64 deceased if the refrigeration gear were self-contained.

Evacuation of the dead (vice temporary interment) will be the priority during the course of Operation BREAKER. Available options for this evacuation included:

- Evacuation by air transport once airfields are operational.
- Evacuation by surface shipping concurrent with phased redeployment of AE vessels.

Either of these options is viable after D+6, when Airfield 1 should be ready to accept C-130 aircraft, although evacuation by surface shipping is the preferred alternative leaving air assets to evacuate wounded to theater support facilities.

Table V-29, shown opposite, provides a breakdown of the graves registration workload by period of combat action. Derivation of casualty figures was based on an analysis of combat action for each of the major units of the MAF coupled with applicable casualty rates found in FM 101-10-1. The computation shows that almost 2.6% of the total KIA will occur prior to the amphibious landing at SYN City. These deaths may have occurred during the steaming time from CONUS to the Demonstration Objective Area, during Demonstration Operations, or during Advance Force Operations. The casualty estimates do not include Naval personnel assigned to the ATF. The heaviest graves registration workload will occur shortly after D-day when 144 KIA must be processed. Each of four graves registration teams must be able to process up to 36 KIA per day during this surge period.

KIA will be expeditiously processed and evacuated to theater mortuaries or CONUS by redeploying AE shipping. Once this shipping has left by D+12, KIA occurring in Period VI will be evacuated by fixed-wing transport. The availability of several refrigerated containers would provide a buffer for storage should any of the evacuation mediums be delayed or disabled.

TABLE V-29. GRAVES REGISTRATION REQUIREMENTS DURING OPERATION BREAKER

LANDING FORCE KIA

BATTLE PERIOD	BATTLE DEATHS		NON-BATTLE DEATHS		TOTAL	REFRIGERATED CONTAINERS
	DIVISIONAL	NON-DIVISIONAL	DIVISIONAL	NON-DIVISIONAL		
Period I	0	0	24	24	48	1
Period II	126	17	1	0	144	3
Period III	173	58	1	0	231	3
Period IV	125	41	0	0	166	3
Period V	100	41	0	0	141	3
Period VI	412	696	37	2	1147	18
				TOTAL	1880	

Note 1 - Deceased during Period I will be consolidated in the ATF, processed at ships' medical facilities, and evacuated by the most expeditious means.

2 - Percentage KIA
- Battle (Divisional) - 18.0% } From ECP 1-1
- Battle (Non-Divisional) - 16.0% } From ECP 1-1
- Non-Battle (Divisional) - 4.5% } Estimated from Historical Data
- Non-Battle (Non-Divisional) - 4.0% } Estimated from Historical Data

COMBAT SERVICE SUPPORT TRAINING

MOBA-ORIENTED TRAINING WILL BE NECESSARY FOR SELECTED CSS UNITS TO ENSURE THAT THESE UNITS WILL BE ADEQUATELY PREPARED FOR COMBAT IN AN URBAN ENVIRONMENT. THIS TRAINING WILL BE ACCOMPLISHED AT PROFESSIONAL MILITARY SCHOOLS, COMMAND POST EXERCISES, PROFESSIONAL DEVELOPMENT SEMINARS, AND SPECIAL TRAINING AREAS AS DICTATED BY THE UNIT MISSION AND MOBA VARIATIONS.

This section will outline specific MOBA training requirements and methods to satisfy those requirements for units performing CSS functions in an urban environment. All USMC FMF units should be familiarized with the differences in navigation, mobility, communication, camouflage, weapons effects and tactical operations induced by MOBA. This familiarization and/or additional training could be provided by a variety of means including Mobile Training Terms (MTT), CPXs, practical exercises, and short instruction blocks at MOS-producing schools. Each FMF unit should include relevant MOBA topics in officer and NCO professional development seminars. Standard programs of instruction should be developed and disseminated to provide a common ground and focal point for unit training. Military literature is full of information concerning MOBA variations for combat and combat support units. Development of training plans for these units is outside the statement of work for this contract effort.

Although all units performing CSS functions will require a minimum level of MOBA training, selected units with a CSS mission will require additional training that is more detailed and specific to that unit's particular mission. Training requirements may range from modifications to unit SOPs to practical exercises involving all unit personnel. BDM analysts have concluded that the following units or elements will require additional MOBA training not normally provided:

- Supply Bn, FSSG
- Maintenance Bn, FSSG; units with 2nd echelon maintenance responsibilities
- Truck Co, MARDIV and Motor Transport Bn, FSSG
- Combat Engineer Bn, Engineer Support Bn, Wing Engineer Sqdn, NCR
- All units with communications equipment
- MP Co, Hq Bn, MARDIV and MP Co, H&S Bn, FSSG
- Civil Affairs Group, USMCR

UNIT	CSS TRAINING TOPIC	MOBILE TRAINING TEAM	PROF DEVELOP SEMINAR	COMMAND POST EX	MOS SCHOOL	PRACTICAL EXERCISE
		TRAINING METHOD				
SUPPLY BN, FSSG	BUILDING REQUIREMENTS FOR SUPPLY STORAGE	x	(x)			x
	CAMOUFLAGE OF SUPPLIES (URBAN EXPEDIENTS)	x				(x)
	MATERIALS HANDLING WITHIN CONFINED AREAS				x	(x)
	FORWARD SALVAGE OPERATIONS		(x)		x	(x)
MAINTENANCE BN, FSSG & OTHER 2ND ECHELON MAINTENANCE ELEMENTS	UTILIZATION OF URBAN MAINTENANCE FACILITIES	x	(x)			
	FORWARD MAINTENANCE OPERATIONS (CONTACT TEAM)		(x)		x	(x)
	EQUIPMENT HARDENING FOR MOBA	(x)	x			x
TRUCK CO, MARDIV MT BN, FSSG & OTHER UNITS WITH MT CAPABILITIES	VEHICULAR MANEUVERABILITY IN CONFINED AREAS	x			x	(x)
	VEHICULAR HARDENING REQUIREMENTS	(x)	x			x
	CONVOY OPERATIONS IN MOBA	x	(x)		x	x
ENGR SUPT BN, FSSG	SUPPORT REQUIREMENTS FOR PORT AND AIRFIELD REHABILITATION	(x)	x			
	INTERFACE WITH CIVILIAN UTILITY NETWORKS	(x)			x	x
WING ENGR SQDN	RAPID RUNWAY REPAIR (RR) TECHNIQUES	(x)	x		x	(x)
ALL COMMUNICATIONS UNITS & ELEMENTS	COMMUNICATION TECHNIQUES IN MOBA	x	x	(x)	x	(x)
MP CO, MARDIV	RIOT CONTROL OPERATIONS		x		x	(x)
MP CO, FSSG	EVACUATION AND REFUGEE CONTROL		(x)		x	x
CIVIL AFFAIRS GROUP	ALL ASPECTS OF CA OPERATIONS IN URBAN AREAS	x	x	(x)		

x SUITABLE TRAINING METHOD

(x) PRIMARY TRAINING METHOD(S)

Figure V-35. MOBA CSS Training Topics

Combat Service Support Training (Continued)

The most important facet of the MOBA CSS training program is the formation of a Mobile Training Team (MTT), within the USMC active structure, tasked to provided baseline MOBA presentations to USMC units. This MTU would consist of five to ten personnel having specialized knowledge of the following subjects:

- Weapons Effects
- Communications
- Amphibious Logistics
- Military/Civil Engineering
- Urban Infrastructures
- Civil Affairs

The MTT would conduct training seminars and information exchanges with all staff sections down to battalion level. These visits would provide a base for unit professional development seminars and promote an increased awareness of the peculiarities inherent in combat actions involving MOBA.

Professional development seminars, conducted at the unit level, would focus on the translation of general MOBA principles into specific recommendations and contingency policies for that unit. These seminars should include all officers and senior NCOs (SGT and above) assigned to the unit. The information exchange provided by the Mobile Training Teams and professional development seminars will provide a basis for the unit to analyze its particular capabilities and limitations in providing CSS within an urban environment. Specific training would then be conducted to upgrade the CSS capability.

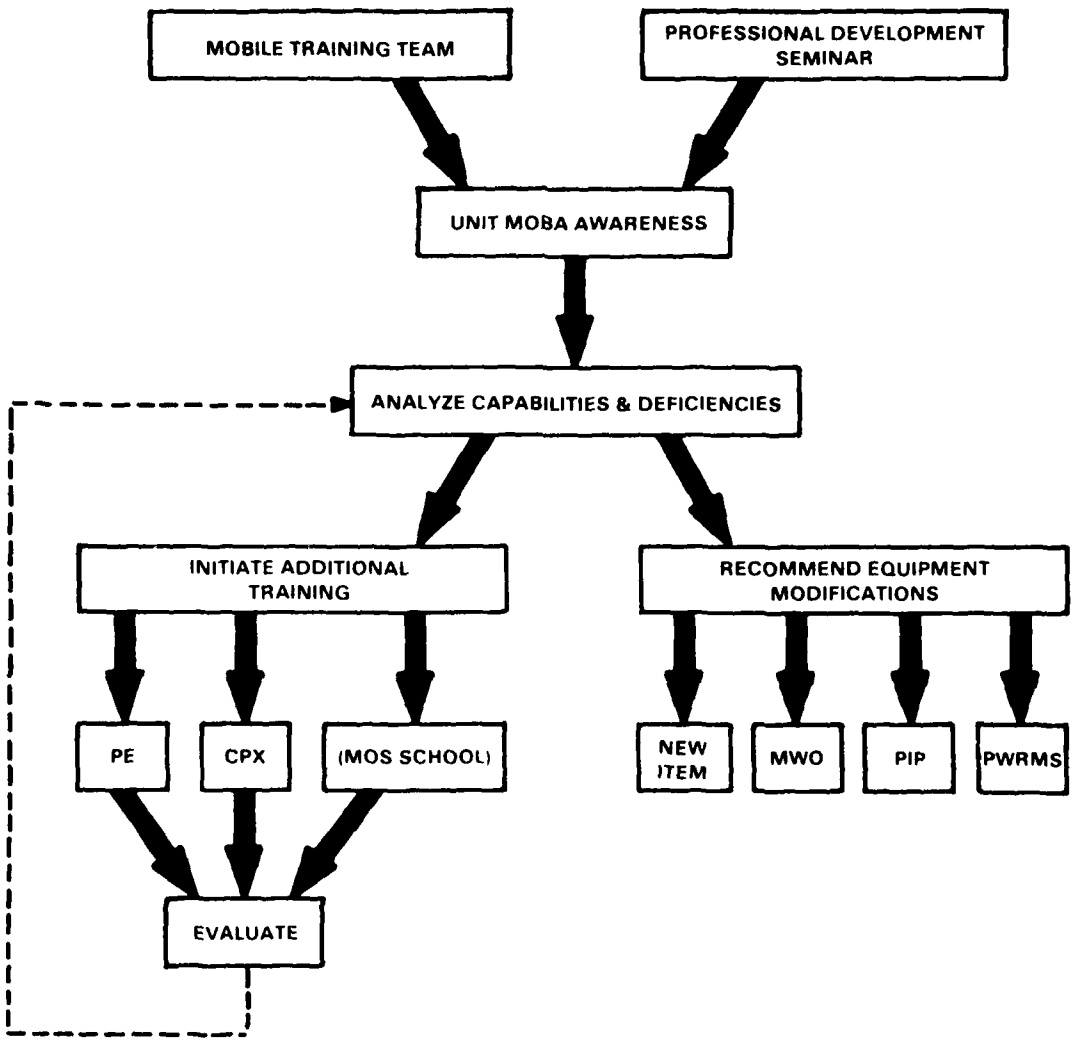


Figure V-36. MOBA CSS Training Plan

Combat Service Support Functions and Requirements

LEGAL

MAJOR LEGAL PROBLEMS WILL CONFRONT A COMMAND IN COMBAT OPERATIONS INVOLVING THE OCCUPATION OF A MAJOR URBAN AREA SUCH AS SYN CITY. LEGAL PROBLEMS ARE GENERALLY PROPORTIONAL TO THE MILITARY/ CIVILIAN POPULATION IN THE AREA OF OPERATION. THE MAF STAFF JUDGE ADVOCATE SECTION WOULD REQUIRE AUGMENTATION FOR ANY MOBA-TYPE OPERATION.

General

The MAF Staff Judge Advocate General is responsible for providing advice and assistance to the command concerning military justice, legal assistance, civil-military relations and international law. The scope of his operation includes matters concerning court-martial, military claims, investigations and the general administration of military justice within the command. Legal assistance is given to members of the command in regard to legal problems of a personal nature. The field of civil/military relations includes the legal aspects of civil affairs, civil claims, and legal advice in regard to utilization of real estate. Finally, when in a foreign country, the staff JAG provides advice on the implications of local law on operations, to include procurement actions.

Legal Problems in a Combat Environment

In a combat situation the majority of the legal problems fall in the military justice and civil/military affairs areas. Combat-related violations of military law with severe implications on military discipline are the most prevalent. These include:

- Desertion
- Self-Inflicted Wounds
- AWOL
- Rape
- Assault
- Murder/Manslaughter
- Wilful Disobediance

Historically, military forces operating in an urban environment with a large civil population generate military disciplinary problems as a result of the close contact of the military force to the civilian population. Further, the environment itself adversely affects tight military control. For personnel in combat with a life and death mission, disciplinary problems are not as great. However, CSS personnel who are not in close combat more easily succumb to the social aspects of the urban environment. Disciplinary problems of the military such as rape, looting and desertion become prevalent. Prompt command action is essential to maintain discipline. It is recognized that during the assault phase, general and special courts martial requiring full courts could not be convened. However, necessary preparatory work of a legal nature could be accomplished and would involve the JAG office. Personnel accused of serious crimes should be held under guard and incarcerated in a designated brig aboard ship when

practicable. Trials should be conducted as soon as possible during the consolidation phase of the operation. Further, the use of military judges to try cases should be encouraged. This judicial procedure would expedite trials in combat conditions and would have a positive impact on military discipline.

Civil/Military Legal Problems

In the SYN City scenario, the major legal functions in the civil affairs area will be those associated with the establishment of military government control ashore. The Landing Force Commander (CLF), at least during the assault, in all likelihood will function as the military governor of occupied sections of SYN City. Judicial as well as executive and legislative authority will be established over the occupied territory. The MAF JAG would be the primary staff legal advisor to the Governor/CLF. However, the major operating legal element would be found in the supporting civil affairs detachment which would supervise and give direction to the judicial elements of the local government which are still operating. Although he exercises supreme authority over the civil population, the military governor of occupied territory is guided by US and international law, usages of war, and by any directive received from his government or superior, in this case the CATF.

The projected heavy legal work load of the MAF will require augmentation of the MAF's legal staff. The following is considered to be a projection of the required augmentation for long-term operations in an urban environment. These teams will be included with the 2nd Fly-in Echelon. No augmentation is required for short-term operations (<15 days).

LEGAL AUGMENTATION REQUIREMENTS

Team Description	Number	Strength MO	Strength ME
War Crimes			
Team, Investigation	1	2	2
Court Martial			
Team, General Court-Martial	1	5	5
Team, Trial Military Judges and Trial Personnel	1	6	6

The personnel augmentation requirement is in addition to the JAG personnel organic to the MAF, and does not include those legal personnel in the supporting Civil Affairs Detachment.

Combat Service Support Functions and Requirements

FINANCIAL MANAGEMENT

FINANCIAL MANAGEMENT INVOLVES THOSE PROCEDURES AND TECHNIQUES THAT ARE APPLIED TO THE CONTROL OF RESOURCES TO ENSURE THAT THE APPROPRIATED FUNDS ARE UTILIZED WITHIN APPROVED PROGRAMS AND BUDGETS.

General

Each major command in the Fleet Marine Forces has a comptroller section to assist in financial management procedures. Creation of a composite MAF comprised of a composite division, wing, and FSSG might result in some problems concerning financial management if sufficient comptroller personnel were not included in the senior staffs. In addition to providing these comptroller personnel, the activating headquarters should also provide VII MAF, and/or its major subordinate commands, with the Planning Estimate (PE) which will serve as the operating budget for the period during which the MAF is expected to exist.

During peacetime, the comptrollers in the division, wing and FSSG regularly perform the financial management functions, whereas the cadre MAF staff normally satellites off one of the principal components (division or wing) with the division comptroller two-hatted in that he also provides MAF-level financial management services. Appropriate Navy and Marine Corps directives and the Marine Corps Air Ground Financial Accounting Reporting System (MAGFARS) apply.

Management

Prior to the activation of VII Composite MAF, each unit of battalion size or higher level, with assigned cost centers, would have received an annual PE from its cognizant commanding general to serve as the operating budgets for those units for the fiscal year. These operation and maintenance (O&M) dollars finance day-to-day operations. When VII MAF is activated, additional planning guidance and allocation or reapportionment of any necessary O&M funds would have to be made by the Fiscal Director, Headquarters U.S. Marine Corps, through CG FMFLANT and CG FMFPAC since both forces would be providing substantial numbers of units and personnel to form the composite division, wing, FSSG and MAF.

O&M dollars provide maintenance, repair parts, organization equipment, routine supplies, and funds for travel and per diem. In addition, these funds are used to procure Class III(W) and Class V(W) supplies which, in this case, will consititute an unusually great expenditure.

The VII MAF Comptroller, assisted by the comptrollers from the major commands within the MAF, will have to identify any funding shortfalls. The source of funding specifically for VII MAF will be identified by higher authority. The Department of Defense will become involved to the degree that funds have to be provided from outside the Department of the Navy, to include the possibility that a supplemental appropriation might be required to provide operational funds above and beyond what had been appropriated for the fiscal year. From the Marine Corps' standpoint, much of the VII MAF's accounting might be termed "accounting after the fact." All Marine Corps O&M accounts would probably be aggregated at Headquarters, Marine Corps at the end of Operation BREAKER or at the end of the fiscal year, and internal adjustments would be made before requesting any additional funds.

Urban Warfare

The unique requirements generated in the field of civil affairs will have considerable impact on financial management. Aside from special financial and supply support requirements for civil affairs functions, urban combat has no appreciable effect on financial management.

International law requires that the Landing Force commander (or area or theater commander) provide a government of law and order for the area which is occupied by forces under his command. This responsibility includes planning for the distribution of supplies and equipment to meet minimum civilian needs. Lack of such support would likely result in starvation and disease among the populace, thereby increasing their hostility and creating additional hazards for the Landing Force. Locally available supplies should be seized and safeguarded from looting or destruction. The ATF/LF Civil Affairs Group will establish procedures and priorities for distribution of these supplies to the local populace. Normally a civil affairs estimate will have identified the magnitude of the civilian supply problem. (Information in the SYN City data base does not address the level or location of civilian supply stocks). Provisions should then be made to meet the estimated shortfall of essential commodities which will have to be provided by the ATF or LF.

In SYN City, the civilian population can be expected to run out of perishable foods by D+4. Other food stocks will be dangerously low by D+7 to D+10. If the VII MAF has been tasked by higher authority to provide supply support to the populace, the MAF comptroller will have to coordinate the financial management aspects of that support. Special funding should be provided from sources external to the Marine Corps.

OTHER THAN THE SUPPLY OF LIFE-SUSTAINING RESOURCES TO THE INDIGENOUS POPULACE, THE CSS FUNCTION OF FINANCIAL MANAGEMENT IS NOT SIGNIFICANTLY AFFECTED BY COMBAT IN URBAN AREAS.

AUTOMATED DATA PROCESSING SYSTEMS SUPPORT

ADPS SUPPORT WILL INITIALLY BE PROVIDED FROM ATF SHIPPING AND THEATER AIRBASE FACILITIES UNTIL SUCH TIME AS ADEQUATE SUPPORT FACILITIES HAVE BEEN ESTABLISHED WITHIN THE FBH.

General

The following considerations impose practical limitations on ADPS support planning and, more specifically, the location and extent of ADPS support facilities.

- Mission
- Enemy capabilities
- Logistic support plan
- Communication means available

Four of the five missions to be accomplished in the SYN City scenario require VII MAF to be prepared to continue the attack to the northwest, away from the Force Beachhead (FBH). This would impact on the extent of fixed or semi-fixed ADPS facilities, the deployment of Data Processing Units (DPUs), and amount of logistical support made available for the relocation of Automated Data Processing Equipment (ADPE) and units. For the SYN City scenario, Aggressor forces are deployed near key LOCs and have the capability to interdict LOCs or utilities that may be required to augment power generation and telecommunication support for ADPE. The satisfaction of logistical support requirements for DPUs and ADPE will depend on the demands placed on FSSG units within the FBH, which will be heavily engaged in establishing CSS facilities, rehabilitating LOCs, and supplying assault units.

Consideration must be given to competing demands for transportation, utility support, and building structures within CSS areas. Communications between tactical and support units within SYN City will impose significant limitations on the deployment and use of ADPE and DPUs. Radio communications will be restricted in an urban environment because of unique physical limitations imposed by buildings. In addition, the Aggressor MRD has a significant capability to degrade or utilize the electromagnetic spectrum to its advantage. Heavy demands will have to be placed on alternate means of communication between components of an automated information system to include indigenous telecommunication networks, wire, and courier services, which are more vulnerable to interception.

Concept of ADPS Support

All organic ADPE and DPUs will accompany deployed units in the AE and AFOE and will be phased ashore in the FBH as the tactical situation permits. This equipment will remain aboard ship during the course of the amphibious assault and will be relocated into the FBH beginning on D+4. All organic ADPE should be in the FBH by D+10. Aviation Supply Data Processing Units (ASDPUs) and associated ADPE will accompany each MAG embarked aboard ATF shipping and deployed to theater airbase facilities. Ships' ADPE will be utilized as required to augment or provide ADPS support to units embarked and deployed ashore until organic ADPE becomes operational. The Force Automated Services Center (FASC) and backup unit will provide data conversion and support system management/control at theater air facilities near the AOA. Entry into DCS for AUTODIN will be provided for at theater air facilities. Daily courier flights will be provided by elements of 7th MAW (Forward) to forces embarked and deployed within the FBH to collect data reports and distribute system reports. Assault units will complete required data reports, in accordance with unit SOP, and forward them to supporting DPUs by the most expeditious means available. Electronic transmission is the preferred method, but air or ground couriers will be used in an ECM environment or when higher priority traffic takes precedence.

Both tactical and nontactical ADPE will be deployed in mobile shelters that have their own power source. Backup power sources will be provided by generators deployed with assault units in the objective area and with elements of the Wing Engineer Squadron deployed to theater airbase facilities. External support requirements, will be limited to the transportation of ADPE and DPUs to the objective area and theater airbase facilities and backup maintenance support which will be provided by Navy Mobile Technical Units (MOTUs).

PLANNING FOR ALTERNATE POWER SOURCES AND ALTERNATE DELIVERY MEANS FOR DATA/SYSTEM REPORTS ARE REQUIRED IN ANY OPERATIONAL ENVIRONMENT. MOBA OPERATIONS HAVE NO UNIQUE IMPACT ON ADPS SUPPORT.

Combat Service Support Functions and Requirements

DENTAL

DENTAL SERVICES WILL BE MATERIALLY REDUCED DURING THE AMPHIBIOUS ASSAULT AND CONSOLIDATION PHASE OF AN URBAN AMPHIBIOUS OPERATION, WHEN ONLY EMERGENCY TREATMENT WILL BE PROVIDED. THEREAFTER, REQUIREMENTS FOR ROUTINE DENTAL SERVICES WILL BE AT LEAST EQUAL TO THOSE EXPECTED DURING THE HEIGHT OF THE VIETNAM CONFLICT.

General

Dental services are provided to the MAF by the Dental Bn, FSSG. This battalion is manned predominantly by Navy personnel. Personnel strength and the square, cube and weight of equipment are indicated in the table below for the Assault Echelon (as indicated in the Lift Fingerprint of 23 Oct 80).

Dental Support - Assault Echelon

	MO	ME	NO	NE	SQUARE	CUBE	WT (ST)
H&S Co Dental Bn	0	2	1	5	112	41	3
2-Dental Companies (each)	0	0	24	38	112	1684	27
TOTAL DENTAL ASSETS (AE)	0	2	49	81	336	3409	57

It should be noted that approximately 50% of the total MAF dental service capability is included in the Assault Echelon.

Every effort is made in peacetime to maintain a high standard of dental health in all of the military services. Units alerted for deployment normally receive priority for medical and dental care, at least for emergency cases. Despite these efforts, replacement personnel often require immediate dental care. For example, FM 8-55 points out that from 1% to 4% of the replacements in Korea needed immediate dental attention and a substantial number required early treatment to correct pre-deployment dental problems.

Impact of Urban Amphibious Operations on Dental Service

The dental service during the movement to the objective, assault and consolidation phases will initially be restricted to emergency care. The overall dental capability in the assault phase is reduced by 50% from the normal level until the follow-on echelon arrives with the remainder of the dental battalion. At that time, full dental service is established ashore. For maximum effective care, four company-sized dental clinics will be established, each supporting designated units of the MAF. Two companies will support the ground combat element on an out-patient basis, one company

will support the air combat element and FSSG in the FBH area, and one company (-) will support theater-based units at the offshore bases until these units are phased into the FBH. The company supporting the FSSG will be collocated with the medical hospital company and will handle both in-and out-patients.

It should be noted that the approximate ratio of dentists to MAF personnel at the height of the Vietnam conflict was 1:607; in Operation BREAKER the ratio will be about 1:545. Conversely, the ratio in Vietnam for dental technicians was 1:283 whereas in BREAKER it will be about 1:335.

During the movement to the objective and initial assault phases, until dental facilities are established ashore, the two dental companies in the AE would assist the LHA's and LPA's dental officers in operating the ship's dental facilities. This would be approximately 4 to 6 additional dentists per ship. During the assault phase of the operation, they would be available to assist hospital corps personnel in caring for the wounded. The dental surgeon in coordination with the MAF surgeon, would determine the overall medical/dental plan and the type of casualties to be handled aboard each ship.

An estimate of dental treatments in the AE during the assault and follow-on operations is indicated in the table below:

Operation	Peacetime Workload*	Change in Dental Workload	
		Assault Phase	Follow-on Ops
Crown & Bridge	37%	Decrease	No Change
Prosthodontics	1%	Decrease	Increase
Operative Denistry	10%	Increase	Increase
Periodontics and Oral Hygiene	7%	Decrease	Decrease
Radiology	24%	Increase	No Change
Examinations	20.8%	Decrease	No Change
Orthodontics	.2%	Decrease	Decrease

* Number of patients

Although the intensity of artillery fire is expected to be less in the SYN City scenario as compared with general open area conventional warfare, casualties from close combat would place greater demands for dental service in the maxillo-facial surgery operations and associated radiodontics during the assault phase. In subsequent operations, replacement of teeth (prosthodontics) and oral surgery are expected to be the priority tasks that will have to be accomplished in the AOA. Dental experience in MOBA is insufficient to serve as a basis for determining specific dental workloads in each category.

Combat Service Support Functions and Requirements

FOOD SERVICE

FOOD SERVICE DEALS WITH THE PROVISION OF RATIONS TO THE PERSONNEL OF AN ORGANIZATION, MESS MANAGEMENT, AND SUBSISTENCE ACCOUNTING.

General

Adequate food service is critical to maintaining the health of all personnel. In addition, it impacts significantly (albeit unquantifiably) on troop morale.

Ration storage and distribution and field baking services are provided by the Ration Company, Supply Battalion, FSSG. The Navy is responsible for food service afloat, but Marine mess personnel are generally used to augment the Naval mess personnel during the course of a deployment. On merchant ships lacking mess facilities, embarked Marine units are responsible for establishing field-type temporary messing facilities.

Food Service in an Urban Environment

In an urban amphibious operation such as SYN City, the types of food services provided will be highly situation-dependent. Until the establishment ashore of battalion service platoons and field mess facilities, individual combat rations will be the primary ration utilized by all personnel. When mess personnel of the service platoons are established ashore and the ration supply conditions are favorable, the standard B ration for the Armed Forces will be utilized for the noon meal ration. Field Ration A would not be utilized during the offensive phase of Operation BREAKER.

In amphibious operations in an urban environment, the tempo of block-by-block building clearance will be slow. It will take considerably longer to clear an urban area than a rural area of similar size. The ultimate goal of unit commanders will be to provide two hot meals and one cold meal per day. The troops will subsist on the Meal, Individual, Combat ration from D-day and possibly on D+1, but efforts will be made to provide hot meals to selected elements beginning on D+1. To meet the food service objective, two alternatives are available:

- Establish field kitchens in batallion service areas and serve hot meals directly to troops in those areas; transport food in insulated containers by vehicle to forward areas. Paper plates should be used in lieu of mess kits or metal trays, thus eliminating the requirement for boiling water to sanitize mess gear. Messes can be located in available and suitable buildings.

- Deliver hot meals to isolated units by helicopter beginning on D+1. One company of RLT 3, located near Bridge 3 and the SYN City dam will require such service. A second company from the same BLT is at Bridge 1 where it can be messed by the surface-landed BLT operating in BLUE Beach area. The Recon Bn will require helilifted hot meals on D+1 until its organic mess section has been lifted in.

When kitchen facilities are not available, the Meal, Combat Individual is issued. Due to its lower nutritional values and limited menu variety, this ration should not be utilized for extended periods. The patrol rations, used principally by Force Recon Teams during the intial periods of the SYN City offensive, contain the dehydrated menu complement and can be eaten as is or with water (rehydrated). The sundries pack contains health and comfort items such as toilet articles, confections, and tobacco. There are also in-flight rations available, as well as those designed specifically for indigenous personnel use. Feeding of the indigenous populace will be addressed in the section concerning Civil Affairs.

Planning

For planning purposes, Class I subsistence requirements during a long-term combat operation have been estimated at 7.05 lbs/man/day. This figure is based upon:

	lbs/man/day
Air (in-flight rations)	.01
Regrigerated subsistence	1.8
Nonrefrigerated (less combat ration)	2.96
Combat Ration	2.28
TOTAL	7.05

While the 7.05 lb/man/day Class I planning factor is most accurate over a lengthy period of combat action, this factor will not sufficiently predict day-to-day changes during the initial days of offensive combat in which units are progressively phased ashore and adequate messing facilities have not been landed or are not operational. Additional Class I planning factors pertinent to these periods have been developed and are discussed in Chapter VII - Logistic Planning Factors and Usage Rates.

Summary

The early establishment of an adequate food service program will enhance the health and morale of the fighting force. The lengthy period of involvement anticipated for the SYN City operation necessitates the early establishment of an effective food service program. The impact of the urban area is minimal except for the potential use of available buildings to house messing facilities.

Combat Service Support Functions and Requirements

POSTAL, ADMINISTRATION, AND BAND

URBAN OPERATIONS DO NOT ALTER THESE COMBAT SERVICE SUPPORT FUNCTIONS IN ANY APPRECIABLE SENSE. THE FUNCTIONS WILL BE PERFORMED ROUTINELY IN AN URBAN SETTING IN THE SAME MANNER THAT THEY WOULD BE PERFORMED IN ANY OTHER COMBAT SETTING.

Personnel assigned to postal and administrative units and the band require the same degree of training and indoctrination as that provided to all other VII MAF personnel. In particular, they have to be familiar with the area of operation, the basic operational plan, and any peculiarities that may impinge on their mission. The CSS functions that they perform, however, will be essentially the same as in any other combat setting.

Urban Warfare

The CSS functions of postal service and administration will be required during Operation BREAKER to enhance morale and unit effectiveness. The band as such will not perform in its primary capacity during the assault and subsequent consolidation of SYN City. Personnel assigned to the band are normally carried by the Hq Co Hq Bn MARDIV and will be used to support medical activities and local security forces at the division headquarters. Many of these personnel will be required to traverse sections of the city during the conduct of their assignments. Familiarity with the principles of urban warfare and the specific street pattern of SYN City will enhance the delivery of mail, messages, reports, and the treatment and evacuation of casualties.

EXCHANGE SERVICE

INITIAL EXCHANGE SERVICES WILL BE LIMITED TO THE PROVISION OF HEALTH AND COMFORT ITEMS WHICH ARE NORMALLY ISSUED AS A SUPPLEMENT TO THE COMBAT RATION DURING THE ASSAULT AND CONSOLIDATION PHASES OF AN OPERATION. RESTRICTED EXCHANGE SERVICES WILL BE ESTABLISHED DURING THE OCCUPATION PHASE. SALES WILL BE TIGHTLY CONTROLLED BY RATIONING TO MINIMIZE BLACK MARKETING AND AN ADVERSE IMPACT ON LOCAL POPULATION.

General

The Marine Corps operates a world-wide exchange service, the profits from which support the special service activities of the Corps such as athletic programs, day rooms, NCO and Enlisted Clubs, and other special service activities.

In a combat situation such services are limited to the issue, normally with the ration, of health and comfort items consisting of tobacco products, toilet articles, and candy products. This ration is provided free from appropriated funds. Under certain conditions soft drinks and a limited beer ration can be provided. When the combat situation permits, usually during the noncombat/occupation phase of an operation, an Exchange can be established. This would be a nonappropriated fund activity, and all items would be sold at cost-plus.

Under occupation/garrison conditions the Exchange Service can expand in accordance with policies prescribed by Headquarters, Marine Corps. In an occupied and former enemy country, State Department policy would tend to be restrictive. Unrestricted operations of exchange service inevitably fosters local black markets particularly in urban areas. Hence, operations are restricted by:

- Limiting line items sold to those which could be characterized as health, comfort and necessity items.
- Tightly controlled rationing of potential black market items. In friendly countries Exchange Services operations are constrained by local laws and status of forces agreements.

Exchange Services During Operation BREAKER

The only exchange services provided during Operation BREAKER will be the issuance of the Ration Supplement Sundries Pack (TAMCN S0060) in conjunction with the basic combat ration.

Combat Service Support Functions and Requirements

SPECIAL SERVICE CLUBS

SPECIAL SERVICE CLUBS PROVIDE RECREATIONAL ATHLETIC PROGRAMS, CLUBS AND SUPPORTING SERVICES TO THE COMMAND TO INCLUDE THE ACCOUNTING FOR APPROPRIATED AND NON-APPROPRIATED FUNDS AND THE PROVISION OF SUPPLIES AND FACILITIES FOR THESE ACTIVITIES.

General

The provision of recreational programs, clubs and supporting services during the occupation phase of an urban operation tends to enhance command morale, reduce disciplinary problems, and portray a favorable image of the command to the indigenous population.

Management

The ACofS G-1/S-1 of the command is responsible for special services functions. Appropriated and non-appropriated funds provide for necessary financial resources for the programs. The non-appropriated funds for special services are distributed to major Marine Corps commands by Headquarters Marine Corps; they are allocated from central funds derived from Exchange profits.

Impact of Urban Operations on Special Services

From the time of embarkation until arrival in the AOA and commencement of the assault, Special Services activities for the VII MAF will consist of routine functions usually associated with such deployments. These include shipboard smokers that feature boxing, wrestling, unit competition in various military skills, use of ships' libraries and any unit or Special Services library facilities available, and movies. No Special Services activities are possible for troops direclty engaged in the assault and consolidation phases of the operation in urban or other more conventional operations. Minimal support can be provided at field hospitals, particularly help in writing letters and providing reading material in the same manner as in any combat operation.

The presence of a hostile (or in other cases a friendly) civilian population makes it incumbent on commanders to minimize contact between MAF personnel and the populace. Any Special Services activities that are organized must be conducted at locations remote from the urban/suburban areas. Special Service support may be rendered at a convalescent center established near Beach BLUE, at which personnel can be prevented from fraternizing with local personnel while still having access to a modest program of special activities. The follow-on forces will be responsible for establishing any permanent R&R facilities.

Combat Service Support Functions and Requirements

ECCLESIASTICAL SERVICES

ECCLESIASTICAL SERVICES PROVIDE GUIDANCE AND SERVICE IN AREAS OF MORAL, SPIRITUAL AND RELIGIOUS WELFARE TO A COMMAND. WHEN MILITARY OPERATIONS TAKE PLACE IN HEAVILY POPULATED AREAS, THE RELIGIOUS BELIEFS AND PRACTICES OF THE INDIGENOUS POPULACE MUST BE TAKEN INTO ACCOUNT DURING PLANNING AND EXECUTION OF OPERATIONS, AND TROOPS MUST BE PROPERLY ORIENTED WITH RESPECT TO ANY IMPORTANT PECULIARITIES THAT MIGHT IMPACT ON TACTICAL OPERATIONS OR REQUIRE CONDITIONED RESPONSES BY LANDING FORCE PERSONNEL. OTHERWISE, THE INTERNAL COMBAT SERVICE SUPPORT FUNCTIONS OF VII MAF CHAPLAINS WILL NOT DIFFER FROM THOSE NORMALLY ASSOCIATED WITH ECCLESIASTICAL SERVICES.

General

The SYN City data book does not provide any information concerning the religious beliefs or practices that will be encountered in Operation BREAKER. Presumably, the populace could react to VII MAF presence in a manner similar to that of the Italian reaction to American operations in Italy during World War II, where western culture prevailed and no violent religious clashes occurred. Conversely, an indigenous population that followed markedly different religious precepts, such as the Iranian Islamic Fundamentalists, would present the MAF with vast problems that centered to a large extent on religious differences. For these reasons, an understanding and appreciation of local religions is vitally important to operational planners. The uniformed clergy may be able to provide some insights into the problem, but the intelligence community will have to furnish the in-depth analysis upon which troop information programs will be based prior to the assault.

MOBA - SYN City

A study of the SYN City map shows that there are approximately 53 churches throughout the city. The median congregation would number about 4,717 persons, suggesting that strong religious influences are to be expected in this area. Twelve churches are located in areas where the initial D-day operations will inevitably take place. Unit commanders should be apprised of the religious implications present in SYN City operations, the location of religious shrines and churches, and the rules of engagement that apply to operations near these structures. In turn, commanders must instruct their troops prior to the assault and require compliance with the rules of engagement during assault and subsequent consolidation operations. Failure to accord proper treatment to indigenous personnel, property and artifacts could create problems of great magnitude that could inhibit or prevent accomplishment of the MAF mission.

Special Area of Interest

FIREFIGHTING

FIREFIGHTING OPERATIONS ASSUME A GREATER IMPORTANCE IN AN URBAN AREA DUE TO THE CANALIZING EFFECTS OF STRUCTURES, INCREASED DENSITIES OF SUPPLY STORAGE AREAS, AND THE NATURE OF FIRE AS AN EFFECTIVE OBSTACLE TO FRIENDLY MOBILITY. VII MAF MUST BE CAPABLE OF PROVIDING FIRE PROTECTION FOR SUPPLY STOCKS AS WELL AS CONTROLLING FIRES USED AS AN OBSTACLE.

There exists a notable dearth of information in military doctrinal references concerning the use of military forces to control fires during the course of combat operations. Many military planners tend to discount firefighting operations during the assault phase by stating thoughts similar to "Let'em burn and bypass the area!" While this option may be viable in open areas offering a maximum of trafficability between locations, the urban building pattern significantly reduces avenues of approach and movement. Military forces conducting amphibious assaults into urbanized areas must be prepared to supervise, and possibly augment, the efforts and resources of indigenous firefighters to minimize the number of forced evacuations and the destruction of vital supplies.

It is necessary to differentiate between two different aspects of firefighting that may be required of military forces conducting assaults in an urban area. The first type of firefighting is essentially nontactical in that it provides a general response to the outbreak of fire. The typical firefighting elements found in most localities throughout the world (and indigenous to SYN City) are examples of this nontactical orientation. The second type of firefighting operation is tactically oriented and provides a breaching capability when flame obstacles are encountered. A minimum nontactical capability is required during the conduct of any type of operation, but the tactical firefighting capability is paramount for assault forces entering a defended urban area.

The SYN City Data Base provides a limited amount of information concerning firefighting resources within the urban area. Data supplied consist of the following:

- Density of fire stations is 1 per 12 sq km.
- Eight fire stations are located within the urban area.
- Vehicular equipment consists of 500 and 750 gallon pumper trucks.
- Each station is assumed to have at least two vehicles of either or both 500 and 750 gallon capacity.
- Indigenous equipment interoperability with USMC equipment is unknown.

Additional data that would be useful to firefighters and/or military planners would include as a minimum the detailed equipment and personnel inventory, number or density of fire hydrants, status and location of buildings with installed fire protection systems, and whether the SYN City equipment was standardized and to what standard. In the absence of this detailed information, it appeared necessary and fruitful to analyze the SYN City firefighting resources in relation to those of selected urban areas in the U.S. The purpose of the comparison is to identify potential shortfalls in firefighting equipment indigenous to SYN City and to estimate the capability of those resources to provide an adequate level of protection under surge conditions caused by combat action.

COMPARISON OF MUNICIPAL FIREFIGHTING CAPABILITIES

	BALTIMORE (792,000)	FAIRFAX CTY (597,000)	ARLINGTON CTY (170,000)	SYN CTY (250,000)
Fire Stations	58	29	10	8
Uniformed Firefighters	1,000	900	213	Unknown
Engine/Pumper Companies (Wagon Co's)	52	58	10	16
Truck Companies (Ladders)	29	12*	3	0

* Includes 2 aerial tower trucks which would not be needed in SYN City.

ESTIMATED SYN CITY FIRE FIGHTING REQUIREMENTS AND SHORTFALLS

	ESTIMATED* PEACETIME REQUIREMENT	ESTIMATED PEACETIME SHORTFALL	VII MAF INTEREST
Fire Stations	12	4	VII MAF organic fire-
Fire Fighters	370	80**	fighting equipment is
Engine Companies (Pumper/Tanker)	12	None	limited and fully required to meet threats
Truck Companies (Ladder)	6	6	of fire at supply dumps,
Firefighting Boats	2	2	ASP's, and airfields.
Search Boats	5	5	

* Based on average planning factors suggested by senior officials (Capt/Chief) of three metropolitan fire departments.

** Assuming three 96-man shifts for the 16 SYN City fire trucks plus two chiefs. Additional hazardous material, heavy duty, utility and command vehicles (and personnel) would be desirable.

Figure V-37. Peacetime Fire Equipment Requirements

Special Area of Interest

Firefighting (Continued)

SYN City firefighting resources appear to be deficient as judged by U.S. standards. Since the SYN City data base is not complete in all details, however, the actual situation in SYN City would probably be marginally adequate to handle a peacetime workload. Although the data base does not specifically mention any indigenous ladder trucks or fire/rescue boats, any city with multi-story structures and a coastal/riverine interface would surely possess such equipment and the trained personnel to operate the equipment.

The indigenous firefighting resources will be placed under control of liaison personnel within the Landing Force Civil Affairs Group. The indigenous chain of command and control would receive its priorities from the CAG firefighting liaison team and function in the normal manner. Special coordination would be effected so that firefighting resources could move through areas under friendly control. It is imperative that indigenous firefighters be placed under strict control; the MAF would not have trained personnel to replace them should they "walk off" their jobs.

VII MAF firefighting resources are shown in the table opposite. Approximately 70 specialized firefighting vehicles are organic to the MAF. This equipment is fully required to combat and control the outbreak of fire at supply dumps, ASPs, bulk fuel facilities, and airfields. The MAF capability to extinguish large fires is limited and the emphasis is placed on prevention and control of the fire. A major fire at an ASP or fuel farm would exceed the firefighting capability of the MAF. MAF firefighting equipment currently in the inventory should not be used to fight fires occurring at locations other than supply storage areas and air facilities.

One of the principal concerns with the introduction of MAF equipment into Aggressor-held territory is the interoperability of this equipment with indigenous equipment such as hoses, hydrants, and couplers. Although all firefighting equipment and facilities within U.S. control conform to the National Fire Protection Association (NFPA) standards as to coupling size, thread type and pitch, etc., it should not be assumed that USMC equipment will be compatible with that indigenous to SYN City. If the MAF equipment operates totally independent from the SYN City equipment there is no problem; but joint USMC-SYN City firefighting efforts may be complicated by incompatible equipment items.

The interoperability problem could be alleviated by the use of adaptive couplers manufactured by Grinnell and other sources. These couplers could be procured once the world area of interest is known. Peacetime procurement of a multitude of adaptors is not feasible. It is recommended that world areas of interest be surveyed to ascertain fire equipment standards and associated requirements for items to assure interoperability. Once a MAF is committed to a specific location, couplers could be procured

on an emergency basis and airlifted to the Amphibious Objective Area. On a field-expedient basis, couplers can be fabricated by the machine shops aboard ATF ships, and provisions should be made for this service whenever urban combat is anticipated in conjunction with amphibious operations. Those provisions should be included in the operation plans of the CATF, CLF, and their appropriate subordinate units or in agreed SOPs providing for the following as a minimum:

- Method for identifying the requirements.
- Chain of command and communication procedures for relaying data and requisitions.
- Firefighting priorities.
- Delivery methods.

Integration of military and indigenous firefighting efforts will require that a command and control nucleus be included with the Landing Force Civil Affairs Group to be landed with the AFOE. This nucleus would be tasked to monitor and control all traditional firefighting efforts within the metropolitan boundary. Indigenous elements would retain their unit integrity and areas of responsibility while military elements would be assigned in the normal manner commensurate with fire protection requirements at supply dumps, ASPs, fuel facilities, and airfields. A limited amount of cross-support could be effected should the tactical situation be of low intensity and the threat to military stocks minimal. At no time should the level of military protection be reduced to satisfy augmentation requirements induced by a shortfall of indigenous equipment. Fires that are out of control and beyond the capability of indigenous assets should be allowed to burn themselves out. Personnel and materials should be evacuated from the danger area and the area will be cordoned off. Efforts can then be directed towards limiting the spread of the fire.

TABLE V-30. MAF FIREFIGHTING ASSETS

	VEHICULAR FIREFIGHTING EQUIPMENT QUANTITIES					
MAF ELEMENT	MC1051	MC530CB	MC530CS	M1000	MB-1	MB-5
H&S Co H&S Bn FSSG	-	8	1	-	-	-
H&S Co Supply Bn FSSG	6	-	-	-	-	-
Bulk Fuel Co ESB FSSG	8	-	-	-	-	-
MABS MAG (VH)	-	1	-	4	-	5
MABS MAG (VF/VA)	-	1	-	4	2	2
Motor Trans Sqdn MWSG	-	3	2	-	-	-

Special Area of Interest

Firefighting (Continued)

Tactical Firefighting

Detailed information concerning the conduct of tactical firefighting under combat conditions is notably absent from military references. Typical tactical planning minimizes this requirement by stating that areas on fire will be bypassed and allowed to burn. However, the tactical value of flame obstacles increases in urbanized areas due to canalization by structures and the quantity of flammable materials available for combustion. The outbreak of fire within a city would also tend to panic the populace thereby increasing the difficulty of conducting combat operations. This advantage would likely accrue to the defender who would be in a better position to locate fires where they would cause the maximum interference.

A survey of available information revealed that there are no regular or specialized firefighting units evident within the Threat military structure. Sappers are tasked with the principal responsibility for fighting fires as necessary in addition to performing their other combat engineer functions. The sapper teams are not, however, provided with specialized firefighting equipment (as of 1975), nor does the Threat possess water tank trucks below Army level. The reliance is placed on water trailers of less than 1000 gallons. Ad hoc elements will be formed within the reserve battalion of assault units to fight fires with available equipment consisting largely of pioneer-type tools. Other measures taken in response to the fire threat include establishing stores of water and sand (or dirt) near threatened areas and facilities.

The MAF does not possess any firefighting resources that may be readily tasked to provide continual support to assault units once supply stocks have been established ashore. Supply buildup begins on D-day and continues throughout the course of the assault operation. In addition, only a small portion of the MAF resources would be landed with the Assault Echelon; the majority of equipment lands with the AFOE. Like the threat, MAF combat engineer elements are tasked implicitly with providing firefighting support to assault units. While the combat engineer capability may be adequate on a conventional battlefield, the capability is grossly deficient to provide adequate support in an urbanized environment. As previously stated, reallocation of resources from the nontactical orientation to tactical support is not feasible beyond the first 18 hours on D-day.

The obvious need for enhancement could be satisfied by a number of options including:

- Provide suitable vehicular resources to the combat engineer structure.
- Provide commercial or military equipment augmentation and task organize separate firefighting units under control of the division commander with coordination provided by the CAG detachment assigned to the division.
- Request interservice support and augmentation by firefighting teams held in reserve forces.
- Commandeer indigenous resources and place them under MAF control.
- Establish an expert nucleus of firefighting operational planners in the Marine Corps Reserve (within the 4th CAG) to provide planning expertise and command supervision in situations involving urban warfare.

The most viable option, considering the SYN City civil situation and budgeting constraints within the USMC, is to identify the firefighting requirements during the deployment planning phase and request augmentation by USAR firefighting elements. A minimum of a firefighting platoon (consisting of a headquarters element, a water truck team, and 3-5 structural fire teams) would be required to provide tactical firefighting support to divisional elements. Firefighting equipment used to support tactical missions requires ballistic protection and maneuverability comparable to that of other tactical vehicles organic to the task groupment. These assets should be embarked in the AFOE, loaded in such a manner as to facilitate early landing if required.

It should be noted that in many scenarios it would not be feasible to activate a USAR unit to support a MAF, either because the authority to do so was lacking or Army requirements took precedence over Marine Corps requirements.

Combat Service Support Functions and Requirements

SUMMARY

VII MAF WILL REQUIRE A HIGH LEVEL OF COMBAT SERVICE SUPPORT TO ACCOMPLISH ITS MISSION WITHIN THE PRESCRIBED TIME PERIOD. THIS SECTION WILL PROVIDE A CAPSULE SUMMARY OF SIGNIFICANT FINDINGS CONCERNING THE RANGE OF COMBAT SERVICE SUPPORT FUNCTIONS THAT ARE NECESSARY TO ASSURE TIMELY MISSION ACCOMPLISHMENT.

A deliberate assault into an urban area will necessitate changes in the manner in which selected combat service support functions are accomplished. Units tasked to provide this support may require augmentation to provide an adequate level of support. Other CSS functions are relatively unaffected by the presence of an urban environment. Previous sections in this chapter have addressed each CSS function in relation to MOBA. Detailed functional analyses were prepared when appropriate and within the overall level of effort in this contract. The remainder of this section will highlight those areas of combat service support in which the available capability does not meet the anticipated requirement.

The MOBA influence upon the range of CSS functions is depicted in the figure opposite. CSS functions with a MAJOR urban area impact will require extensive augmentation to provide adequate support during Operation BREAKER. Functions in the MODERATE category require minor modifications to existing methods to assure compatibility with the urban environment. Functions listed in the LOW category are not significantly affected by MOBA and are accomplished in the same manner as in other nonurban environments. CSS functions listed under OTHER require augmentation in any environment and are not urban-unique problem areas. Functions not provided during the amphibious assault are also listed. This delineation is expected to be valid in any urban environment including SYN City.

MAJOR IMPACT	MODERATE IMPACT	LOW IMPACT
CIVIL AFFAIRS	SUPPLY	FINANCIAL MANAGEMENT
ENGINEER	TRANSPORTATION	AUTO DATA PROCESSING
MILITARY POLICE	LANDING SUPPORT	FOOD SERVICE
	COMMUNICATIONS	POSTAL
	MAINTENANCE	ADMINISTRATION
	GRAVES REGISTRATION	ECCLESIASTICAL SERVICES
	CSS TRAINING	DENTAL
	LEGAL	

NOT PROVIDED	OTHER*
EXCHANGE SERVICES	EMBARKATION
SPECIAL SERVICE CLUBS	MATERIALS HANDLING
BAND (PRIMARY MSN)	MEDICAL SUPPORT
PASSENGER & FREIGHT TRANSPORTATION	

* PROBLEM AREAS NOT MOBA-UNIQUE

Figure V-38. MOBA Impact Upon CSS Functions (Assault Phase)

Summary (Continued)

Civil Affairs

- Deliberate evacuation of civilians from BSAs, CSSAs, and other areas was planned for approximately 28,000 persons.
- Offensive military operations in urban areas are likely to generate extensive logistic requirements in direct support of the populace; these requirements must be met to prevent civilian interference with tactical and logistic operations.
- The organic civil affairs capability in the Marine Corps is not adequate to support MAF offensive operations in a hostile urban environment; augmentation is essential.
- Analysis of the situation in SYN City disclosed that of the 20 CA functions 12 were of key importance to successful accomplishment of the Landing Force mission and had to be provided for.
- CA functional areas in which the Marine Corps does not normally require or maintain trained personnel, but which are important in urban warfare, should be the basis for levying USMC requirements on the USMCR and US Army for USAR support.

Engineer

- The normal engineer assets organic to a MAF are considered to be adequate to provide the range of engineer combat service support in a nonurbanized objective area.
- Most coastal urban areas contain facilities such as airfields and ports that would benefit the Landing Force.
- The VII MAF mission to assault, seize, consolidate SYN City and be prepared to continue the attack to the northwest must be accomplished within ten days of the D-day landing. Engineer resources will be in great demand to establish logistic support areas and rehabilitate LOCs.
- The engineer capability organic to VII MAF is judged not capable of completing the required tasks prior to D+10. The Naval Construction Regiment has therefore been embarked in the AFOE to assist with the rehabilitation of two airfields and the SYN City port.

- Establishment of an informal Engineer Group is recommended to facilitate control of all engineer resources and ensure that all engineer efforts are prioritized and accomplished in a timely manner. The potential level of engineering required in an urban area is such that liaison must be maintained by each of the LF engineering organizations.

- A Rapid Runway Repair capability must be structured (personnel and equipment) into the Wing Engineer Squadron. NCR capabilities should be evaluated in respect to repair of typical port facilities.

Military Police

- Additional MP requirements due to the SYN City infrastructure include traffic control, convoy escort, civilian evacuation, crowd control, and control of detention facilities and evacuee assembly areas.

- The level of MP augmentation depends in part on the attitude of the indigenous populace. This information is not provided in the SYN City data base.

- In the absence of more definitive information, it is recommended that at least two additional MP Companies be embarked in the AFOE. This force multiplier will allow combat units to devote their full intention to achieving designated combat objectives.

Supply

- The uniqueness of the urban environment is such that the development of a MOBA PWRMS Project Stock should be considered. Items in this project stock would include selected Class II, IV, V, and VII items.

- Normal supply procedures and policies are adequate to provide assault support to VII MAF.

- Storage of supplies, especially Class V, requires large land areas and the use of selected buildings for covered storage.

- The impact of containerization is far more wide-reaching than that imposed by the assault into an urban environment.

Summary (Continued)

Transportation

- Transportation requirements prior to embarkation and during the trans-oceanic deployment are not significantly affected by the existence of an urban objective.
- Transportation during the deliberate assault must reflect the balanced employment of all forms of transport.
- Transport resources must be compatible with containerized supplies - current equipment is not adequate to transport large quantities of containers.
- Transport equipment should reflect an echeloned introduction into the AOA commensurate with the total volume (and/or weight) of cargo to be moved.
- Current transport vehicles are judged to be capable of operating within an urban environment. No new items of equipment are necessary to provide transport support in such an environment.
- The increased vulnerability (and fixed level of assets) of MT vehicles in the SYN City area warrants additional hardening to protect personnel and cargo. Lightweight, easy to apply armor for critical areas should be procured and made available for deployment.

Landing Support

- Landing support operations are influenced to a greater extent by topographic and hydrographic conditions in the beach landing areas than by the urban complex immediately inland.
- A doctrinal employment of landing support resources has been used in Operation BREAKER with the exception of assets at BLUE Beach. The constricted landing area does not warrant the use of two separate Shore Party Teams to support the landing of two BLTs. One reinforced Shore Party Team is judged adequate to provide the required support.
- Landing support resources were adequate to structure and staff a total of 4 HSTs, 2 SPTs, and one austere Shore Party Group.

Communications

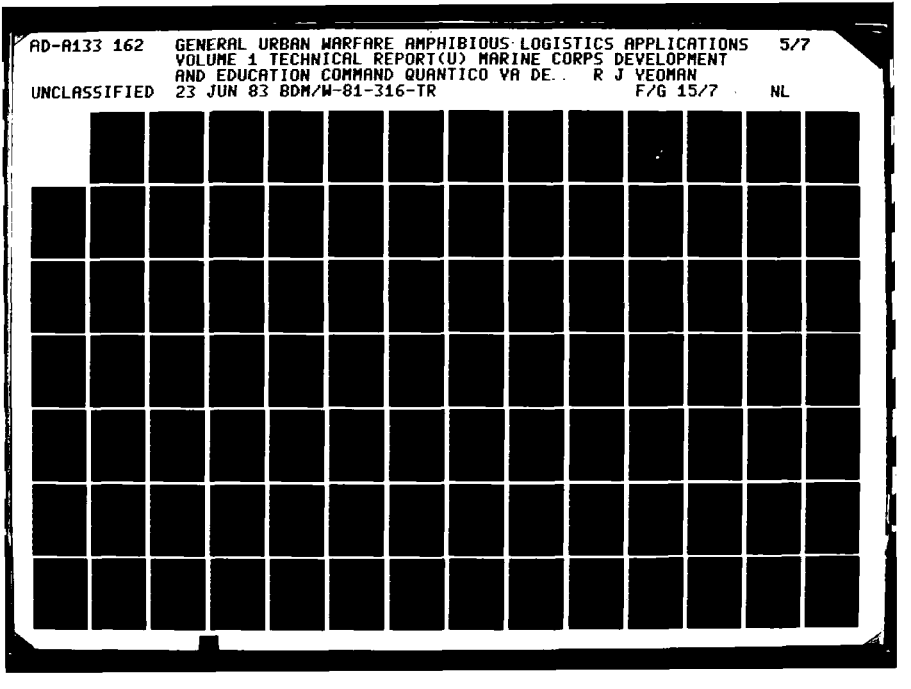
- Numerous studies have noted that communications will be degraded in an urban environment. SYN City is no exception.
- The indigenous communication system, including radio and television, will be used only to accomplish civil affairs liaison between VII MAF and the SYN City populace. VII MAF elements will use organic communication gear to accomplish their respective missions.
- Pending the introduction of more capable communications equipment, ad hoc measures will be undertaken to maintain communications in areas of degradation.

Maintenance

- Like any assault operation, a greater reliance will be placed on forward contact teams during the early stages of the assault.
- The SYN City area is expected to provide numerous maintenance facilities that would be useful to accomplish maintenance functions.
- Current maintenance procedures and capabilities are judged to be adequate in an urban environment.

Graves Registration

- Criteria for temporary interment, as suggested in ECP 1-1, cannot be met in most (if not all) areas of SYN City.
- Psychological factors and public opinion press for the evacuation of all KIA back to CONUS.
- KIA during Operation BREAKER will processed by the Graves Registration Platoon and evacuated by redeploying AE shipping or fixed-wing aircraft once Airfield 1 is operational.
- The use of refrigerated containers to hold KIA would provide a storage buffer alleviating the need for temporary interment should the retrograde operation be delayed. These containers should be embarked in the Assault Echelon.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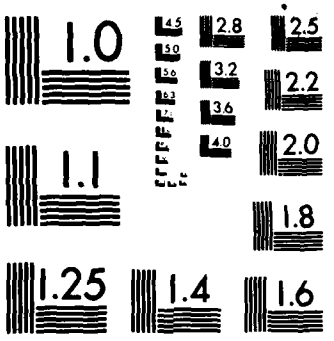


MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

Summary (Continued)

CSS Training

- Selected combat service support elements will require additional training to properly interface with facilities anticipated in any urban environment.
- This training should be initiated by Mobile Training Team visits to CSS units followed by unit Professional Development Seminars. Identified training topics may be addressed by practical exercises (PE), command post exercises (CPX), and additional blocks of instruction at MOS-producing schools.
- Deficiencies in CSS training are not of such magnitude as to jeopardize accomplishment of the MAF mission. Combat and combat support training deficiencies, while not specifically addressed by this study, are judged to be more crucial than CSS deficiencies.

Legal

- An increase in the legal workload is expected during an amphibious assault into an urban area. The level of military crime will increase as well as civil claims against the US government.
- Additional legal teams will be embarked in the AFOE to handle the increased legal workload and provide for an adequate level of support for long-term operations within the urban environment.

CSS Functions with LOW MOBA Impact

- The CSS functions of Financial Management, Automated Data Processing, Food Service, Postal Service, Administration, Ecclesiastical Service, and Dental Service are not significantly affected by combat operations in a urbanized environment.
- These functions will continue to be performed in the same manner as in any other amphibious assault. Personnel should be provided with basic indoctrination concerning urban combat.

CSS Functions Not Provided During Amphibious Assault

- Exchange Services, Special Service Clubs, Band (performing primary mission) and Passenger and Freight Transportation will not be provided within the AOA during the amphibious assault of SYN City.
- These functions would not normally be provided during an amphibious assault into any environment.

Embarkation

- Problem areas in embarkation center around the lack of required cube capacity rather than any specific MOBA influence.
- Shipping assets included within the Assault Echelon leave a shortfall of over 300,000 cubic feet. Additional "gray bottoms" (preferred course of action) or a diversion of assets from the AE to the AFOE will be necessary to embark VII MAF.
- The personnel and square capacity of the Assault Echelon vessels is adequate in both current and mid-range time frames.

Materials Handling

- Current materials handling resources are adequate to handle the landing of the Assault Echelon, which is breakbulk in nature.
- Fielded USMC MHE assets are not compatible with containerized cargo in the AFOE. Procurement of 50,000 lb. RTCH, container trailers, and mobile ramps will be necessary to land and distribute AFOE cargo.
- The Amphibious Logistic System (ALS) with ELCASs and TCDFs will interface with urban port facilities. Selected subsystems must be embarked in the AE so that they are operational by the D+5 arrival of the AFOE.
- The MOBA environment is not a significant factor with respect to MHE. Containerization infuences are far more significant.

Medical

- A moderate level of casualties will exceed the medical capability ashore (in terms of bed availability) once assault shipping and CRTSs redeploy outside the SYN City area. Additional definitive treatment facilities with 1,200 bed capacity must be on station by D+10.
- Mass casualty situations will exceed the medical capability of VII MAF and supporting Navy units.
- Indigenous medical facilities, already at 85 percent utilization, will be fully required to handle additional civilian casualties.
- This deficiency in available medical support is not MOBA-unique. A moderate level of casualties in any combat environment will exceed the available bed capacity organic to the MAF once AE shipping leaves the AOA.

CHAPTER VI

INDIGENOUS RESOURCES

Indigenous Resources

INTRODUCTION

SYN CITY RESOURCES, IF MANAGED AND UTILIZED PROPERLY, WILL ACT AS A COMBAT MULTIPLIER ENABLING THE LANDING FORCE TO ACCOMPLISH ITS MISSION WITH MINIMUM IMPACT ON AND INTERFERENCE FROM THE INDIGENOUS POPULACE. RESOURCE MANAGEMENT BEGINS WITH THE ASSAULT LANDING AND CONTINUES THROUGH THE ARRIVAL OF FOLLOW-ON FORCES.

The public and commercial facilities in any urban area evolve to meet the needs of the local populace. Those needs include normal subsistence and the manufacturing, agriculture, trade, and other principal endeavors of commercial and social nature. Destruction and interdiction of external lines of communication deprive the community of essential commodities. Damage inflicted on internal supply sources and LOCs impacts on local supply levels and distribution systems.

In Operation BREAKER, Advance Force operations generally avoid attacking SYN City, but the external LOCs are subjected to intensive attack by the Attack Carrier Striking Force and Theater-Based Aviation of 7th MAW. Coastal LOCs are also attacked by naval gunfire. The combination of air and surface attacks will inevitably force a reduction in the supply of food and other supplies that are needed in SYN City on a daily basis to satisfy local demands.

From a military standpoint, considerable information is usually available concerning urban areas. Dedicated intelligence collection efforts add to the library of information, particularly through the use of street maps and aerial photography. Details concerning stockage levels, particularly those in the hands of private citizens, are more difficult to ascertain. The SYN City Data Book does not provide any useful information in this category.

VII MAF has no alternative to landing in the immediate vicinity of SYN City. The five mission statements allow only from two to ten days to accomplish assigned tasks. The configuration of SYN City is such that the attacking force cannot avoid establishing significant elements of the initial CSS systems within the city. Even austere BSAs encroach on the fringes of suburban areas. The larger, more sophisticated, CSSAs must include suburban areas and facilities to accommodate the space requirements of the 7th FSSG. Combat units will also require use of local structures and facilities, particularly for billeting forces which are not in contact with the enemy and for storing unit supplies. Use by military forces of local urban facilities, to include private dwellings, is not unusual. World War II provides numerous examples in which villages, towns, and major cities were the focal points of prolonged military operations, during which CSS actvities took place almost entirely within urban settlements.

The magnitude of the civil affairs problem and the management of indigenous resources depends, to a large degree, upon the disposition and intentions of the populace subsequent to the assault landing. An overtly hostile populace intent upon disrupting VII MAF operations would be expected to render useless all facilities and resources of benefit to the Landing Force. Municipal workers would leave their posts and civilian sapper teams would be expected to implement denial plans at utilities, telecommunications facilities, port and bulk fuel facilities, and local transit systems. The capability of VII MAF to accomplish its mission in an environment with long-term violent civilian reaction is tenuous. This potential situation may be ameliorated by the fact that LOCs external to SYN City have been cut and SYN City food stocks are expected to run short by D+10. The civilian populace will then be forced to rely on the Landing Force for subsistence and violent anti-US actions would be expected to diminish.

Although a "scorched earth" policy is possible from the outset, BDM analysts have concluded that a more rational and plausible reaction to the assault landing would be the selective denial of key facilities followed by implementation of a civil defense plan. The majority of the populace, including key officials, would likely evacuate to shelters located within the city and remain there until the conclusion of the assault landing. These officials would view the presence of VII MAF as temporary and maintain control of the government to minimize disruption over the long-term. An effective civil affairs program at this point would concentrate upon locating these officials and establishing stable civil-military relations and an immediate civil information program.

In the absence of any specific information, it is impossible to estimate the level of denial or damage to indigenous resources. Elements of VII MAF have been broadly tasked to ascertain this level of damage at the earliest opportunity after the assault landing.

Catagories of indigenous resources of interest to the Landing Force include:

- Natural Resources
- Facilities
- Structures
- Utilies and Communications
- LOCs
- Equipment
- Supplies
- Human Resources

Indigenous Resources

RESOURCE MANAGEMENT

IN SYN CITY VII MAF WILL HAVE THE STATUS OF ADMINISTRATOR AND USUFRUCTUARY, I.E., AN AGENT HAVING THE RIGHT OF USING AND ENJOYING ALL THE ADVANTAGES OF THE PROPERTY WITHOUT ALTERING OR DAMAGING THE SUBSTANCE OR VALUE OF THAT PROPERTY.

Commander's Powers

CG VII MAF will have certain internationally recognized powers concerning the land and property in SYN City. These powers are classified as follows:

- Destruction: Permitted when necessary to, or resulting from, military operations during or preparatory to combat.
- Confiscation: Authorized in combat for public and private movable property used in the threat military effort. This property may be taken without obligation to compensate the state. In occupied territory, only public movable property may be confiscated.
- Seizure: Permitted for direct military use, but payment for or return of the property is required, not later than at the end of the occupation.
- Requisition: Taking for the needs of the occupying force, to be used only in occupied territory. Payment is required immediately or as soon as possible.
- Control: Supervision of property to the degree necessary to prevent its use by or for the benefit of the hostile force. It may include possession and occupancy. All categories of property and resources may be controlled.

Resources Control

A Marine Corps landing force has an immediate but limited role in population and resource control. The commander must establish the minimum necessary controls of population and resources to accomplish his mission and maintain reasonable order in the civilian community.

In SYN City, VII MAF will exercise complete control of civilians, facilities and other resources within designated areas, such as BSAs, CSSAs, and airfield complexes. This control will be exercised through 4th CAG and administered locally by tenant units in each area.

Management of property and facilities will be accomplished as follows:

- Seizure: Buildings, dwellings, selected movable public property, and facilities needed by the Landing Force will be seized without immediate payment and turned over to follow-on forces with the view that these resources will be returned to their owners upon completion of the operation.

- Control: Food, medical supplies, and other commodities related to urgent civilian requirements will be controlled to prevent their use by the Aggressor force and to assure that they are used for the benefit of the populace thereby reducing demands on VII MAF for these items.

- VII MAF may requisition services where necessary for the care, feeding, or shelter of the civilian population. This provision of international law is the basis for seizing schools or other structures, food, clothing, medical supplies, etc., to support the anticipated evacuee population.

Throughout SYN City, many public buildings, facilities and other resources will continue to be managed by local authorities, volunteer agencies, and private citizens. To the maximum extent feasible, and consistent with VII MAF's mission and objectives, local persons will be encouraged to continue that management activity. Subordinate units of VII MAF have been tasked in Oplan 1-81 to monitor, supervise or control specific resources and facilities, or to be prepared to do so if required.

A requirement has been identified to augment 4th CAG. CA teams for Property Control and Civilian Supply are included in this augmentation. The task organization of the 4th CAG (Appendix 1 to Annex G to Oplan 1-81) shows that both teams are initially attached to 7th FSSG with the teams (-) landing over RED Beach and elements of both teams landing over BLUE Beach. This concept places functional specialists ashore early in the two urban areas of greatest civilian property and supply interest. Division troops will be in the assault and should not be encumbered by property management requirements or any responsibilities for civilian supply other than identifying, reporting, and arranging temporary security for major resources that will be used or controlled by VII MAF.

Command Responsibilities

Unit commanding officers are responsible for exercising proper management of public and private property assets converted to their use. Unwarranted destruction of any property will be avoided. Property used in support of enemy forces may be attacked and/or destroyed at the local commander's option. Simple records will be kept at battalion level and higher of all indigenous resources taken and used by Landing Force units, including conditions at the time of seizure or relinquishment. Problems or questions relating to management of indigenous resources will be referred to supporting CA detachment personnel.

Indigenous Resources

NATURAL RESOURCES

NATURAL RESOURCES SUCH AS OPEN LAND AREAS AND BODIES OF WATER WILL BE IN GREAT DEMAND DURING THE EXECUTION OF OPERATION BREAKER. COMPETING DEMANDS FOR THESE RESOURCES MAY FORCE MAF PLANNERS TO ASSESS THE VALIDITY OF THE REQUIREMENTS AND PRIORITIZE USAGE.

Land Resources

Land resources include farms, fields, woods, surfaced and unsurfaced open areas and, for purposes of convenience, interment sites. These areas provide subsistence, storage, and recreation to the populace. On the other hand, VII MAF will require open areas for ASPs and hardstands for supply storage and maintenance as well as room to maneuver forces. VII MAF will commandeer such land areas as deemed necessary to conduct logistic operations and store ammunition (1,544 acres for 15 DOS).

Farmland will be considered carefully with respect to its importance to the local community as a source of food supplies. Destruction and interdiction of external LOCs will stop the flow of food into the city and make the populace more dependent upon food grown locally. The Food and Agriculture Team within the proposed civil affairs structure will be tasked to evaluate the importance of local agriculture and recommend any agricultural areas to be restricted from military use. Combat support requirements for ASPs and EAFs will take precedence in any case.

Open fields within the metropolitan boundary will be used for HLZs, VSTOL sites, supply storage, and deployment of selected artillery units, with unit supplies maintained in nearby vegetated areas. Wooded areas on the fringes of the city will be used to implement barrier plans, billet tactical troops, and store unit supplies. No unusual use or prohibition is contemplated for these areas.

Parking lots and other hardstands will be cleared of all civilian items and used to store supplies, maintain equipment, and provide assembly areas for tactical movements and civilian evacuations. The selection and utilization of these surfaces will be left to subordinate commanders. These areas will be required in dispersed locations throughout SYN City and would probably total less than 100 acres.

Interment sites will not be used for combat purposes except when required by military expediency. It will be necessary to screen these areas to deny their use to the enemy, and subordinate commanders will ensure that acts of desecration do not occur.

Water Resources

Water resources within SYN City include swamps, lakes, ponds, and rivers. Ground and subsurface water, free from any contamination, is vital to promote the health and welfare of both the Landing Force and indigenous civilians. Potable water is provided by the reservoir and private wells; contamination of these sources would require that extraordinary measures be taken by all personnel and military elements.

Lakes and ponds will be checked for potability and possible alternate sources of drinking water in the event the reservoir supply becomes contaminated. These sources will also be used for firefighting, decontamination, routine vehicle washdown, etc. Swamps are to be avoided by LF personnel, and any indications of mosquito infestation or other disease-carrying insects will be reported to the nearest LF medical officer.

Use of North and South Rivers will be inhibited initially because of the Aggressor capability to interdict the waterways. After SYN City has been seized and occupied or controlled, the rivers will be used to move supplies inland under the direction of CG 7th FSSG. In particular, North River will provide an excellent throughway from the port area to Airfield 1.

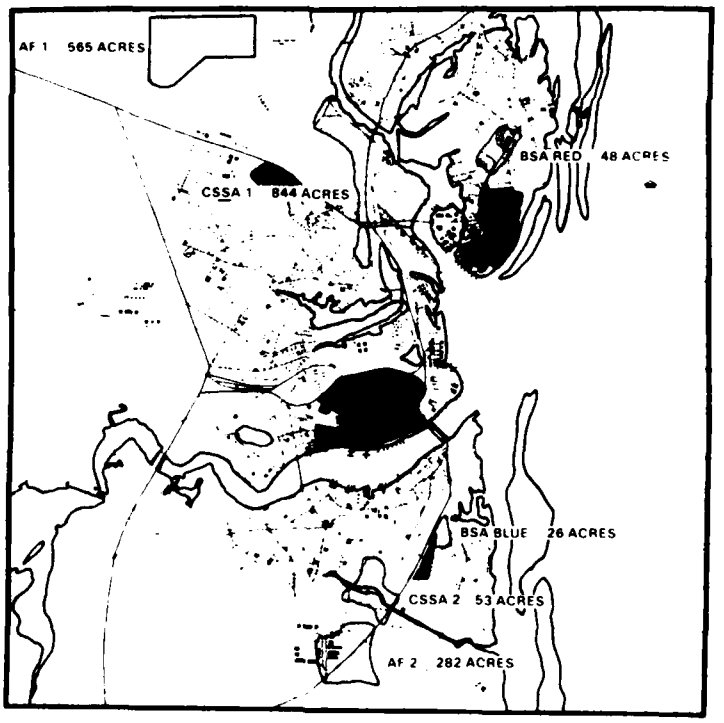


Figure VI-1. Ammunition Storage Areas During Operation BREAKER

Indigenous Resources

MAJOR FACILITIES

MAJOR FACILITIES IN SYN CITY INCLUDE THE PORT, PRISON COMPLEX, BULK FUEL COMPLEX, AND THE NAVAL STATION. VII MAF WILL BENEFIT FROM THE INTACT CAPTURE AND SUBSEQUENT USE OF THESE FACILITIES; THREAT FORCES WILL ATTEMPT TO DENY THIS USE.

Port Facilities

Experience factors based on invasion of developed harbors indicates that extensive damage can be expected in the port of SYN City. In addition to the expected damage levels described in Chapter V--Engineer Vertical Construction, the removal of sunken wrecks or blockships may be required. From two to three sunken ships may be expected in the SYN City port, which is relatively small in size. The harbor entrance is narrow and likely to be blocked.

The Landing Force will make maximum use of available port facilities augmenting that throughput capacity by LOTS operations at RED and BLUE Beaches. The thousands of man-hours required to repair the port are beyond the capability of VII MAF engineers during the assault operation. MAF use of the port will be on an expedient basis with ELCAS providing a cargo transfer interface if docks have been severely damaged. The CG, 7th FSSG will be responsible for managing the port, which will be the focal point of CSSA 1. Dock areas on the Old City peninsula, south of New City, and in the naval station will be used when possible to augment facilities in the main port.

Fuel transfer points will be used if they are serviceable, but the expeditionary capabilities of the AAFS will enable the LF to transfer fuel ashore without reliance on any of the indigenous facilities. Container shipment centers will be used after arrival of the AFOE if possible; otherwise containers will be landed from causeways, barges, or RO/RO ships either in mobile-loaded status or using Landing Force MHE.

Factories/Industrial Areas

The SYN City Data Book does not provide detailed information on factories in the city. The three industrial areas are described, however, and they figure prominently in VII MAF planning. The industrial areas have large open spaces, covered storage areas, engineer equipment, and other stocks that are of value to the Landing Force. Their early capture is important. Their value lies in their remoteness from the urban areas and the LOCs which provide access to them. Warehouses in the port area are important because of their location and relationship to roads, railroad sidings, and river transportation.

Prison Complex

The prison complex, located in the approximate center of the SYN City metropolitan area, is the principal detention facility in the area. The

security level and prison population are unknown, but it is expected that the prison is at least 75% utilized and houses up to 2,000 personnel. The prison is not a principal objective in Operation BREAKER and the possibility exists that the prison staff will abandon their posts and prisoners may be able to escape and make their way into New City during confusion caused by the assault landing. The CLF should make provisions for armed reconnaissance of the complex until the area is consolidated on or about D+3.

The prison complex will be used by the Landing Force to house POWs and civilian internees to the limit of its capacity. Inmates remaining in the facility upon VII MAF arrival will be screened and their disposition determined by VII MAF Provost Marshal. Civil affairs liaison efforts with the local government will encourage a voluntary retention of the prison staff to administer the existing inmate population. Military police and/or combat elements organic to VII MAF will be tasked to administer the facility and the PW/CI. MP Co, H&SBn, 7th FSSG will be augmented as required to perform this function initially.

Bulk Fuel Complex

The bulk fuel complex, located west of the main port and adjacent to the prison, has a 100% probability of suffering major damage as Threat forces defend and conduct delay operations in the main port area. Threat sapper teams, aided by civilian technicians, would likely be tasked to rig command-detonated explosives on distribution lines, manifold assemblies, and containment berms. Friendly forces would have little chance of capturing this facility intact, especially if the contents were volatile fuels and the tanks were less than full. Execution of a flame obstacle of this magnitude would effectively deny the entire area bounded by the port, prison complex, and New City.

Once landed, the FSSG Commander or designated representative will estimate the level of damage to the fuel storage complex and recommend rehabilitative efforts if within the capability of friendly engineer units, including the NCR. The NCR will be tasked to repair elements of the facility, but as a low priority following airfield development, port rehabilitation, and development of ASPs. Repair efforts are not expected to commence prior to D+15 at which time the utility of such repairs should be re-evaluated in the light of the continuing MAF mission and the arrival and capabilities of follow-on forces.

Naval Station

The naval station, located on South River opposite New City, contains facilities and equipment that would facilitate the repair of ATF shipping and lighterage damaged during the amphibious assault. This facility is also subject to intensive denial efforts and would not be consolidated in entirety until D+5 or later. Engineer priorities during the assault phase do not include the rehabilitation of yard facilities due to constraints on engineering resources.

Indigenous Resources

STRUCTURES

LANDING FORCE USE OF URBAN STRUCTURES MUST BE CALCULATED TO PROVIDE NECESSARY LIVING, WORKING, AND STORAGE SPACE IN SUPPORT OF THE LF MISSION WHILE MINIMIZING THE INSTRUSION INTO CIVLIAN MANAGEMENT AND LOGISTIC SUPPLY SYSTEMS. PRE-ASSAULT ANALYSES OF URBAN STRUCTURES AND THE TENTATIVE ALLOCATION OF BUILDINGS, FACILITIES, OR OTHER AREAS SHOULD BE REEVALUATED AS EARLY AS POSSIBLE AFTER THE ASSAULT LANDING, BASED ON A DETERMINATION OF DAMAGE, ACTUAL CONTENTS OF THE FACILITIES CONCERNED, AND AN ESTIMATE OF THE USABLE SPACE AVAILABLE.

Warehouses

Warehouses will be used to the maximum extent possible by units of VII MAF. When seized, an inventory will be taken of stocks contained in the warehouses. The ACofS G-4, in coordination with CO 4th CAG, will issue instructions concerning the disposition of the stocks in the warehouses. CG 7th FSSG will determine the allocation of all warehouses for use by CSS units. Requirements for supply storage are discussed in Chapter V--Engineer Vertical Construction.

In particular, warehouses in the main port area, the peninsula west of Old City, the naval station, and the three industrial areas will be commandeered for use by units of VII MAF. Material which is not immediately useful for issue to the populace or use by the MAF will be moved to other locations, placed in outside storage, or destroyed. Civilian labor and transport will be used to the maximum extent practicable to accomplish these functions.

Schools

SYN City schools, including the university, will not be in session during Operation BREAKER. Students from local areas will remain at home with parents or guardians, while university students will remain at that location. School buildings vacated will be used to provide temporary shelter for displaced persons, evacuees, and refugees. The planned evacuation sequence is discussed in Chapter V--Civil Affairs, and will not be repeated here. Schools appear to be the best location to house DPREs since the schools would be expected to have messing, sanitary, and C^2 capabilities within walking distance of evacuation zones. Further, use of schools in this manner reduces security requirements attendant to DPREs and eliminates the need to construct temporary camps for these people.

Municipal Police and Fire Stations

Control over these structures must be established as soon as the general areas in which they are located come under MAF control. It is intended to use the services of police and firemen in their customary role. VII MAF will enter the communication nets of both agencies and assist them in carrying out their civic functions to the degree that it supports accomplishment of the mission.

Unless the physical situation dictates otherwise, 4th CAG Public Safety Teams will direct and coordinate the activities of police and firemen through their regular chains of command. It is not intended that MAF personnel occupy and supervise each separate station.

Stores/Shopping Centers

Stores and shopping centers are often subject to looting. The stocks maintained therein will be required to support the local population through controlled distribution. Early seizure and safeguarding of these structures, particularly food stores and supermarkets, will be necessary. All such stores will be seized and placed under guard at the earliest opportunity to prevent looting by civilians or pilfering by troops. Physical security, provided by indigenous personnel, will be placed on these activities until instructions have been provided for proper disposal of the commodities which they contain. Decisions relating to the use of those facilities for MAF storage will be made by the ACofS G-4. (All or most of the stores and shopping centers are located in TAORs that lie outside of the areas designated for BSAs and CSSAs, and, therefore, their use is more a tactical concern than it is logistical).

In general, VII MAF will not make use of stores and shopping centers for its own purposes. Local purchase of critical items may be authorized by CG VII MAF. The Civilian Supply augmentation team in 4th CAG will assist with the evaluation and disposition of items within stores.

Private Dwellings

Private dwellings that are suspected to be defended by Aggressor forces should be attacked by using established house-to-house fighting techniques. Grenades should be used liberally. Fragmentation hand grenades are useful in circumstances when no civilians are believed to be present in the target dwelling; offensive hand grenades, which are no longer in the inventory, are preferred when noncombatants are in the structure. When there are no indications that Aggressor forces are occupying or otherwise using a dwelling, it should be entered cautiously but without expending firepower.

Private dwellings will generally be used for small-unit command posts and billeting. Occupants may be required to take cover in basement areas or other comparatively secure spaces within the structure. In specified areas, such as BSAs, CSSAs, and other general areas converted to MAF use, civilians will be evacuated to sites outside the tactical or logistical areas being commandeered.

Indigenous Resources

Structures (Continued)

Public Hotels/Apartments

It is not anticipated that public hotels or apartment buildings will be used by VII MAF except for alternate relocation sites for evacuees. In general, they will be avoided unless enemy forces take up positions in them, thus making it necessary to seize the buildings. Extreme care will be taken to avoid unnecessarily hazarding any noncombatants, but not if LF personnel are thereby exposed to greater hazard.

VII MAF CAG will determine the number of occupants and their status in hotels and apartments in coordination with the ACofS G-2. Particular attention will be paid to foreigners, especially any diplomatic personnel. Early estimates are required concerning the number of individuals to be supported, the availability of food and water, and the possible threat to VII MAF operations.

These facilities will not ordinarily be converted to MAF use, except in the case of small, inconspicuous structures that might be useful and in cases where civilian management problems will not be created by commandeering the buildings.

Hospitals, Dispensaries, and Other Medical Facilities

Appendix 3 (Medical Services) to Annex D (Logistics) to Oplan 1-81 provides a list of the indigenous medical facilities in SYN City. In case of emergency, medical personnel with VII MAF are authorized to use local facilities and supplies; otherwise they will be reserved for use by local medical personnel for the treatment of civilians.

Churches and Museums

Under exceptional circumstances, such as occupation by Aggressor forces, churches and museums may be attacked. Normally they will be entered carefully, searched, and the contents left unmolested.

Indigenous Resources

EQUIPMENT

SELECTED EQUIPMENT ITEMS FOUND WITHIN SYN CITY WILL BE COMMANDEERED BY VII MAF FOR USE BY THE LANDING FORCE. OTHER INDIGENOUS EQUIPMENT, SUCH AS FIREFIGHTING AND MOTOR TRANSPORT VEHICLES, WILL BE MADE AVAILABLE FOR CIVILIAN USE ONCE A REQUIREMENT FOR THESE ITEMS HAS BEEN IDENTIFIED.

A typical city contains many items of equipment that would be of value once the assault has been completed and tactical areas of responsibility have been consolidated. Some items of particular interest to VII MAF include:

- Buses
- MHE
- Cargo vehicles
- Engineer equipment
- GSE (at airfields)
- Lighterage and ferries
- Fire and police vehicles
- Railroad rolling stock
- Loading ramps

This equipment will be used to enhance the health and welfare of the populace as well as augment the logistic capability of the Landing Force.

The civil affairs program implemented by the Landing Force will make maximum utilization of indigenous resources to evacuate, feed, and protect the populace. Although most of the evacuation will be on foot to nearby schools, the availability of commercial buses would speed the evacuation process and provide a greater degree of control during the evacuation. Indigenous motor transport vehicles will be used to move emergency and subsistence supplies to designated locations. These vehicles will be operated by civilians under MAF direction. Police and fire vehicles will be used to accomplish their normal functions. The MAF firefighting capability is limited and fully required at logistics areas and airfields. Control of fires in all other areas is the responsibility of the civil government and all available indigenous firefighting vehicles will be required for that purpose.

VII MAF will commandeer for its own use materials handling equipment, engineer equipment, aviation GSE, lighterage, railroad rolling stock, and loading ramps. All Landing Force elements should be alert to the possible value of indigenous equipment and report locations of this equipment to the appropriate MAF unit commander (i.e., MHE-H&S Bn FSSG, Engineer equipment--Engr Supt Bn FSSG). MHE and engineer equipment will be moved to equipment parks in CSSAs. Aviation GSE, lighterage, railroad rolling stock, and mobile loading ramps will be left in place until a specific requirement forces relocation of these assets. It is expected that USMC equipment operators will be able to use indigenous equipment with minimum, if any, additional training.

Indigenous Resources

UTILITIES AND COMMUNICATIONS

ALTHOUGH VII MAF CAN ACCOMPLISH ITS MISSION IN THE ABSENCE OF VIABLE INDIGENOUS UTILITIES AND COMMUNICATIONS NETWORKS, EVERY EFFORT WILL BE MADE TO SEIZE THESE FACILITIES INTACT DURING THE ASSAULT LANDING SO THAT THEY MAY BE USED TO PROMOTE THE HEALTH AND WELFARE OF ALL PERSONNEL IN SYN CITY.

Dam and Water Distribution System

The SYN City dam is a key facility to be seized in each of the missions in the current and mid-range time frames. The dam and reservoir provide the major source of potable water for the city, although some wells are found in Old City. It is not possible to estimate with any confidence whether or not the Aggressor forces will blow the dam. To do so would deprive the populace of their only major source of water and create very severe problems for them and for the Landing Force. If the dam is blown by the enemy, the Landing Force and Amphibious Task Force will have to provide a water source to meet at least the minimum requirements of the people in addition to the Landing Force requirements ashore. At a 1 qt/man/day subsistence level, four frame-mounted erdalators should be able to meet this additional demand. The FSSG has been tasked to provide necessary resources to accomplish this mission.

If the dam has not been blown, its early seizure will enable the LF to maintain security over it to prevent sabotage or other action by the enemy force or hostile populace. The dam also provides a means for moving troops across South River in the event Bridges 1, 2, and 3 are destroyed during the assault.

The Landing Force will make use of the indigenous water supply and system to the maximum extent possible. An element of the 4th CAG Public Works and Utilities Team (Augmentation) will land at L-hour with BLT 1/3 and begin an evaluation of the water supply system. Municipal workers at the water treatment plant will be strongly encouraged to remain at their jobs with supervision and security provided by VII MAF.

Electric Power System

The main power plant, located at the eastern end of the reservoir and adjacent to the dam, is earmarked for capture at L-hour by a company of BLT 1/3. Technical advisors from the CAG Public Works and Utilities Team will accompany BLT 1/3 and provide a quick assessment of damage to the facility. Probable damage levels were discussed briefly in the introduction to this chapter. Assuming a light level of damage and denial, workers found at the plant will be strongly encouraged to remain at their posts. Supervision and security for the power plant workers will be provided by BLT 1/3 in conjunction with the CAG team. The decision re: providing or denying electric power to the civilian community will be made by the MAF headquarters.

Should the main power plant or distribution system suffer moderate to heavy damage and/or denial, the necessary repairs will probably be beyond the capability of the Landing Force. The decision to repair will rest with the indigenous government, which also shoulders the primary responsibility for the overall health and welfare of the populace. It is expected that the government, if not the workers, will cooperate and implement repairs as soon as tactical areas of responsibility have been consolidated by VII MAF.

Landing Force elements will be authorized to make full use of the civil power system to conserve their organic equipment and fuel. The ability to interface with either European or US electric systems should be a mandatory requirement for all future USMC electrical equipment. Military elements will use organic generating equipment if it is determined that the two systems will not interface.

Utilities and Communications (Continued)

Sewerage

The situation with the sewage disposal system is much the same as with the electric power system. BLTs are landed at L-hour in the immediate vicinity of both municipal sewage treatment plants. Members of the CAG Public Works and Utilities Team will assess the functional capabilities of these facilities and supervise municipal workers at these sites. Although outdoor privies and septic tanks are still in use in scattered locations within SYN City, the majority of the populace relies on the municipal system.

As with the electric power system, the MAF does not have the capability to repair these facilities. Heavy damage to one of the two treatment plants will cause a reduction in the processing capability. Civil information programs would instruct the populace to minimize the load by turning off unnecessary water and careful use of head units. Damage to both plants would force the populace, and VII MAF, to use expedient methods for waste disposal. Suburban families would be encouraged to bury and mark locations of human waste. In densely populated urban areas, local vehicles would be pressed into service, together with local labor, to collect human waste and deliver it to designated areas where it poses no threat to water supplies and where burning or chemical treatment will eliminate other health hazards.

Garbage

Routine sanitary collection and disposal activities in SYN City are expected to diminish to a point of virtually no activity during the assault and initial consolidation phases of Operation BREAKER. Civilians will be instructed to place refuse at existing collection points until a collection system is implemented by the civil-military government. Landing Force units will be required, as limited by the tactical situation, to evacuate their garbage and trash to existing landfills, located in the vicinity of Airfield 1 and CSSA 2. Each unit will be responsible for collecting and disposing of its own garbage; engineer units will not be tasked to provide this service. (Total LF garbage is on the order of 100 ST/day.)

Once major areas of SYN City have been consolidated, a normal collection scheme will be implemented by the civil government using civilian workers. VII MAF resources will not be used to dispose of civilian garbage.

Police and Fire Communications Systems

Seizure of the central headquarters for the police and fire departments is essential. Efforts will be made to assure the cooperation of both organizations in maintaining public safety. If their cooperation is assured, both agencies will be permitted to function with a minimum of interference and supervision by Landing Force units. Their communications systems will be monitored but not expropriated. Lack of cooperation on the part of the police and fire departments will make it necessary to take control of their facilities and communications and to incarcerate the senior personnel and any others suspected of taking an active adversary position against the Landing Force.

VII MAF Provost Marshal, in conjunction with a CAG Public Safety Team, will be responsible for performing liaison with the SYN City Police Department and supervising police public safety activites. CG 7th FSSG will provide liaison and supervision over the SYN City Fire Department and its functions in conjunction with CAG Public Safety personnel. The 7th Comm Bn is prepared to monitor or control police and fire communications.

Telephone System

Landing Force units will be directed to seize telephone exchanges and maintain control and monitoring over the civil system. No use will be made of the civilian telephone system by Landing Force units without authority from headquarters (VII MAF Communications-Electronics Officer). Use of the civil system may be authorized for low-level, unclassified, routine, administrative traffic. In no case will operational or logistical information be transmitted over this system except that relating to civil affairs or military government.

Radio and Television Systems

Prior to the assault, the ATF will monitor all radio and television stations in and near SYN Ctiy, and will be prepared to jam any or all of the stations. During the assault phase, Landing Force units will be directed to accomplish early seizure of these stations to deny their use to the enemy. Once taken, the stations will be kept under guard and made available for use by the 4th CAG for civil information programs. The Communications Battalion has been directed to be prepared to supervise the repair, operation, and maintenance of public communications within its capabilities.

Indigenous Resources

LINES OF COMMUNICATION

GROUND LINES OF COMMUNICATION WILL BE USED EXTENSIVELY BY VII MAF TO MOVE COMBAT FORCES AND PROVIDE LOGISTIC SUPPORT. LOCs IN SYN CITY ARE WELL-DEVELOPED BUT MAY BE SUBJECT TO DENIAL EFFORTS PRIOR TO AND DURING THE AMPHIBIOUS ASSAULT. TACTICAL RESPONSIBILITIES CONCERNING LOCs ARE DELINEATED IN OPLAN 1-81, WHILE CSS EFFORTS ARE DISCUSSED IN CHAPTER V--ENGINEER HORIZONTAL CONSTRUCTION.

Lines of communication in SYN City include roads and thoroughfares, bridges, airfields, and railroads. Every effort will be made to capture these facilities intact; rehabilitative efforts to battle damage will commence late on D+1 and continue for as long as the MAF is in SYN City. Bridges and airfields are primary objectives and are vital to the successful accomplishment of the mission. Selected railroad facilities are certain to be denied to the Landing Force and the rehabilitative effort may exceed the capability organic to the MAF (including the NCR).

Roads and Thoroughfares

Direction and control of traffic will be the responsibility of unit commanders in TAORs and CG 7th FSSG in CSSAs. Designated engineer units will be responsible for maintenance of those roads which are used as MSRs or for other important purposes. An early reconnaissance and survey will be required to determine the suitability of the main thoroughfare west of Airfield 1 to be converted into an EAF, should that become necessary.

Initially, tertiary road networks in selected suburban areas will be used to stock ammunition. The Class V stocks will be placed at the side of designated roads which provide separate entry and exit. Stocks may be placed between private dwellings (other than wood construction) that have been evacuated. Stacks of ammunition will be separated by at least 100 feet to prevent sympathetic detonation. Camouflage will be used as appropriate; traffic will be strictly controlled in these expedient storage areas.

Bridges

Bridges over North and South Rivers are the key to rapid movement and delivery of supplies. The three bridges over South River offer the only rapid means for deploying and resupplying forces south of that river. Their destruction would make it necessary to rely on rafting or causeway ferries, since there is not enough bridging in VII MAF to install more than one span over North River.

Certain bridges will be designated objectives, and their early seizure will be directed to prevent destruction by the enemy. Once they have been

taken, bridges will be inspected immediately to determine whether or not they have been rigged for demolition by the Aggressor forces. The South River bridges will be rigged for demolition by the LF so that they can be dropped in the event the Aggressor forces are able to mount a major armored attack from the south; this area constitutes the greatest armored threat to the LF.

All key bridges will be kept under guard to prevent sabotage by enemy troops or civilians. Surveillance will be maintained over the water approaches to all such bridges.

Airfields

The two airfields within the SYN City metropolitan area will be seized at L-hour. Estimates of damage and repair will be completed as early as possible, and equipment to effect these repairs will be on site beginning on D+1. These airfields, once rehabilitated, will allow the deployment of high-performance aviation assets from theater airfields into SYN City. The ACE will be more responsive to demands for air support once established at Airfields 1, 2, and an EAF to be constructed. The arrival of the first Fly-In Echelon has been slated for D+10 to D+11 depending on the level of damage to Airfield 1.

Civilian aircraft found at either airfield will be impounded, moved to a segregated area, and secured. Repair equipment and POL stocks will be commandeered if they would benefit the Landing Force. Civilian workers will not be required nor used at either facility.

Rail Lines

It will be necessary to make an early assessment of the condition of the railroad line, rolling stock, and other railroad facilities to determine the degree to which these assets can be used by the Landing Force. The lines connecting the port area to Airfield 1 and the western industrial area are of particular interest, since these areas are intended to be used as staging areas for MCATF operations and possible storage sites by follow-on forces. CG 7th FSSG, in conjunction with the CAG Public Transportation Team, will be responsible for evaluating damage and utilization of railroad facilities. Predeployment planning should proceed on the assumption that all motive equipment has been disabled, trackage has been selectively destroyed, and rail lines in the port area have sustained moderate to heavy damage as a result of intense combat in that area.

The anticipated level of damage is such that immediate use of rail lines should not be expected. Any major repairs are beyond the MAF capability and would have to be accomplished by indigenous workers under MAF supervision. The rail system is not expected to play a major role during either the assault or consolidation and engineering resources have not been committed to its rehabilitation. The system will be most valuable once the MAF deploys to the northwest and large volumes of supplies must be moved from the port to forward deployed CSSAs.

Indigenous Resources

SUPPLIES

VII MAF WILL COMMANDEER CONSTRUCTION SUPPLIES AND FUEL STOCKS FOR ITS OWN USE. FOOD, MEDICAL SUPPLIES, EMERGENCY SUPPLIES, AND A LIMITED QUANTITY OF FUEL WILL BE MADE AVAILABLE FOR CIVILIAN USE THROUGH DISTRIBUTION SYSTEMS IMPLEMENTED AND MONITORED BY THE CIVIL AFFAIRS GROUP.

Construction Materials

Construction materials that will be exploited by VII MAF include sand, gravel, cement, lumber, culverts, and steel stock. Expected locations for these materials will be gleaned from pre-operation photographic reconnaissance, and engineer elements are tasked to report additional locations as the assault and consolidation progresses. With the exception of sand procured from beach areas, engineer elements will maintain records of stocks commandeered and forward these reports to the CAG Civilian Supply Team. Civilian requirements for these materials during the assault phase will be minimal and Landing Force requirements will take priority.

Fuel

The landing force will exploit any stocks of POL found to be uncontaminated and suitable for use in USMC equipment. The CG FSSG will be notified of locations and estimated quantities of MOGAS, DF-2, JP-4, greases, lubricants, and other miscellaneous Class III products. These supplies will be drawn down or transferred to established VII MAF bulk fuel storage facilities or stockage points. POL products are normally found at service stations, heavy equipment repair facilities, and equipment yards.

Fuel will be required by authorized civilian agencies to provide subsistence support and ensure public safety. Fuel consumers will include motor transport, fire, and police elements within the civil government. The Civilian Supply Team within the CAG will allocate this fuel on an as-required basis.

Subsistence Supplies

The Civilian Supply Team is tasked with the mission to catalog all indigenous supplies, especially those that would be of immediate benefit to the populace or those that would be restricted for civilian use. Since refugees and evacuees will require support beginning on D+1, and civilian food stocks, including nonperishables, are expected to run low by D+10, one of the first priorities for the Civilian Supply Team will be to locate, catalog, and make available for distribution any food items. This action will minimize the overall level of subsistence support required of the Landing Force and the level of security that must be accorded to caches of food.

Indigenous Resources

HUMAN RESOURCES

PROPER MANAGEMENT OF THE HUMAN RESOURCES IN SYN CITY IS THE KEY TO THE SUCCESSFUL ACCOMPLISHMENT OF THE MAF MISSION. HUMAN RESOURCES MAY ACT AS A FORCE MULTIPLIER OR AS AN INSURMOUNTABLE OBSTACLE DEPENDING ON THE MANNER IN WHICH THEY ARE UTILIZED, CONTROLLED, AND PROVIDED INFORMATION.

An assault into an urban area cannot be conducted in the face of determined and violent resistance by the populace. The Landing Force must convince key civil agencies and departments that cooperation is in the best long-term interest of the populace. Key officials must be identified prior to the operation and located as soon as possible after the assault landing. The Civil Affairs Group, elements of which should be embarked with the Assault Echelon, provides the interface between the populace and the Landing Force.

Elements of the population whose cooperation will be sought fall into several broad groups.

- Key government officials (ESSENTIAL)
- Municipal utility workers (water, electric, sewer, sanitary disposal) (ESSENTIAL)
- Firemen and police (ESSENTIAL)
- Transit and motor transport operators (HELPFUL)

Indigenous Resources

SUMMARY

URBAN AREAS HAVE THE POTENTIAL FOR PROVIDING KEY RESOURCES OR FACILITIES THAT MAY BE USED TO ENHANCE THE MILITARY CAPABILITY OF THE LANDING FORCE AND SUSTAIN THE INDIGENOUS POPULACE.

Resources and facilities subject to Landing Force use have been discussed briefly in previous sections as to general patterns of utilization. These preliminary analyses must be reevaluated once the MAF has landed and subordinate units have had the opportunity to conduct ground reconnaissance to supplement any information provide by in-country agents and photointerpretation teams. The object of the total reconnaissance effort is to provide a quantitative and qualitative analysis of all available resources.

While all of the resources are important to the Landing Force mission, the availability of selected areas, facilities, and supplies are vital. These key resources and their intended uses include:

- Fields, Surfaced Areas - Supply storage, maintenance
- Woods - Tactical billeting, supply storage
- Port - Focal point for cargo throughput
- Prison - Primary detention facility for POWs and civilian internees
- Airfields - Basing for high-performance aircraft, emergency resupply, medevac
- Schools - Primary relocation sites for evacuees
- Public Buildings - Major CPs, storage, sanitary facilities
- Private Dwellings - Billeting, minor CPs
- Bridges - Intact capture vital to conserve limited bridging assets
- Roads - Class V storage (tertiary roads), MSRs
- Construction Supplies - Airfield, road, and port rehabiiltation
- Key Municipal Workers - Civil/Military interface and operation of utilities

NATURAL	1. Farms	EQUIPMENT	1. MHE	STRUCTURES	1. Warehouses
	2. Fields		2. Motor Transport		2. Schools
	3. Woods		3. GSE (Aviation)		3. Police & Fire Stations
	4. Surfaced Areas		4. Engineer		4. Stores/Shopping Centers
	5. Interment Sites		5. Public Safety		5. Private Dwellings
	6. Lakes/Ponds				6. Hotels/Apartments
	7. Swamps	SUPPLIES	1. Construction		7. Medical
	8. Rivers		2. Subsistence		8. Churches & Museums
FACILITIES	1. Port		3. Fuel		
	2. Prison		4. Medical		
	3. Bulk Fuel Complex			UTILITIES & COMMUNICATIONS	1. Water Treatment
	4. Naval Station	HUMAN	1. Civil Government		2. Electric Power
	5. Industrial Areas		2. Utility		3. Waste Treatment
	6. Airfields		3. Public Safety		4. Sanitary Disposal
			4. Equipment Operators		5. Police & Fire Comm.
			5. General Populace		6. Telephone
ROADS	1. Roads				7. Radio & Television
	2. Bridges				8. Newspapers
	3. Railroads				

	RESOURCE UTILIZATION														MANAGEMENT BY VII MAF*	
	MILITARY REQUIREMENT									CIVIL REQMT						
RESOURCE	MOBILITY	COUNTERMOBILITY	SURVIVABILITY	GENERAL ENGINEERING	CMD. CONTROL. COMMUNICATIONS	SUPPLY	MAINTENANCE	PUBLIC SAFETY	PUBLIC HEALTH	PUBLIC INFORMATION	NO IDENTIFIED REQMT	CA MANAGEMENT	GCE MANAGEMENT	ACE MANAGEMENT	CSSE MANAGEMENT
NATURAL	1,2, 4,6, 8	3,6, 7,8	3	3,6 8		2,3, 4,8	4	6,8	1,5, 6,8			1	2,3, 6,7		4
FACILITIES	3,6			5		1,3	4,5	2						6	1,2, 3,4, 5
STRUCTURES			**		1,3, 5,6	1,4	1	2,3	4,7	3	8	ALL			
UTILITIES AND COMMUNICATIONS				1,2, 3,4	5,6, 7,8			1,5	1,2, 3,4	7,8		ALL			
LOCs	ALL														1,2, 3
EQUIPMENT	2,4	4	5	4		1,2	3	5	2			5		3	1,2, 4
SUPPLIES	1,3	1	1	1		1,3			2,4			2,4			1,3
HUMAN				2	1,3			3,4	2	1,5		ALL			

*GENERAL MANAGEMENT RESPONSIBILITY NOTED SHOULD BE REEVALUATED ON A CASE-BY-CASE BASIS ONCE ASSAULT UNITS HAVE LANDED

**AS REQUIRED: STRUCTURE TYPES WILL VARY

See Key on Facing Page

Figure VI-2. VII MAF Utilization of Indigenous Resources

CHAPTER VII

LOGISTIC PLANNING FACTORS AND USAGE RATES

Logistic Planning Factors and Usage Rates

INTRODUCTION

COMBAT IN BUILT-UP AREAS NECESSITATES MODIFICATIONS TO SUPPLY REQUIREMENTS AS WELL AS OPERATIONAL TACTICS. THE ULTIMATE SUCCESS OF VII MAF ELEMENTS COMMITTED WITHIN THE SYN CITY METRO AREA WILL BE SIGNIFICANTLY AFFECTED IF CRITICAL MATERIAL ITEMS HAVE NOT BEEN IDENTIFIED, PROCURED, AND MADE AVAILABLE FOR SHORT NOTICE EMBARKATION.

This chapter is intended to give estimates for usage and resupply quantities for all classes of supply for VII MAF elements committed to offensive operations in the SYN City scenario. These logistic planning factors and usage rates are only preliminary planning factors and must be modified based on actual usage once combat has been initiated. General influences of logistic planning factors include, but are not limited to:

- Mission of both Threat and friendly forces.
- Area of operational commitment.
- Intensity of combat.
- Specific force structure of opposing units.
- Rules of engagement and weapons effectiveness.
- Mission importance within the overall strategic and tactical plan.
- Availability of indigenous or captured materiel.

The combined effect of these general influences must then be related to specific tactical and operational considerations that are unique to urban combat in the SYN City scenario.

Given the SYN City environment and the concept of operation that has evolved for VII MAF to accomplish its mission, there occur some specific influences on supply planning that deserve mention.

- Although the majority of VII MAF is committed within the SYN City metropolitan boundary, Task Force "A" (MCATF w/2nd Tk Bn, 1 AAV Co, BLT 2/1, Engr Plt) will be conducting mechanized operations NW of SYN City. Most artillery fires will be directed outside SYN City as will most tactical air strikes.
- The majority of the fixed-wing assets of the ACE will be based at theater facilities or amphibious platforms until minimum support facilities are operational at Airfields 1 and 2.
- As soon as the FBH has been secured, MCATF operations will be initiated to screen the FBH and interdict Threat reinforcement efforts.
- SYN City has an established port, LOCs, storage facilities, utilities.
- Movement corridors into and within SYN City are restrictive both to the attacker and defender.

The logistic planning factors developed in the following pages reflect the influences of all general and specific factors inherent in the SYN City operation and could be expected to vary with other urban environments. Pre-operation aerial photographic reconnaissance supplementing existing intelligence data bases will be the key for successfully planning combat service support including usage rates and required replacement factors.

Equipment and organizational modifications or introductions anticipated during the mid-range time period include the following:

Organizational	Equipment
• Mechanized infantry units	• Next generation of communications gear
• LAV units	• HMTT, LAV, LVT(X)
• Mechanized engineer units (ad hoc)	• MCESS, reverse osmosis purif equip
• Strength changes due to new equipment	• Improved engineer equipment
	• XM 198, XM244, XM224 weapons
	• LCAC (USN)

These equipment and personnel changes will have a direct effect on the usage rates for all classes as well as priorities for replacement of inoperative equipment. Doctrinal changes by either Threat or friendly forces will also impact on logistic planning factors.

Logistic planning factors given in the remainder of this chapter are properly termed usage rates rather than replacement rates. The distinction between the two terms is that the usage rate refers to the quantity of items requiring replacement while the replacement rate is that quantity of items which can actually be replaced as based on inventory stockage, transportation requirements, and budgetary constraints. Most items will have a replacement rate that is equal to the usage rate. Capture of significant stocks of indigenous engineer contruction materiels in SYN City might militate in favor of reducing the overall replacement factor for these items for this particular scenario.

General usage rates and replacement factors to be used in any environment are derived from historical data concerning similar conflicts updated by the results of automated models and simulations, physical and operational characteristics of the item itself, and influences of both a general and specific nature. Commitment of a MAF to an operational area with known characteristics will necessitate modifications to the general usage rates to provide a more accurate estimate of logistic requirements. Accurate estimates of resupply requirements will promote more efficient usage of budgetary monies for inventory stockage, transportation assets, and CSS provided by other elements in support of the resupply process.

Logistic Planning Factors and Usage Rates

CLASS I - SUBSISTENCE

DURING PERIODS II THROUGH VI, THE OVERALL PLANNING FACTOR FOR CLASS I ITEMS IS 4.68 LB/MAN/DAY AND IS DERIVED FROM SPECIFIC PERSONNEL STRENGTHS AND DIFFERING RATION MIXES DURING EACH PERIOD.

The planning factor or usage rate for Class I items is heavily influenced by the mixture of ration types over the duration of the operation, the percentage of personnel consuming each ration mix, and the physical characteristics of the ration components. General guidance concerning ration mixes is given by MCO P4400.39D which delineates the ration mix for ground troops and aviation/support troops. During the initial 30-day period, ground troops will consume 15 days B rations and 15 days C rations while other troops will eat a total of 25 days B rations and 5 days C rations. Personnel strengths within the FBH are given in Annex P (CSS) to OPLAN 1-81 for each period. (See Food Service section in Chapter V for additional information concerning the food service concept.) The particular ration mix during the 30-day offensive period investigated is given in the table below.

PERIOD	PERSONNEL (Ground Combat)	PERSONNEL (Avn & FSSG)	PERSONNEL (Total)	RATION MIX (Ground)	RATION MIX (Avn & FSSG)
II (D-Day)	12,141	308	12,449	All C	All C
III (D+1 to D+3)	20,706	3,918	24,624	All C	All C
IV (D+4 to D+6)	18,221	11,607	29,828	2C, 1B	1C, 2B
V (D+7 to D+10)	18,019	18,354	36,373	1C, 2B	All B
VI (D+11 to D+30)	17,445	24,861	42,316	1C, 2B	All B

This food service schedule is based on the worst-case assumption that hot meals are not available prior to D+4. The actual ration mix is 14C/17B for ground combat troops and 5C/26B for aviation and FSSG personnel. Only personnel actually within the FBH are considered when calculating the Class I usage rate. This rate does not include the influence of personnel remaining aboard assault shipping or deployed at theater air facilities consuming different ration mixes than those within the FBH. Data concerning physical characteristics of rations and supplemental items is shown below.

ITEM	WT/RATION	CUBE/RATION
C ration	6.25 lb	.2 CF
B ration	3.792 lb	.1164 CF
Trioxane	.18 lb	.00775 CF
Sundries Pack	.41 lb	.169 CF

A complete C ration will be composed of the ration itself plus one intermediate package of trioxane plus a ration sundries pack totalling 6.84 lb @ .37675 CF. The complete B ration will include the ration plus the sundries pack or 4.202 lb at .2854 CF. Although trioxane is properly classified as a Class III consumable item, it has been included in the Class I computations for convenience to give a more complete planning factor for Class I.

Using the specific ration mixes and personnel strengths, the averaged ration weight and cube for each period is below.

PERIOD	LB/MAN/DAY	CF/MAN/DAY
II	6.84	.3768
III	6.84	.3768
IV	5.43	.2562
V	4.29	.1594
VI	4.21	.1521

The overall factor for the 30-day offensive period (actually 31 days including D-day) is 4.68 lb/man/day at .187 CF/man/day for all personnel within the FBH.

This overall Class I planning factor is valid for only those personnel in the FBH during Periods II through VI for the SYN City scenario. It should not be applied for other USMC personnel groupments in other tactical situations or scenarios. The planning factor for personnel at theater air facilities or aboard ship will be approximately equal to 6.54 lb/man/day which is the total weight of an A ration.

Day of supply planning factors contained in Annex P to OPLAN 1-81 are calculated based on standard USMC approved planning factors given in the JSCP. The 7.05 lb/man/day Class I factor, given in the JSCP, is based on the ration mix over a 180-day period and includes in-flight and A rations. The overstatement of Class I tonnage varies from 3 percent (Periods II and III) to 67 percent (Period VI). This phenomenon is not MOBA-peculiar but results from the ration mix given in MCO P4400.39D and the relatively short time period considered in relation to a 180-day consumption period.

Logistic Planning Factors and Usage Rates

CLASS II - SECONDARY EQUIPMENT ITEMS

CLASS II SUPPLIES INCLUDE A VARIETY OF INDIVIDUAL AND ORGANIZATIONAL ITEMS OF EQUIPMENT AS WELL AS THE MAJORITY OF TYPES 2 AND 3 ITEMS. ANALYSIS OF SELECTED CLASS II ITEMS INDICATES THAT MANY REPLACEMENT FACTORS MAY REQUIRE MODIFICATIONS AS A RESULT OF THE INFLUENCE OF URBAN COMBAT.

Class II items are divided into subclasses as follows:

- Class II(A) - Air
- Class II(B) - Ground Support Material
- Class II(E) - General Supplies
- Class II(F) - Clothing and Textiles
- Class II(M) - Weapons
- Class II(T) - Industrial Supplies

With the exception of J3035 Portland Cement, J3090 Lumber Products, J3200 Roofing felt, and N6021 Launcher 35mm Practice, all Type 2 "as required" items are contained in Class II as well as most Type 3 items requiring special control. Allowances for all but a few Type 2 and 3 items are omitted from the TAM since requirements for these items are highly scenario-dependent and are authorized by the CG, FMF. Many of the Class II items are expendable or are consumable in nature and must be resupplied on a recurring basis. Other items such as tool sets and individual weapons are durable and will require replacement only through combat action precipitating loss, damage, or destruction.

The influence of urban combat on Class II items surfaces in several ways. All Class II items are man-portable and may be stolen by civilians or by friendly troops for barter purposes in the absence of money. Survival-type items such as water cans, flashlights, body armor, and tools would experience a greater loss or disappearance factor as these items are pilfered by civilians. Individual weapons, being more effective for close-in fighting, would also be expected to show a greater usage rate from combat action as well as pilferage. Engineer demolition equipment and rope would be used extensively to breach building walls and reduce urban fortifications. Damage from wear and tear, hostile fire, and misplacement account for much of the replacement of individual items within these demolition sets. The likelihood of repeated chemical attacks increases greatly the requirement for replacement of chemical protective clothing and detector sets. WD-1/TT telephone cable will show an increased replacement rate as a greater percentage of the communications net ashore will be composed of wire due to short inter-unit distances. Sabotage actions by enemy troops and civilians will further increase the usage rate.

In the SYN City environment in particular, Threat force artillery delivery systems are within range and capable of chemical agent delivery at

any time. Deployment into SYN City during the winter may necessitate issue of selected Type 3 items. Much of the land area is urban in nature and will require extensive use of combat engineer breaching techniques and related equipment. Although the overall usage of tentage would decrease as a result of personnel and supplies occupying indigenous structures, replacement of individual clothing during the initial stages of intense combat may be required by chemical contamination, wear and tear, and the initial nonavailability of laundry services.

The mid-range time period will probably include minor modifications to tools, clothing, tentage, general supplies, and ground support material. Individual and small crew-served weapon introductions may include the XM 249 5.56 MG, 9mm pistol, improved M16A1 rifle, and improved man-portable antiarmor weapons. Threat equipment may also be expected to undergo similar changes. Evolution of doctrinal tactics will not significantly affect usage of Class II items with the exception of the employment of CB weapons. Winterization kits will be altered to fit the HMTT-series vehicles and maintenance tool sets will be reconfigured to reflect maintenance tasks imposed by new items of equipment. Camouflage nets (LSS) will be used extensively until other methods are found to defeat visual and IR surveillance. Class II items currently designated HIGH USAGE will continue to be high usage items in MOBA operations in the mid-range time period.

A replacement factor is defined by JCS Pub. 1 as being "the estimated percentage of equipment in use that will require replacement during a given period due to wear out beyond repair, enemy action, abandonment, pilferage, and other causes, except catastrophes." Marine Corps replacement factors are expressed in terms of a thirty-day period and are further broken down depending upon where the combat is located (Europe or Worldwide) and whether the action is intense or sustained. It should be further noted that the replacement factor may be influenced by budgetary, stockage, and transportation constraints as well as the phase-out of obsolete equipment. Not all combat losses must be replaced. With the introduction of the XM 249 5.56mm MG, the replacement of M60 7.62mm MGs would be curtailed and replacements with the XM 249 would commence as soon as ammunition stockages could be altered.

Usage rates and replacement factors included in the TAM have been derived using historical experience, computer modeling and simulation, and group discussion by informed members of a USMC CARF (Combat Active Replacement Factor) Review Board. The factors are intended to give general guidance concerning resupply requirements and must be modified to reflect the particular mission, threat, and environment in which the Marine element is engaged. These factors are all preliminary estimates and would be modified once the unit was engaged in actual combat. Many of the replacement factors reflect the traditional Marine Corps mission of amphibious assault over a sparsely populated beach area and subsequent seizure and defense of a FBH until follow-on forces arrived in the AOA.

Logistic Planning Factors and Usage Rates

Class II - Secondary Equipment Items (Continued)

HQ USMC recently sponsored a study produced by SRI International and entitled "Logistics Planning Factors Study: Combat Active Replacement Factors (CARFs) For Supply Classes II(W) and VII(W)." This study has been produced as a final report but does not, as of the printing of this TR, bear the official approval of the CMC, nor has the study been staffed through the various concerned sections at HQ USMC. The SRI study also uses historical experience, threat, doctrine, and mission to modifiy US Army WARFs (Wartime Replacement Factors) to Marine Corps items and equipment. In many instances, the Army WARF may be the more accurate replacement factor especially when considering prolonged land combat or MCATF operations. Guidance provided by a HQ USMC letter LBC-RCC/vmd dated 16 April 80 suggests that future methodology for determination of CARFs will use to the maximum extent the US Army methodology used to derive WARFs. Modified WARFs that produce preliminary CAARs (Combat Active Attrition Rates) will be reviewed by the Replacement Factor Review Board, converted to CARFs, and recorded in the IDF (Item Data File) within the Logistics Management Information System (LMIS). The SRI CARFs reflect combat losses during long-term operations ashore but do not include the influence of urban combat.

One of the key phases in the translation of WARF values to CARF values is the matching of Marine Corps equipment designated by TAMCN to US Army equipment identified by Line Item Number (LIN). Much of the USMC equipment is identical in nature and use to US Army equipment and would be expected to have a similar usage rate and replacement factor. Three criteria for equipment item matching between uniformed services are exact matches of National Stock Numbers (NSN), iterative matches involving variations in model configuration, and applicative matches between items with similar intended uses or physical characteristics.

MOBA CARFs for the offensive phase of the operation were derived by a group of technical analysts familiar with the SYN City data base and scheme of operation, Marine Corps equipment, and combat operations in an urban environment. Over half of the group totaling six had direct combat experience during conflicts in WWII, Korea, or Vietnam. The group was tasked to estimate Class II replacement factors for selected items and was given the current TAM CARF and SRI CAAR when available. Individual surveys were compiled and analyzed; group discussions were held concerning replacement factor values that varied widely between individuals. The resulting values are presented in the right-hand column of the table on the opposite page. The validity or accuracy of these values can be established only by further modeling, group surveys, and ultimately, actual combat.

TABLE VII-1. MOBA COMBAT ACTIVE REPLACEMENT FACTORS FOR SELECTED CLASS II ITEMS

CLASS II SELECTED ITEMS

NOMENCLATURE	TAMCN[1]	SUBCLASS[2]	TAM CARF 1		MOBA CARF
			EI	ES	OFFENSE
Armor, body	K4004	E	NL	NL	.1333
Bayonet, M7	E0050	E	.0800	.0400	.0600
Block & tackle set	B0090	T	NL	NL	.1158
Cable, tele, WD-1/TT	H2100	B	.1700	.0850	.2150
LSS, camouflage net	C4261	F	.3321	.1660	.1857
LSS, support system	C4260	F	.3321	.1660	.1857
Can, gasoline, 5G	K4128	E	.0200	.0100	.0330
Can, water, 5G	V4455	E	.2000	.1000	.2100
Clothing, outfit, chem, 1 unit	C2035	F	.0560	.0280	1.3750
Clothing, outfit, chem, ensmbl	C2130	F	4.884	2.442	2.0000
Decom kit, M13	C2065	E	NL[4]	NL	1.000
Demo equip, engr sqd	E0280	E	.0600	.0300	.2430
Demo equip, indiv	E0290	E	NL	NL	.2430
Detector kit, M256	C2101	E	.0660	.3300	.4674
Dispenser, RCA, port, M3	E0320	E	NL	NL	.2349
Flashlight, plastic	K4352	E	NL	NL	.0600
Generator, smoke, M3A3	E0520	E	NL	NL	.0580
Htr, space, 60000 BTU, M1950	V4550	E	.0600	.0400	.0430
Individual clothing, ensemble	Various	F	NL	NL	.7000
Individ clothing, ensemb, cold	Various	F	NL	NL	.7000
Landing boat, inflat, 7-man	C5170	E	.1600	.0800	.0960
Launcher, grenade, M203	E0692	M	.1400	.0700	.1870
MG, 7.62mm, M60	E0990	M	.2350	.1150	.4230
MG, cal .50, M2	E0980	M	.0600	.0300	.2495
Minefield marking set	B1320	E	NL	NL	.0975
Night vision sight, individ	E1158	B	.1647	.0830	.1928
Rifle, 5.56mm, M16A1	E1440	M	.2293	.1025	.2464
Rope, manila, 3/4"	J3215	E	NL	NL	.6767
Shop sets & equipment, various	E1644 thru E1720	E,E	NL	NL	.1755
Shotgun, 12 ga, M870/MK1	E1760	M	.2000	.1000	.4000
Tool kits and sets, various	E2010 thru E3170	B,E,T	NL	NL	.0755

Note 1 - From NAVMC 1017 - TAM Revision #6, 25 Nov 80

2 - Subclass commodity designator, all items Type 1 material
B - Ground support K - Tactical vehicles E - General Supplies T - Industrial Supplies
G - Electronics M - Weapons F - Clothing & textiles

3 - - CARF not evaluated

Logistic Planning Factors and Usage Rates

Class II - Secondary Equipment Items (Continued)

A comparison of the replacement factors presented reveals significant disparities between Marine CARFs and BDM MOBA CARFs. Items with higher MOBA applicability and usage will require replacement in proportion to that usage. These HIGH USAGE items are:

- MG, 7.62mm, M60 (and XM 249 replacement)
- Rifle, 5.56mm, M16A1
- Demolition equipment, engineer squad
- Demolition equipment, individual
- Chemical protective ensembles both one-piece and overgarment
- Chemical detection and decontamination kits
- Flashlights, water cans, and manila rope
- Individual clothing ensembles
- WD-1 telephone cable
- M203 grenade launcher
- Night vision sights
- Shotguns

The overall influence of urban combat upon the Class II planning factor is widely varied and depends upon the individual item selected. Establishment of a MOBA PWRMS Project Stock would include additional allowances of many Class II items. The situation is further clouded since the USMC is currently in the process of reevaluating all Class II planning factors using US Army WARF data. MOBA CARFs suggested in this study should be incorporated into refined and staffed planning factors developed as a result of the SRI Class II (W) and VII (W) study. A consolidated planning factor can then be computed by applying individual item CARFs to item densities within the MAF structure. Any estimate of this consolidated Class II (W) planning factor before the SRI study has been fully staffed would be premature.

Although precise changes are difficult to estimate without running the MAGTF Lift Model with the revised CARF data, general trends and influences on the subclasses composing Class II are presented below. These estimates represent subjective judgements by BDM analysts in the absence of detailed analyses possible with the MAGTF Lift Model. (The modification and running of the Lift Model to quantify the MOBA influence on Class II planning factors was clearly outside the scope of this study.)

Class II	(A) - No Major Change	(F) - 5% Increase
	(B) - 5% Increase	(M) - 25% Increase
	(E) - 20% Increase	(T) - 15% Increase

It is recommended that additional efforts be directed toward modifying the CARF determination process to include a MOBA category. These modifications will provide a method by which preliminary assessments given above can be quantified and analyzed in relation to nonurban usage rates.

Logistic Planning Factors and Usage Rates

CLASS III - PETROLEUM, OILS, AND LUBRICANTS

OPERATIONS IN AN URBAN ENVIRONMENT WILL REDUCE CONSUMPTION RATES OF CLASS III BULK PRODUCTS. CONSUMPTION OF PACKAGED COMPONENTS WILL DECREASE SLIGHTLY. USAGE RATES FOR THE GROUND COMBAT ELEMENT OF VII MAF ARE ANALYZED IN RELATION TO ESTABLISHED FACTORS GIVEN IN THE TAM AND MAGTF LIFT MODELS.

Class III products include a variety of chemical compounds of which the majority by volume and weight are petroleum-based. Some of the different types of Class III items are:

- Fuels - MOGAS, Diesel, Kerosene, JP
- Oils - internal engine, special purpose
- Lubricants and greases
- Hydraulic and insulating oils
- Preservatives
- Liquid and compressed gases
- Bulk chemical products
- De-icing and antifreeze compounds
- Coal, coke

The following analysis will focus on ground usage of fuels, oil, lubricants and greases in an urban environment. Usage of hydraulic and insulating oils, liquid and compressed gases, and de-icing compounds will remain at the current level which should be based on the requirements of individual equipment items requiring these products. Preservatives for long-term storage will not be used while the MAF is in an offensive posture. The only foreseeable uses for coal or coke are tied directly to SYN City as is the possible requirement for antifreeze compounds.

Existing Computational Methodologies

USMC fuel consumption factors are given in NAVMC 1017 - Table of Authorized Materiel (Revision #6). Consumption rates for all USMC fuel consumers are expressed in terms of gallons per hour for a set number of hours per day use. The USMC methodology for estimation of fuel requirements is to sum over all fuel consumers the individual consumption rate multiplied by the daily operating time multiplied by the number of similar equipment items. Lubricating oils and greases are computed in the following manner based on instructions in the TAM:

- Lube Oil, Internal (gal): 3% of MOGAS total PLUS 3.5% of Diesel total
- Lube Oil, Gear (gal): .5% of total MOGAS and Diesel
- Greases (lb): 1% of MOGAS total PLUS 3% of Diesel total
- Kerosene (gal): .5% of total MOGAS and Diesel

Rodent control is estimated to require .12 gal/person/30 days or .004 gal/person/day of any type of bulk fuel.

The USMC method for computing ground fuel requirements is simple and has been incorporated into the MAGTF Lift Model. Estimates of fuel requirements are available for all FMF units or typical groupments of units (MAU, MAB, MAF). The problem with this methodology lies in its simplicity since it was designed to provide general estimates for long-term fuel use in an unspecified environment. The fuel planning figures for individual equipment items are not sensitive to combat intensity nor daily displacement distances. The usage of particular equipment items would also be influenced by the specific operational environment.

The simplicity of the USMC fuel consumption methodology and its insensitivity to the peculiarities of urban combat led BDM analysts to examine other methods by which the fuel estimate could be tailored closer to the requirements of Operation BREAKER.

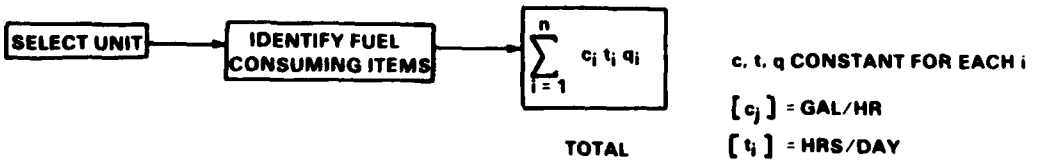


Figure VII-1. Class III(W) Computational Methodology - USMC

Class III - Petroleum, Oils, and Lubricants (Continued)

Overall fuel usage (U.S. Army methodology) is based on the combined requirements for displacement, supply, service, housekeeping, and stationary equipment with a 10% waste factor being applied to the total bulk fuel requirement by each type of fuel. Most of the bulk fuel usage in a ground combat element comes from the displacement of unit vehicles. Logistic operations involving movement of supplies internally within an Army division are equal historically to 10% of the total organizational consumption per kilometer of displacement multiplied by the total round-trip supply distance. When the supported maneuver element is occupying a static position and co-located with the supply element, the supply requirements for fuel are not computed separately but are included in the housekeeping requirements. Service requirements are supplemental fuel usages for tactical vehicles to allow for engine warm-up, reconnaissance, movement within the bivouac area, and low RPM operation. Fuel usage rates to satisfy service requirements are influenced by climate, topography, tactical operations, and intensity of combat. FM 101-10-1 states that under average conditions the service requirements for bulk fuel can be estimated by using the total organizational consumption required to displace 16 km over a road surface (vice cross-country movement). Housekeeping requirements include fuel consumed by vehicular maintenance, administrative vehicles, and heating units. Static units will use a composite estimate. FM 101-10-1 gives a daily factor of 4000 gallons (type unspecified) per division.

Many units' housekeeping requirements are absorbed under service requirements. Stationary equipment such as generators, refrigerators, bath units, M12IA1 decontamination apparatus, and air compressors also consume fuel based on the timed usage of each equipment item. A standard 10% waste factor gives an estimate of bulk fuel losses through spillage, evaporation, and small combat losses, such as individual vehicle fuel supplies rather than entire tank farm assemblies.

U.S. Army methodology for predicting fuel consumption in a given situation is based on organizational fuel consumption per kilometer of displacement. This figure is the summation of all fuels required to move the unit's self-powered equipment and vehicles a displacement of one kilometer. If the average gallons per kilometer consumption data is known for each item, then the displacement calculation becomes quite simple. Unfortunately, USMC fuel consumption data, as provided in TAM Revision #6, is expressed solely in terms of gallons per hour usage.

The calculation process (USMC) requires less time than the Army process but the consumption rates by the Army method should be more accurate as they are influenced by the specific tactical operation. To provide more flexibility for planning and computation purposes it is recommended that average miles/gal or better yet gal/km data for non-stationary equipment be provided in future TAMs.

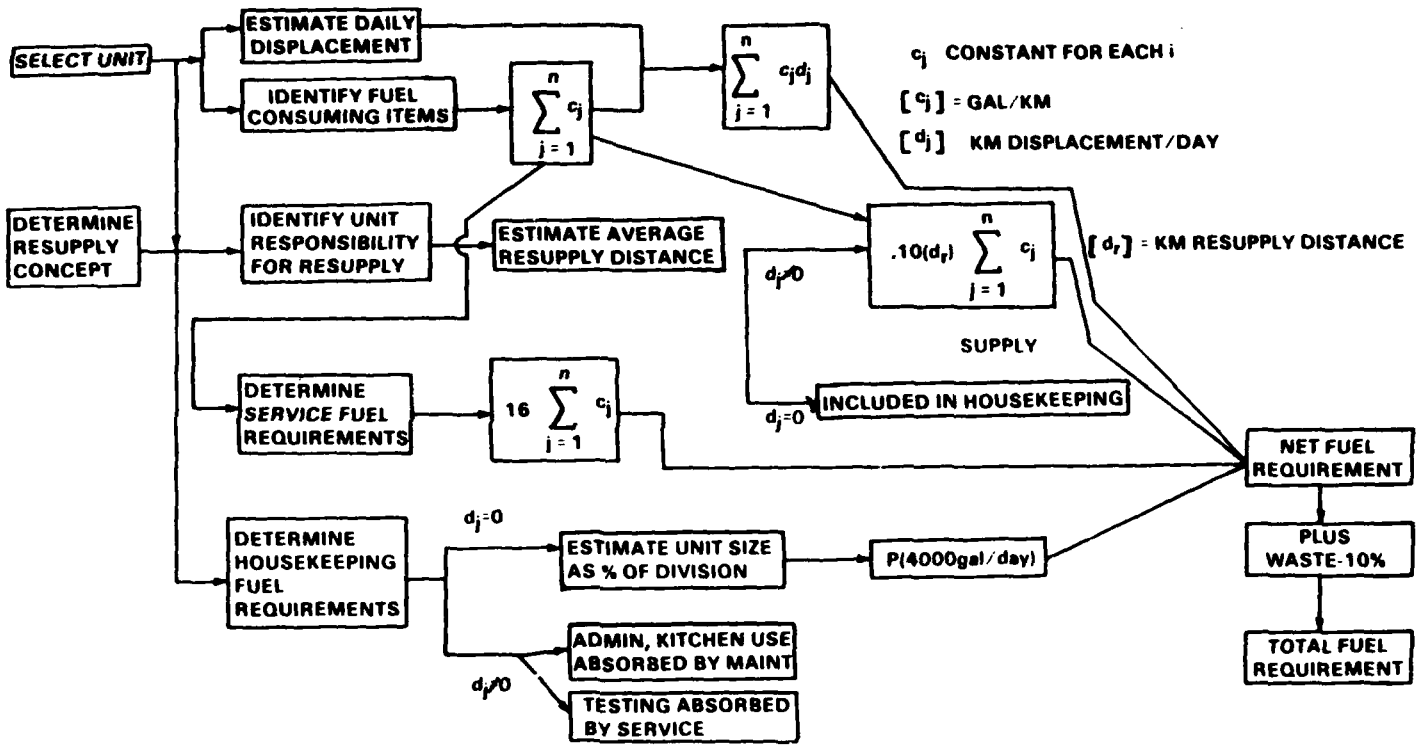


Figure VII-2. Class III(W) Computational Methodology - US Army

Logistic Planning Factors and Usage Rates

Class III - Petroleum, Oils, and Lubricants (Continued)

Urban Peculiarities

The influence of urban combat upon ground fuel usage will be significant. Urban infrastructures restrict movement to established corridors and LOCs. Weapons that have high kill probabilities at close to near ranges will be used in preference to guided or indirect fire weapons. Fuel-burning equipment that is not suited to urban combat will not be used except to provide backup for other systems. Fuel used to power C^2 equipment, i.e., radios, radar, ECM gear, will remain the same as in a conventional environment. The more dense the city, the less fuel will be used by tactical combat vehicles.

The SYN City environment, in conjunction with the tactical concepts employed in Operation BREAKER, provides additional considerations for the calculation of fuel consumption.

- Seizure and consolidation of LF/ATF Objectives located in dense urban areas will be accomplished by dismounted infantry troops.
- MCATF operations west of SYN City will commence on or about D+4 to consolidate the FBH and destroy enemy forces within a 45 km radius from SYN City.
- All tactical operations within SYN City occur within a radius of 10 km from the SYN City geocenter.
- Equipment assets are phased ashore as dictated by the Landing Plan as modified by the actual combat situation.
- Embarked aviation, helicopters and VSTOL, will accomplish most refueling aboard ship prior to D+4.
- Fixed-wing assets will not be brought ashore until D+10 due to the lack of suitable landing surfaces prior to airfield rehabilitation.
- Vertical lift will be used exclusively for resupply of outlying units until the end of D+3.
- Requirements for fixed-wing aviation will be heaviest outside the SYN City metropolitan area to attrite and delay Threat reinforcing and counterattack efforts.

These influences suggest that a lower than normal Class III (W) consumption should be expected of units within the metropolitan boundary, while the fuel consumption by MCATF elements outside SYN City should be greater than that estimated using the standard USMC methodology. Aviation fuel usage is most heavily influenced by combat operations against Threat forces external to SYN City. Planning factors for Class III (A) should approximate those anticipated during a conventional (i.e. nonurban) operation.

- Daily unit displacements may be measured in terms of blocks rather than kilometers or miles. Stiff resistance by dug-in enemy units may decrease the daily advance to a matter of feet -essentially a stationary position.
- Round-trip resupply distances will be shorter in urban combat than conventional combat over a wide battlefield.
- Service fuel requirements will increase as vehicles are sited within structures or idled pending forthcoming fire missions or other tactical missions.
- Total daily fuel for stationary equipment will decrease if essential utilities (water, gas, electric) are captured intact and maintained under the supervision of MAF engineers.
- The wastage factor should be increased by at least 5% to account for civilian pilferage and sabotage of POL stocks.
- Many self-propelled major weapons systems will be employed differently in an urban environment. Tanks, AAVs, and SP howitzers will be utilized in fewer numbers than a normal force task organization would dictate.

Figure VII-3. MOBA Considerations Regarding POL Usage

Logistic Planning Factors and Usage Rates

Class III - Petroleum, Oils, and Lubricants (Continued)

BDM Computational Methodology

After an analysis of USMC and US Army fuel estimation processes, BDM analysts concluded that neither method provided the sensitivity to quantify fuel usage during the initial stages of an amphibious assault into an urban area. One method (USMC) was not sensitive to combat intensity or displacement distances, while the other method (US Army) was based on US Army tables of equipment and unit equipment densities. It was deemed necessary to develop a new methodology based loosely on a combination of existing methodologies.

The fuel consumption model, as developed by BDM, was required to be sensitive to the following factors:

- Radius of combat action for each major subordinate unit (down to Co level).
- Location of and distance to major logistic support activity (BSA, CSSA).
- Individual equipment item fuel consumption patterns and parameters.
- Realistic phasing ashore of equipment assets during AE and AFOE landings.
- Phase of combat action within the assault, seizure, and consolidation of SYN City.

The first stage in the model development was to examine the location and action of VII MAF elements during each period of the amphibious assault. Major unit locations and bases of operation were than related to a radius of combat action and a distance to the nearest BSA or CSSA. These locations and associated distances are shown in the table below. The model is structured to accept changes in the distance values should unit locations or supporting logistic activities be changed.

TABLE VII-2. COMBAT ACTION RADII AND RESUPPLY DISTANCES - OPERATION BREAKER

LOCATION	RADIUS OF ACTION (R)				SUPPLY LOCATION/	RESUPPLY DISTANCE (D) (ONE WAY)
	PII	PIII	PIV	PV		
AF 1	1 5	1 75	1 75	1 75	RED/CSSA 1	180 130
PENINSULA	1 5	2 0	2 0	2 0	RED/CSSA 1	60 95
PORT	3 0	1 5	2 5	3 0	RED/CSSA 1	110 20
NAVAL STATION	2 5	4 0	4 0	4 0	BLUE/CSSA 2	80 80
BLUE BEACH	2 0	2 0	2 0	2 0	BLUE/CSSA 2	20 20
AF 2	1 5	1 5	1 5	1 5	BLUE/CSSA 2	105 105
O&B 3	1 0	1 0	1 0	1 0	BLUE/CSSA 2	205 205
IND AREA 1	15 0	10 0	45 0	45 0	RED/CSSA 1	210 145

NOTE 1 ALL DISTANCES EXPRESSED AS KILOMETERS

2 1st ENTRY DENOTES SUPPLY LOCATION IN PERIODS II AND III
2nd ENTRY DENOTES SUPPLY LOCATION IN PERIODS IV AND V

The next step in developing the fuel consumption model was to categorize all items of USMC equipment into categories representing vehicles or equipment items with similar patterns of utilization and fuel consumption. Fuel consumption factors given in TAM #6 and FM 101-10-1 were modified and expressed in terms of gallons per kilometer. Fuel consumption for stationary equipment items was expressed as gallons per day and taken directly from USMC TAM #6. Once equipment items were categorized, detailed spread sheets were prepared showing the total quantity of items in each category in each major location within SYN City during each period of the assault. The spread sheets were prepared using an optimistic view of the landing sequence so that the maximum quantity of fuel consumed would be calculated in each period. Tne equipment categories, fuel consumption factors (gal/km and gal/day), and TAM consumption factors are shown below.

TABLE VII-3. FUEL CONSUMER CATEGORIES AND CONSUMPTION PARAMETERS

EQUIPMENT ITEM	CALCUALTE DISPLACEMENT	FUEL CONSUMPTION FACTOR	DAILY CONSUMPTION	TAM CONSUMPTION	REPRESENTATIVE ITEM
1 TANK (D)	5 93R	77	•	100	M60A3
2 LVTC, P (D)	5 93R	68	•	126	LVTP-7A1
3 LVTR (D)	36R/((2R 10)+4)	1 0	•	150[1]	LVTR-7
4 M88A1 (D)	36R/((2R 10)+4)	1 25	•	100	M88A1
5 M578 (D)	36R/((2R 10)+4)	45	•	45	M578
6 SP HOW (D)	5 58R	4	•	30	M110A2
7 HVY CGO (D)	36D ((2D 15)+ 67)	125	•	42 64	M54A2C
8 LT CGO (D)	36R/((2R 15)+ 5)	08	•	32	M561
9 MTV (M)	100	2	•	37 2	M116A1
10 LT CGO (M)	36R/((2R 15)+.5)	08	•	16 4	M880
11 LT UTILITY (M)	36R/((2R 15)+.5)	04	•	12	M151A2
12 MHE (D)	N A	N/A	48	48	MC-4000
13 GEN (D)	N A	N/A	60	60	MEP-114A
14 ENGR CONST (D)	N A	N A	60	60	MC-1150
15 HVY CRANE (D)	N A	N A	96	96	DROH 2500
16 MISC ENGR (M)	N A	N/A	18	18	M121A1
17 LAUNDRY/BATH (D)	N A	N/A	160	160[1]	M532
18 AAFS (D)	N A	N/A	700	700	M69HC
19 TAFDS (M)	N A	N/A	52 5	52 5	M1966
20 HERS (M)	N A	N/A	15	15	–
21 MF40 (GSE) (D)	N A	N/A	18	18	MF40
22 SPEC HVY CGO (D)	21 6D/((2R 15)+1)	125	•	31 98	M49A2C
23 LT CRANE (D)	N A	N/A	32	32	1581 WF

NOTE 1 DAILY CONSUMPTION ESTIMATED TAM DATA INCOMPLETE

• CALCULATED BASED ON DISPLACEMENT EQUATION AND RELEVANT R D VALUES

Class III- Petroleum, Oils, and Lubricants (Continued)

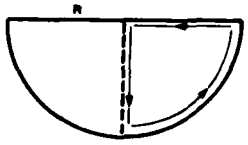
Since the fuel consumption was to be based on the daily displacement of individual equipment items (except stationary equipment), it became necessary to develop general displacement equations for each major vehicle or equipment type. The displacement equations are based on the combat radius (R) and resupply distance (D) for each major operational area in SYN City and are most applicable to the SYN City tactical situations during Operational BREAKER. These displacement equations would require modifications should other AOAs and tactical concepts be utilized. All equations express daily displacement distances noted by T (total daily displacement).

Displacement for Tanks, LVTs

Industrial Area 1

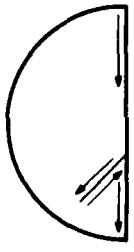
Assume that the MCATF will conduct operations to the limit of its radius of action. The maximum displacement would occur if the MCATF left Industrial Area 1, moved west to its limiting radius, along a circular arc to its northwestern limit, and then returned to the Industrial Area. The total displacement in this case would be 2.78R. Two patrols per day would yield a displacement of 5.56R.

Naval Station



The Naval Station area encompasses all of the land area south of South River between bridges 1 and 3 and the southern industrial area. The total area will be divided into 2 sectors for patrolling purposes. If the patrols were conducted twice per day following the general route shown, then the total displacement would equal 3.57R x 2 or 7.14R.

Port Area



3R displacement per patrol x 2 patrols per day = 6R

The weighted average of these three areas yields 5.93R for total daily displacement for tanks and LVTC,Ps.

Displacement for SP Howitzers

Location

2-8" Btry on Peninsula - virtually no displacement

1-155 Btry vic Blue Beach - virtually no displacement

1-155 Btry w/MCATF - up to 5.58R

SP howitzer batteries in semi-fixed locations at the Pensinsula or BLUE Beach will not displace any significant distance but will require periodic idling of engines to charge batteries, maintain hydraulic integrity, and perform organizational maintenance. In temperate climatic conditions, one hour is judged to be adequate for these purposes. Fuel consumption during this hour is taken to be 1/3 the hourly rate given in the TAM or 5.0 gallons per day.

The 155 SP Btry providing direct support to the MCATF will travel with the MCATF displacing up to 5.58R per day.

At the displacement usage of .4 gpk (derived from averaging individual fuel consumption rates given in FM 101-10-1), the 5 gallons per day roughly translates to 12.5 km displacement which is 8.33R at the Peninsula or 6.25R at BLUE Beach.

The MCATF displacement of 5.58R will be used for all howitzer batteries, and any differences will not be significant when compared to the fuel capacity of the howitzer itself.

Class III - Petroleum, Oils, and Lubricants (Continued)

Displacement Within Radius of Action - Lt Cgo & Utility Vehicles

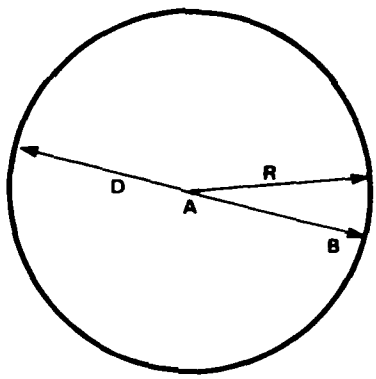
Assume that light cargo and utility vehicles of a particular unit operate within an area of radius R. An average trip will consist of driving from point A to B, accomplishing the given mission in 30 minutes, then returning to point A. If the vehicles travel at a rate of 15 kph and are in use up to 18 hours per day, then the maximum number of trips (N) can be derived as shown below.

$rt = d \quad d = 2R \quad t = (2R_r + .5) \qquad tn = 18 \text{ hours}$

$N = 18 \div ((2R \div 15) + .5)$

The total mileage (T) is equal to the number of trips multiplied by the mileage per trip (2R) or

$T = 2R(18) \div ((2R \div ((2R \div r) + .5) \qquad \text{where } r = 15 \text{ kph}$



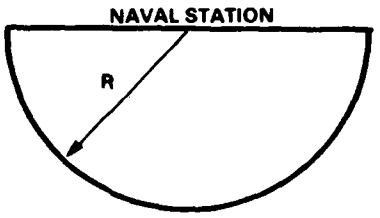
Displacement for Tracked Recovery Vehicles
(LVTR-7, M88A1, M578)

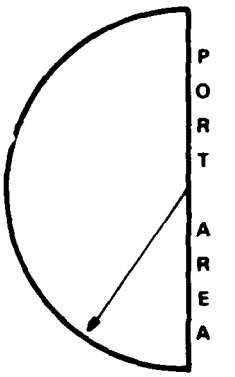
Case 1: Recovery vehicles with MCATF - 1 LVTR, 5 M88A1, 1 M578. These vehicles will accompany the trains echelon of the MCATF until recovery operations are required. Should no recovery operations be required, the daily displacement may approach 5.58R. If a vehicle requires towing back to the industrial area, that particular recovery vehicle will undertake the mission and remain at the Industrial Area for the remainder of the day.

Alternate: $T=2R(18) \div ((2R+r) + 4)$ $r=10$kph

Case 2: Recovery vehicles at other locations (vic Naval Station and Port Area) will remain in central locations and initiate recovery operations upon request. These vehicles will not accompany their supported units at all times and maximum displacement will be governed by the radius of action and time-distance factors.

$T = 2R(18) \div ((2R \div r) + 4)$ where $r = 10$ kph





Class III - Petroleum, Oils, and Lubricants (Continued)

Displacement of Hvy Cgo & Special Hvy Cgo Vehicles

Heavy Cargo (≥ 2 1/2T)

The primary use of these vehicles will be to transport organizational equipment and supplies from the logistic support areas to the supported units. The applicable radius of action for these vehicles will be the distance from the unit supply dump to supply stockage areas at the BSAs or CSSA. The total displacement for each vehicle will be equal to the supply distance multiplied by the number of trips completed in an 18-hour day. If D equals the resupply distance, N represents the number of trips, then the total displacement (T) is equal to:

$T = 2(D)(18) \div ((2D/r) + .67)$ where r = rate of march or 15 kph

↑ 40 min load/unload time

Special Hvy Cargo

This category of tactical vehicles includes M49A2C, M530CS, M530CB, M50A2, M543A2, and M1000 series vehicles. The M49 and M50 series vehicles, accounting for 50% of this category, are used to transport fuel and water respectively and will generally move between proximate fuel and water points and the supported units. The M530 and M1000 series vehicles are equipped for firefighting operations while the M543A2 is a 5T wrecker (recovery vehicle). It is estimated that special heavy cargo vehicles will have a total displacement given by:

$T = .5\ (2)(D)(18) \div ((2D/r) + 1.0)$ where r = 15 kph

↑ weighting factor (Some CLIII & water stocks will be at locations intermediate to LSAs)

↑ load/unload or station time

Displacement for Marginal Terrain Vehicles (MTV)

Marginal Terrain Vehicles, M116A1 and M733 series cargo carriers, will be based and serviced out of the port area. They will be used to shuttle supplies to units that are inacessible by standard wheeled vehicles. Virtually all areas within the metropolitan boundary suitable for tactical units are accessible by wheeled vehicles. Exceptions may occur at the area surrounding the Dam and Bridge 3, Industrial Area 1, and to a lesser extent near artillery positions on the Peninsula.

Supplies for units occupying positions in these areas, and other outlying areas west of Industrial Area 1, will be moved by wheeled vehicle as far as practicable, transferred to MTVs, and moved by MTV the remaining distance.

It may be beneficial to site MTV detachments in the vicinity of marginal terrain areas until suitable combat roads are prepared. If MTVs are sited in this manner, the displacement would be similar to that for light cargo and utility vehicles in that particular area. The interport resupply distance D or 2.0 km, will be used as it equals the peninsula radius of action, which is the greater radius between the peninsula and Dam and Bridge 3.

Thus, the displacement equation becomes:

$$T = 36R/((2R+15) + .67) \quad \text{where } R=2$$
$$= 76.6 \text{ km}$$

Additionally, if the vehicles move from their base areas to their action areas and back once per day, then an averaged 24 km must be added yielding slighting over 100 km per day. The figure of 100 km will be used in all further calculations involving daily displacements for MTVs.

Class III - Petroleum, Oils, and Lubricants (Continued)

The BDM fuel computation module has been programmed in BASIC into a Tektronix mini-computer. This program and detailed output are shown in Appendix A to this document. For each location to be considered, values for the combat radius, resupply distance, and number of days in the period must be inputted. The program will then "ask" for the numer of items in each equipment category. Finally, the operator chooses the output format--either suppressed or standard. Samples of the output are shown below (suppressed) and opposite (standard).

The program calculates vehicle displacement, multiplies by the appropriate fuel usage factor, and then multiplies by the equipment item density. This value is shown under the CALC CONSUMPTION columns. (The program also discriminates between vehicles requiring MOGAS or diesel fuel and places the calculated fuel consumption under the appropriate column.) The calculation is then repeated for each equipment category using TAM fuel consumption values. Ratios between SYN City calculated consumption and TAM calculated consumption are listed. The program then sums all fuel consumption and multiplies by the number of days in the period. A 15% waste factor is included in the fuel totals.

Two options built into the program include the suppression of the print format and the summing of fuel consumption from multiple locations. The suppressed format is useful when only the consumption totals are required and consumption by individual equipment category is not as important. Summing fuel requirements from multiple locations can be used to develop storage requirements at logistic support areas.

FUEL USAGE COMPARISON - CLASS III (W)

PERIOD: II

LOCATION AIRFIELD ONE
RADIUS OF ACTION= 1.50 KILOMETERS
RESUPPLY DISTANCE= 18.00 KILOMETERS
LENGTH OF PERIOD= 1 DAYS

SYSTEM I.D	QUANTITY IN AREA	CALC CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
CONSUMPTION TOTALS=		420.11	1353.32	0.31	5101.07	5896.19	0.87
FOR 1 DAYS, TOTALS=		420.11	1353.32		5101.07	5896.19	
MID-RANGE IMPACT =		75.90	75.90	1.00	5445.28	7172.61	0.76
FOR 1 DAYS, TOTALS=		75.90	75.90		5445.28	7172.61	

Figure VII-4. Class III(W) Analysis - Suppressed Format Sample

FUEL USAGE COMPARISON - CLASS III (W)

PERIOD 11

LOCATION AIRFIELD ONE
RADIUS OF ACTION= 1.50 KILOMETERS
RESUPPLY DISTANCE= 10.00 KILOMETERS
LENGTH OF PERIOD= 1 DAYS

1 TANK (D)
2 LVTC, P (D)
3 LVTR (D)
4 M88A1 (D)
5 M578 (D)
6 SP HOW (D)
7 HVY CGO (D)
8 LT CGO (D)
9. MTV (M)
10 LT CGO (M)
11 LT UTILITY (M)
12 MHE (D)
13 GEN (D)
14 ENGR CONST (D)
15 HVY CRANE (D)
16 MISC ENGR (M)
17 LAUNDRY/BATH (D)
18 AAFS (D)
19 TAFDS (M)
20 HERS (M)
21 MF40 (GSE) (D)
22 SPEC HVY CGO (D)
23 LT CRANE (D)

SYSTEM I.D	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
1	0	0.00	0.00	0.00	0.00	0.00	0.00
2	0	0.00	0.00	0.00	0.00	0.00	0.00
3	0	0.00	0.00	0.00	0.00	0.00	0.00
4	0	0.00	0.00	0.00	0.00	0.00	0.00
5	0	0.00	0.00	0.00	0.00	0.00	0.00
6	0	0.00	0.00	0.00	0.00	0.00	0.00
7	53	0.00	0.00	0.00	870.68	1407.12	0.62
8	6	0.00	0.00	0.00	37.03	192.00	0.19
9	0	0.00	0.00	0.00	0.00	0.00	0.00
10	7	[illegible]	[illegible]	[illegible]	0.00	0.00	0.00
11	83	256.11	996.00	0.26	0.00	0.00	0.00
12	6	0.00	0.00	0.00	288.00	288.00	1.00
13	47	0.00	0.00	0.00	2820.00	2820.00	1.00
14	7	0.00	0.00	0.00	420.00	420.00	1.00
15	0	0.00	0.00	0.00	0.00	0.00	0.00
16	2	36.00	[illegible]	1.00	0.00	0.00	0.00
17	0	0.00	0.00	0.00	0.00	0.00	0.00
18	0	0.00	0.00	0.00	0.00	0.00	0.00
19	0	0.00	0.00	0.00	0.00	0.00	0.00
20	2	30.00	[illegible]	1.00	0.00	0.00	0.00
21	0	0.00	0.00	0.00	0.00	0.00	0.00
22	0	0.00	0.00	0.00	0.00	0.00	0.00
23	0	0.00	0.00	0.00	0.00	0.00	0.00
CONSUMPTION TOTALS=		420.11	[illegible]	[illegible]	5101.07	5896.19	0.87
FOR 1 DAYS, TOTALS=		420.11	[illegible]		5101.07	5896.19	
MID-RANGE IMPACT =		75.90	75.90	1.00	5445.28	7173.61	0.76
FOR 1 DAYS, TOTALS=		75.90	75.90		5445.28	7173.61	

Figure VII-5. Class III(W) Analysis - Standard Format Sample

Class III - Petroleum, Oils, and Lubricants (Continued)

Calculated ground fuel usage for the current and mid-range periods is summarized in the table opposite. These totals do not include fuel consumed by Navy elements or Naval Support Forces. The fuel totals indicate that the overall MOGAS consumption, through Period V, is 50% of what would be calculated for the same equipment using the existing USMC methodology. SYN City diesel fuel consumption was calculated to be 72% of the corresponding TAM value. MOGAS consumption during the mid-range is significantly reduced from the current level as a result of the continuing trend toward dieselization of ground tactical vehicles. In fact, of the 23 equipment categories only miscellaneous engineer equipment and HERs were expected to require MOGAS during the mid-range period. Since fuel consumption for stationary items was taken from the TAM and was not made sensitive to displacement distances, the ratio between SYN City calculated consumption and TAM consumption equalled unity.

Detailed fuel comparisons and calculations per tactical area of responsibility and combat period are provided in Appendix A to this document. Both expanded and suppressed formats are given as well as a listing of the computer program. Equipment densities during each period were based upon a subjective evaluation of the landing sequence and are optimistic to give an upper bound for fuel consumption. The program is structured so that these densities may be changed to reflect different tactical and logistic situations. The methodology has potential for refinement in several areas but provides a displacement-sensitive method for comparison with the existing USMC calculation process.

Ground fuel calculations, by the BDM methodology, lead to several conclusions concerning fuel consumption, fuel storage, and time period and environmental influences upon the overall fuel consumption.

- Methodologies for determining fuel consumption would be more useful for detailed planning if they were more sensitive to the actual tactical situation with associated unit displacements and vehicle usage patterns.

- The overall SYN City diesel fuel consumption was approximately 45% of the TAM consumption prior to commencing MCATF operations to the west of SYN City. This result also reflects the decreased use of stationary equipment and small tactical areas of responsibility during the assault landing and D-day operations.

- MCATF operations will require fuel in excess of that calculated using the existing methodology. This is clearly seen in the expanded consumption tables in Appendix A.

- MOGAS usage will decrease significantly by the mid-range period with the fielding of diesel engine replacements for the current series of light wheeled vehicles. The corresponding increase in diesel fuel consumption averages approximately 11%.

- The BDM fuel consumption methodology is structured so that requirements for bulk fuel storage facilities are sensitive to vehicle displacement, required day of supply stockage, and locations of primary logistic support areas.

- Consumption calculations from the USMC and BDM methodologies are of the same order of magnitude indicating that the existing methodology will be adquate to provide a broad planning factor valid for an amphibious assault into an urban area.

- It is recommended, however, that efforts be undertaken to revise the exisitng methodology to provide additional sensitivity for specific tactical environments and corresponding equipment utilizations.

TABLE VII-4. CALCULATED CLASS III(W) CONSUMPTION DURING OPERATION BREAKER

PERIOD	SYN CITY MOGAS	TAM MOGAS	RATIO SC/TAM	SYN CITY DIESEL	TAM DIESEL	RATIO SC/TAM
II	2,552 (493)[1]	6,146 (493)	.42 (1.0)	29,919 (31,977)	65,805 (71,457)	.45 (.45)
III	30,411[2] (4,896)	63,929 (4,896)	.48 (1.0)	374,103 (399,619)	525,857 (589,891)	.71 (.68)
IV	40,599 (8,394)	80,302 (8,394)	.51 (1.0)	466,966 (499,171)	637,149 (709,057)	.73 (.70)
V	68,036 (14,242)	132,796 (14,242)	.51 (1.0)	743,182 (796,976)	1,011,078 (1,129,633)	.74 (.71)
TOTAL	141,598 (28,024)	283,173 (28,024)	.50 (1.0)	1,614,170 (1,727,744)	2,239,890 (2,495,039)	.72 (.69)

NOTE 1 - PARENTHETICAL NUMBERS REFER TO MID-RANGE FUEL QUANTITIES
2 - TOTAL DURING PERIOD III (D+1 TO D+3); SAME FOR OTHER PERIODS

Logistic Planning Factors and Usage Rates

Class III - Petroleum, Oils, and Lubricants (Continued)

Class III(A) Requirements

Consumption of aviation fuel during the course of any tactical operation will be influenced by the type of aircraft employed, the sortie rate for each aircraft, and the munitions load and flight profile during each sortie. During the course of Operation BREAKER, a heavy reliance is placed on carrier and theater-based fixed-wing air support to maintain air superiority during the assault landing and subsequent consolidation of SYN City. These aircraft will also be used to attrite Threat counterattack forces attempting to close on SYN City. Rotary-wing aircraft figure prominently during the heliborne landings and initial logistic support of peripheral units. This pattern of aircraft utilization is basically the same as in an amphibious assault into a nonurban environemnt, and BDM analyst have concluded that existing planning factors for aviation fuel consumption were adequate for establishing initial Class III(A) requirements in the FBH.

Since the development of detailed sortie rates, flight profiles, and munitions loads was outside the scope of this contract, the Class III(A) planning factors are based on fuel consumption data (gal/aircraft/day) incorporated into the MAGTF Lift Model. The aircraft density within the FBH during each period and the desired stockage level complete the basic data requirements. Initial stockage levels are 1.5 DOS for all VSTOL assets and increase to 3 DOS for all aviation assets by the end of Period V. Relevant planning factors for Class III(A) are shown in the figure opposite.

It should be noted that aircraft squadrons are not brought into the FBH until suitable facilities have been established ashore. Embarked aviation is supported by helicopter platforms while theater-based aviation is supported from locations outside the AOA. Fuel consumed during this support period will be provided by the CATF and/or DLA (theater).

PERIOD II, III: 1.5 DOS FOR ALL VSTOL ASSETS

A/C SQUADRONS	#A/C/SQDN	GAL/A/C/DAY	1.5 DOS
2 HMA	24	242	17,424
1 HML	24	237	8,532
8 HMM	12	452	65,088
5 HMH	16	626	75,120
3 VMA(V)	20	1,212	109,080
			275,244 x 1.1 = 302,769 gal

PERIOD IV: 3 DOS FOR ALL VSTOL ASSETS → 605,538 GAL

PERIOD V: 3 DOS FOR ALL VSTOL ASSETS AND ASSETS IN FLY-IN ECHELON #1 (SHOWN BELOW)

ADDITIONAL A/C SQUADRONS	#A/C/SQDN	GAL/A/C/DAY*	3 DOS
7 VMFA	12	2,542	640,584
3 VMA(AW)	10	1,890	170,100
1/3 VMO	18	237	4,266
			814,950 x 1.1 = 896,445 gal

TOTAL CLASS III(A) IN PERIOD V: 605,538 (VSTOL)
896,445 (FIE #1)
1.501,938

* CONSUMPTION DATA EXTRAPOLATED FORM MAGTF LIFT MODEL

Figure VII-6. Class III(A) Requirements During Operation BREAKER

CLASS IV - CONSTRUCTION MATERIALS

CLASS IV CONSTRUCTION MATERIALS ARE THOSE SUPPLIES BROUGHT BY THE LANDING FORCE FOR THE CONSTRUCTION/REHABILITATION OF HORIZONTAL AND VERTICAL FACILITIES. EXTANT FACILITIES IN URBAN AREAS WILL REDUCE MATERIAL REQUIREMENTS FOR NEW CONSTRUCTION BUT FACILITY REHABILITATION AND BARRIER DEVELOPMENT WILL CONTINUE TO IMPOSE SIGNIFICANT MATERIAL REQUIREMENTS.

The Landing Force supplies will include Class IV materials of sufficient quantity to support VII MAF for the initial 60-day period. These materials will be used to construct, modify, or rehabilitate vertical and horizontal facilities including defensive positions, barriers, roads, bridges, EAFs/LZs, and building structures. Major items included in Class IV supplies are shown on the opposite page. Quantities required for each item are based on a 10-day offensive period preceding the defense of SYN City. Class IV items required at theater support facilities are not included in the calculations.

The analytical focus of this section is the quantity of construction materials required to support offensive operations (10-day anticipated duration) in an urban environment (SYN City). Although Class IV requirements are at a maximum level during the preparation for a deliberate defense, offensive Class IV requirements and materials designated for repair/restoration of critical facilities must be articulated early in the planning phase preceding the tactical execution of the mission. Any moderate-size city can be expected to have indigenous stocks of constructon materials unless defending Threat forces take measures to deny use of these stocks.

Culvert, U-shaped metal fence posts, lumber products, commercial quality cement, sheet steel, and railroad track section (only if a city is served by a railroad net) are items used for general construction work and would be stocked in or near the urban area. Fortification and barrier materials such as sand bags, barbed wire/tape, and landing mat have obvious military use and may also be available in urban environments, especially those that are in countries with a pervasive military influence. Many of these items are stored in the open; quantities and locations of indigenous stocks can be determined from low to medium-altitude surveillance platforms.

Bulk material storage areas in SYN City are located at E6-N7 and E9-N8. Common construction materials would be stored in these central storage areas as well as in small lots owned or controlled by small contractors. All facilities are well-developed in SYN City. The determination of and time available to defending Threat forces will have a significant impact on the level of restorative construction during the

offensive phase. Repairs to existing facilities will commence on D-day and continue until the restoration and reconstruction is complete. The intensity of combat and type and material used to construct inner-city building will drive requirements for providing fortified weapons emplacements in these structures. Multi-walled masonry buildings will require few internal modifications while wood frame buildings may be totally useless for use as temporary defensive positions.

Class IV material requirements will increase in the mid-range period due to increased weapons effectiveness and improved Threat breaching systems. Temporary defensive positions will require greater hardening measures to reduce ballistic penetration and provide protection against fragmentation and blast effects. Increased reliance on sophisticated electronic command and control systems requires that these systems be given an adequate measure of protection from hostile fires. Availability of local materials will continue in the mid-range period.

Bag, burlap	Lumber (2" x 4" x 10')
Barbed wire, 400 m reel	Lumber (4' x 8' plywood)
Barbed wire, concertina	Cement, portland
GPBTO	Roofing felt
Mat set, AM-2	Sheet steel
Pipe, culvert, 18"	Plastic sheet, roll
Pipe, culvert, 36"	SILIKAL, bag
Post, fence, 32"	
Post, fence, 60"	

Figure VII-7. Principal Class IV Items

Logistic Planning Factors and Usage Rates

Class IV - Construction Materials (Continued)

Hardened Positions

Urban - Equivalent of 14 Inf Co building 1.25 shelters @

2/Sqd 24/Co -	336
1/Co level HQ -	14
1/Bn level HQ -	4
	354

Each shelter	Total
400 sandbag (2 walls 2.5m x 2.5m 800 sandbags/25 SM)	177,000 Sandbags
10 2" x 4" x 10'	4,425 Pieces
2 4' x 8' x 1/2" plywood	885 Sheets
2 4' x 8' x 1/4" steel sheet	885 Sheets

Note - 50% of total is minimum essential.
- Sand is available in beach areas.

Nonurban - Equivalent of 5 Inf Co building 1.0 shelters @

2/Sqd 24/Inf Co -	120
Co level HQ (line) -	3
Bn level HQ (urban)-	3

Each shelter

	Inf Co	Co Hq	Bn HQ	Total
Sandbags	600	1200	400	76,800 Sandbags
Post, 60"	11	22	-	1,386 60" Posts
Post, 32"	4	8	-	504 32" Posts
Steel sheet	1	2	2	132 Sheets
2" x 4" x 10'	3	6	10	408 Pieces
Plywood sheet	-	-	2	6 Sheets
Plastic sheet	1	2	-	126 Rolls

Note - 80% of total is minimum essential.
- Sand or earth used to fill sandbags.

Mobility Barriers

Urban - *14 Inf Co equivalents each deploying a total of .5 km of tactical wire in a configuration similar to triple standard concertina*

	400m reels barbed wire	Reels GPBTO	60" Post	32" Post
7 Km tactical wire	70	1377	933	100
5 Km inter-building wire (= double exped. concer)	50	1667	417	67
1 Km miscellaneous wire (@ 15 reels/km)	15	-	-	-
50 sheets plywood				
2000 2" x 4" x 10'				

Nonurban

	400 reels barbed wire	Reels GPBTO	60" Post	32" Post
11 Km tactical wire (3S)	110	2163	5867	147
6 Km tactical wire at BSAs (3S Concer)	60	1180	3200	80
2 Km Tactical wire for POW control (3S)	20	383	1067	27

4 Km steel post obst (RR track): 4 Km x 150 post/110m x 10 x 2.5m/post equals 15,000 meters of track

6 Km equivalent of double apron fence within post obstacle - 15 reels

4 Km steel tetrahendrons 4 Km x 100 tet/100m x 10 x 9m/tet ≈ 36,000 m

Note - Barbed wire materials based on data contained in Table 4-3, FM 5-34 dated 24 Sept 76.

Logistic Planning Factors and Usage Rates

Class IV - Construction Materials (Continued)

Landing Surfaces

Airfield 1

4,200 total meters of runway surface @ 24m width yields 100,800 SM of runway surface that will be exposed to hostile fire.

Assume 10% of the total surface area requires initial matting to upgrade facility to a minimum operating strip. This area then represents 10,080 SM.

SILIKAL - 3,000 bags @ 1 bag to repair the average damage produced by one aircraft cannon round.

Airfield 2

Matting of 72' x 3,600' EAF with taxiways and parking areas requires approximately 1,815,000 SF of AM-2 matting.

EAF 3

Matting of 96' x 5,184' EAF with taxiways and parking areas requires approximately 2,103,000 SF of AM-2 matting.

V/STOL Sites

Matting of 10 72' x 72' VSTOL landing areas - 51,840 SF.

Matting of 10 heavy-lift helicopter landing sites each measuring 175' x 175' would require 306,250 SF of matting.

Total

4,276,080 SF of AM-2 matting requires 14,848 bundles each weighing 1,980 lb and occupying 62 CF. This matting will be delivered to the AOA in three increments aboard commercial shipping.

Drainage

5 culverts perpendicular to road surface - large capacity @
600 sandbags
12 culvert 36" (2 halves per culvert)
10 post 60"
5 post 32"
12 2" x 4" x 10'

12 culverts perpendicular to road surface - medium capacity @
300 sandbags
12 culvert 18"
10 post 60"
5 post 32"
8 2" x 4" x 10'

Drainage Total

6600 sandbags
60 culvert 36"
144 culvert 18"
170 post 60"
85 post 32"
156 2" x 4" x 10'

Note - Existing drainage facilities would be improved only if runoff presented a serious problem for road movement or airfield operation. Basic material may be locally available and will be identified by engineer elements upon arrival in SYN City.

Logistic Planning Factors and Usage Rates

Class IV - Construction Materials (Continued)

Lines of Communication

Road Repair - Repair materials include military bridging, culverts (See Drainage), and base course materials which must be procured locally.

Only hasty bypasses and pioneer trails will be constructed during the offensive phase of Operation BREAKER.

Bridge Repair - Repairs not including span replacement will utilize local materials such as timber, steel beams, cement, steel sheet, and miscellaneous steel stock. No unique materials need to be included in the Landing Force supplies to accomplish these repairs.

Railroad Repair - FM 101-10-1 states that destruction of railroad facilities will be characterized by:

- 100% destruction of portside trackage
- 80% destruction of station sidings
- 75% destruction of railway terminals
- 100% destruction of fuel and water stations
- 75% destruction of railway bridges

Due to the possible Threat denial of these facilities, no extensive restoration is anticipated during the offensive phase of the operation. Repairs will be initiated on portside trackage as soon as the area has been consolidated and engineer resources are available.

Each Km of single track railroad line requires 98.27 ST of 98# rail or 125.00 ST of 115# rail. Each complete railroad switch weighs 5.95 ST.

Road ballast, cross ties, rail fasteners, and other items will be appropriated from local sources or salvaged from other lengths of track.

TAMCN	ITEM DESCRIPTION	UNIT	PREPARE HARDENED POSITIONS	CONSTRUCT MOBILITY BARRIERS	IMPROVE LANDING SURFACES REPAIR AF DAMAGE	CORRECT DRAINAGE	MODIFY/REPAIR BUILDING STRUCTURES	REPAIR DAMAGE TO LOCs	TOTAL QUANTITY	TOTAL WEIGHT (ST)	REMARKS – SEE BELOW
U3010	BAG, BURLAP	PKG	2538			66			2604	32.55	1
	BARBED WIRE, 400M	REEL		625					625	5.89	1
U3040	GPBTO	CONCER		6780					6780	21.57	1
	MAT SET, AM2	BUNDLE			14848			*	2606	14700	1
U3180	PIPE, CULV, 18"	EACH				144			144	1.66	2
U3190	PIPE, CULV, 36"	EACH				60			60	3.45	2
U3210	POST, FENCE, 32"	EACH	504	421		85			1010	2.53	1
U3220	POST, FENCE, 60"	EACH	1386	11484		170			13040	58.68	1
J3090	LUMBER (2"×4"×10')	EACH	4833	2000		156	☆	*	6989	62.12	2
	LUMBER (4'×8' PLY)	EACH	891	50			☆	*	941	40.16	2
J3035	*CEMENT, PORTLAND*	BAG	*	*							2
J3200	ROOFING FELT	ROLL					☆				2
	SHEET STEEL ¼"	SHEET	1017						1017	332.22	2
	RAILROAD TRACK	KM		15				*	15	737.03	2
K4720	PLASTIC SHEET	ROLL	126				☆		126	1.20	1
	STEEL STOCK, L	KM		36					36		2
	SILIKAL	BAG			3000				3000	135	1
								TOTAL	16134		

* ALTERNATE USE, DEPENDS ON QUANTITIES USED TO SATISFY PRIMARY REQUIREMENTS

☆ SCENARIO DEPENDENT, REQUIRES ADDITIONAL DATA CONCERNING SYN CITY BUILDING CONSTRUCTION; INDIGENOUS MATERIALS WILL BE USED WHENEVER POSSIBLE

1 ITEMS ARE COMBAT ESSENTIAL AND MAY NOT BE LOCALLY AVAILABLE; MUST BE EMBARKED

2 ITEMS WILL BE LOCALLY AVAILABLE IN UNKNOWN QUANTITIES. IN-COUNTRY AGENTS AND AERIAL PHOTOGRAPHY WILL BE UTILIZED TO DETERMINE LOCAL AVAILABILITY AND EMBARKATION REQUIREMENTS FOR THOSE MATERIALS

Figure VII-8. Construction Materials Required to Support Offensive Operations in SYN City

Logistic Planning Factors and Usage Rates

CLASS V-AMMUNITION

CLASS V ITEMS WILL EXPERIENCE CHANGES IN AMMUNITION MIX AND USAGE RATES AS A RESULT OF POSSIBLE USMC INVOLVEMENT IN AN URBAN ENVIRONMENT.

Class V consists of all types of ammuniton including chemical, radiological and special weapons, bombs, explosives, mines, fuses, detonators, pyrotechnics, missiles, rockets, propellants, and other associated items as outlined in MCO 8010.1C. Both air and ground-originating munitions are included in Class V. The following discussion will include conventional munitions only. As successful accomplishment of the mission is directly related to the availability of the correct type of ammunition at the required location in the right amount, planning estimates for Class V items must be thorough and include an in-depth analysis and understanding of the tactical operation. Ammunition stockage levels in the combat zone must be of a sufficient quantity to support the worst-case level of ammunition usage.

Ammunition usage is based on many interrelated factors. Threat, terrain, organic weapons, ammunition availability, intensity of conflict, and scheme of maneuver all have a direct influence on ammunition expenditures for various weapons systems, including individual weapons. The overall tactical situation will dictate the commander's expenditure since once the forces are engaged in combat, ammunition is the only means by which the enemy may be destroyed. Abnormally high ammunition usage rates during periods of light to moderate action will prematurely reduce ammunition stocks to a level that may not support the remainder of the tactical operation in the absence of ammunition resupply. Commanders should understand the basis for ammunition expenditure rates and maintain accurate records of ammunition allotted and expended in order not to exceed the overall availability rate.

Ammunition usage rates are generally given in terms of the number of rounds per weapon per specified time period or deployment. Most references refer to the ammunition usage in terms of intensity of combat (assault/intense or sustained). MCO 8010.1C , Class V(W) Available Supply Rates for Fleet Marine Force Combat Operations is used as the base of the analysis of urban ammunition usage rates. MCO 8010.1C, dated 16 October 1978, is in the process of being revised; the revised draft was not available before this analysis was completed.

The nature of the urban area will determine weapons effectiveness and weapons utilized to destroy the enemy. Urban areas are generally characterized by internal areas containing relatively dense populations and in most cases multistory building structures. Any obstruction over one meter in height will provide line of sight restriction for at least one ground weapon or weapon system. Line of sight restrictions in almost any urban

area will dictate which weapons are effective and will accomplish the mission without producing unnecessary casualties to the indigenous population. Long-range indirect fire weapons and surface-to-surface guided missiles with long arming distances in comparison to total flight distance will not be effective and will be used less than man-portable weapons with high short-range kill probabilities. Vehicular weapons systems are canalized by urban infrastructures to such an extent that they provide lucrative targets for portable antitank weapons before they have a chance to provide fire support for friendly troops. Such weapons require a higher than normal contingent of dismounted infantry troops to provide security against close-quarters attacks. The most effective weapons in urban combat are individual small arms, machine guns, flame weapons, breaching weapons, and light mortars.

Although the SYN City data base does not give a decription of building profiles or heights for either the urban or suburban areas, it can be assumed that some buildings in the "Old City" and many buildings in the "New City" are of multistory construction. Building construction materials will vary depending on the climate, area of the world, and availability of local materials. Most inner-cities have buildings that are constructed from reinforced concrete or masonry. These buildings will provide excellent cover and concealment for combat troops and will be utilized for command centers, administrative facilities, and firing positions. Ammunition used to reduce these positions must, therefore, be effective with respect to close-range accuracy and wall-breaching effects. BLTs conducting the assault through urbanized areas of SYN City will be supported by platoons of tanks rather than tank companies as the additional tanks would not contribute to an increased combat effectiveness but would only become targets for antitank weapons. Tactical air support will not be as effective in SYN City for many of the same reasons. Units that are deployed in the outskirts of the metropolitan area will continue to use that weapons mix which is appropriate to the terrain outside of SYN City.

The mid-range time period will include the introduction of many new weapons and weapon systems as well as mines, missiles, and demolitions. As with current weapons, each new weapon must be evaluated in terms of effectiveness in an urban environment. Improved small arms, machine guns (XM249), man-portable flame and demolition missiles will all be used to a greater degree in urban combat than will main battle tanks and long-range antitank missiles. The climate and terrain in SYN City will not change appreciably in the mid-range period. Anticipated opposing forces will benefit from improved weaponry and the likelihood of special weapons use will increase. The SYN City population will increase by 5% to 10% and the metropolitan area will increase in size as well as population density. The overall effect of the mid-range period on ammunition usage rates in an urban area appears to be minimal due to the types of weapons employed to assault and seize the city.

Logistic Planning Factors and Usage Rates

Class V - Ammunition (Continued)

Class V (W) usage rates were estimated for the urban/suburban combat actions projected to occur in SYN City using six mini-scenarios (Appendix B) and applying subjective reasoning with respect to the numbers and types of engagements that might involve VII MAF units according to their planned deployments (Oplan 1-81). The following aspects of VII MAF operations in Operation BREAKER were considered in developing the methodology for estimating Class V (W) usage rates:

- Only Class V expenditures inside SYN City were considered.
- Combat actions against regular enemy military forces (MRB Rein) occurred only at Airfield 1, the main port area, and New City.
- Combat actions against irregular enemy units, principally small sniper teams, occurred throughout urban and suburban areas through D+30.
- MAF units defended against enemy sniper/sapper penetrations of CSS areas, ASPs, and the airfield complexes through D+30.
- The numbers of enemy-initiated incidents were estimated based on the number and types of enemy personnel presumed to be available and the VII MAF tactical/logistical situation as it was projected to unfold in Annex C (Operations) and Annex P (Combat Service Support) to Oplan 1-81.
- The MRB (Rein) was assumed to have been eliminated as an organized force by D+4.
- Aggressor military and civilian personnel from the two Army garrisons and naval station, augmented by MRB stragglers and civilians, were estimated to be capable of forming at least 46 3-man sniper teams and 75 5-man sapper teams, with the capability of replacing losses through civilian recruitment and stealing or capturing weapons and ammunition.
- Over 1,700 civilian men and women were considered to be available to replace sniper/sapper losses. This constitutes about 1% of the male/female population aged 14 to 55, after discounting the 34,250 evacuees/refugees, assuming that males include 48% of the population with 81.1% aged 14-55, and females number 52% of which 79% are 14-55. (Typical census)

- After D+10, Aggressor irregular actions against the MAF were projected at 91 sapper attempts on D+11 decreasing on a straight-line basis to 38 on D+30; two suburban irregular (SI) sniper incidents per day; and one urban irregular (UI) sniper attempt per day. (Note: the decreased MAF presence in urban/suburban areas accounts for the decrease in sniper action, whereas the importance increases for targets such as CSS areas, ASPs, airfields, etc.

- Because of the civilian presence and possibly deleterious rubbling effect, use of aerial bombing was not considered in the city except as an alternative means of attack if artillery proved to be inadequate. Aircraft vulnerability to SA-7 missiles was also a consideration.

- Except for the urban scenario involving the MRB in the port warehouse/industrial area, artillery fire was used sparingly due to the limited enemy force, civilian presence, and general unsuitability of artillery in these specific SYN City circumstances.

- RAW and SMAW-type weapons were not considered for use in Operation BREAKER because they are not currently in the Marine Corps inventory. These or some other similar weapons will be essential for use in urban combat.

- Tanks and self-propelled artillery were used sparingly in SYN City:

  - Limited enemy threat.
  - Nonavailability of concrete-piercing tank ammunition.
  - Requirement for SP artillery to support MCATF operations.
  - Direct-fire ranges too short, systems too vulnerable.

Note: See Appendix B Table B-5 for Types and Frequencies of Combat Actions During Operation BREAKER

Logistic Planning Factors and Usage Rates

Class V - Ammunition (Continued)

Class V(W) expenditures for each scenario action and the total of all anticipated scenario actions are shown in the table opposite. Munitions listed in the table are not inclusive; other Class V items such as flares, smoke signals, AT mines, and demolitions would be used during the course of Operation BREAKER. Ammunition expended by the MCATF conducting operations to the west of SYN City has also been omitted from the table as it does not reflect an urban expenditure. Requirements for Class V(W) items during the actual surface assault over the beach are expecteed to be lower than normal due to the relatively small threat force (MRB) within SYN City. The total Class V(W) requirement would therefore include additional ammunition expended during the following operations:

- Demonstration operations and deceptive landings.
- Surface assault by two RLT (-) on D-day.
- MCATF operations against a division-sized threat beginning on D+1 and continuing through D+30.
- Miscellaneous requirements at theater support areas.

Urban ammunition requirements for a 30-day period have been compared to the Class V(W) mount-out for a notional MAF as given in the MAGTF Lift Model dated 5 March 1981. While the precise number of weapons included in the model may differ from those organic to VII MAF, the comparison is intended to give an indication of the relative adequacy of this mount-out for selected ammunition types. It should be noted that ammunition expenditures were based on urban operations against a relatively small threat force in a specific set of tactical operations in SYN City. A larger and more capable threat would cause a significant increase in the Class V requirement. The most important aspect of this Class V analysis is the methodology, which would be valid for any urban operation with any size opposing force. The basic steps in the methodology are as follows:

- Deploy threat in urban area based on historical and doctrinal examples.
- Assign objectives to assaulting forces and maneuver forces to achieve their objectives.
- Develop scenarios representing typical combat actions.
- Analyze Class V requirements per scenario action.
- Estimate the number of scenario actions occurring during the given operation.
- Total ammunition requirements for all scenario actions.
- Analyze total expenditure in relation to Class V mount-out.

TABLE VII-5. AMMUNITION EXPENDITURES DURING OPERATION BREAKER

WEAPON	AMMUNITION PODIC	AMMUNITION EXPENDITURES PER SCENARIO TYPE						TOTAL-ALL SCENARIO ACTIONS[1]	% ORG LOAD RQMT[2]	% TOTAL RQMT[3]
		DI	UD	CI	UI	ID	SI			
M16A1	A071 (Ball)	355	29,718	39,600	7,208	16,200	9,540	3,162,282	12.50	5.95
M60	A131B(4&1)	600	20,000	20,000	4,000	11,400	4,500	2,418,900	76.74	30.09
M[illegible]	A576A(4&1)	100	-	-	-	-	-	191,700	16.60	7.37
M[illegible]	A569(4&1)	-	9,750	-	-	13,800	-	58,463	9.02	3.83
M203	B546(HE) B567(CS)	6(HE)	540(HE) 18(CS)	144(HE)	-	540(HE)	-	14,211(HE) 32(CS)	12.94 .23	4.42 .07
M[illegible]	B627(Illum) B630(WP) B632(HE)	-	46(WP)	24(Illum) 48(WP) 60(HE)	-	576(HE)	12(WP)	24(Illum) 1941(WP) 1788(HE)	.23 39.28 7.16	.07 13.02 1.99
M79A2	C226(Illum) C276(WP) C256(HE)	-	34(HE)	16(Illum) 32(WP) 40(HE)	-	68(WP)	-	16(Illum) 236(WP) 100(HE)	.16 3.50 .20	.04 .96 .05
M60A1	C505(HEAT) C521(APDS)	-	11(HEAT) 17(APDS)	-	-	28(HEAT) 11(APDS)	-	104(HEAT) 63(APDS)	.70 .48	.26 .16
M[illegible]A1	C445(HE) C477(WP C466(CS)	-	-	-	-	932(HE) 74(WP) 66(CS)	-	2796(HE) 222(WP) 204(CS)	NL[3]	NL[3]
M109A1	D544(HE)	-	9(HE)	-	-	-	-	16(HE)	.02	NEG
M72A2	H557	-	8	-	-	36	-	122	1.56	.70
DRAGON	NL	-	4	15	-	12	-	58	NOTE 4	NOTE 4
TOW	NL	-	-	15	-	4	-	27	NOTE 4	NOTE 4
M33/M67	G881A	-	210	-	2	64	-	870	10.32	10.32
M34	G937A	-	12	-	6	-	6	1677	97.96	97.96
M16A1	K143	2	4	-	-	-	-	3841	1561	703
TNT (1 lb)	M032	-	24	-	-	-	-	42	.34	.11
SATCHEL CHG (20 lb)	M757	-	32	-	-	10.5	-	88	8.50	2.79

NOTE 1. TOTAL SCENARIO ACTIONS: 1917 DI, 1,75 UD, 1 CD, 125 UI, 3 ID, 151 SI.

2. ORGANIZATIONAL LOAD REQUIREMENT = BA + 15 DOA; TAKEN FROM MAGTF LIFT MODEL DTD 5 MARCH 81 FOR NOTIONAL MAF.

3. TOTAL REQUIREMENT = BA + MOUNT-OUT (60 DOA); TAKEN FROM MAGTF LIFT MODEL DTD 5 MAR 81 FOR NOTIONAL MAF.

4. MOUNT-OUT QUANTITIES FOR THESE WEAPONS ARE CLASSIFIED, BUT WHEN EXPENDITURES CAN READILY BE ACCOMMODATED.

Class V - Ammunition (Continued)

The analysis of expenditure versus mount-out reveals that the typical Class V(W) mount-out for a notional MAF will be adequate to support urban combat operations (Operation BREAKER) with several notable exceptions. These exceptions are:

- The heavy use of M60 machine guns in the urban area consumes over 76% of the typical Class V(W) mount-out of 7.62 mm linked ammunition carried in the Assault Echelon. It is recommended that 25% additional ammunition (DODIC A131B) be embarked with the AE to preclude any shortfall should the arrival of the AFOE be delayed.

- Insufficient M34 WP smoke grenades are included in the mount-out stocks. Although 100% of these items are carried as part of the organizational load, the requirement during Operation BREAKER approaches 98% of the embarked quantity.

  - While M8 HC smoke grenades could be substituted for M34 grenades, the total quantity is still deficient.

  - The nature of the sceanrio area and combat actions within that area often precludes the use of mortar and artillery-delivered smoke due to the difficulty of placing these smoke rounds accurately at the desired location in sufficient time to support the tactical operation.

  - It is recommended that mount-out quantities of HC and WP smoke grenades be increased by at least 100% since these types of smoke-producing munitions are most effective in restricted areas.

- Mount-out quantities of mines, including the M18A1 Claymore mine, are grossly insufficient to support any type of assault operation. The requirment for M18A1 mines during the 30-day operation equalled 3841 mines whereas only 546 of these mines were included in the 60-day mount-out.

  - It is recommended that at least 5000 M18A1 mines be included in a MAF mount-out to provide sufficient command-detonated mines for defensive purposes.

  - It is also recommended that the variety of mines in the mount-out be increased to include mines other than the M16A1, M18A1, and M1 series. The mount-out should include M25, M14, M15, M18, M24, and M21 mines as well as those currently in the mount-out.

- The entire mount-out of mines should be reevaluated to ensure that sufficient quantities are available to implement barrier plans and install hasty protective minefields. The mine quantities currently included in the notional MAF mount-out are barely adequate to install one standard pattern minefield. (Defensive requirements will be addressed in Phase II of this study.)

In addition to those Class V(W) items analyzed during the course of the mini-scenarios (Appendix B), BDM analysts examined other items which should be included within the mount-out of a MAF destined for urban operations. The following observations are provided based on a subjective evaluation of the requirements of Operation BREAKER.

- Concussion grenades, not in current production or in current inventories, are the preferred type of hand grenade when attacking within structures with thin walls or civilian inhabitants. These grenades should be procurred immediately from an existing source and stored with the MOBA PWRMS.

- Concrete-piercing fuses are a necessity in urban combat for all calibers of artillery. The notional MAF mount-out includes 771 of this item, which is judged to be marginally adequate for Operation BREAKER but inadequate in the presence of a larger threat force.

- RAW and SMAW-type weapons are especially useful in urban combat to provide a stand-off capability for wall breaching. The vulnerability of self-propelled artillery pieces and individual Marine demolition teams demands that this type of weapon be developed and fielded as soon as possible.

- BDM analysts, including personnel with combat engineering experience, were of the opinion that current methods for breaching holes in reinforced concrete ceilings and floors are not adequate in the context of urban combat. The requirement exists for ammunition that will breach a 2' diameter hole through 6-8" of concrete and cut any rebar that provides reinforcement to the concrete.

Mount-out quantities of Class V(A) will support the limited use of aviation within SYN City. The majority of close air support will be outside the city in support of MCATF opeations. Munitions used within the city will include machine gun rounds, smoke, AT missiles early in the operation, and possible general purpose bombs. The total quantity of Class V(A) was discussed in Chapter V in which standard sortie rates and ordnance loads were applied to the number of squadrons anticipated to be within the FBH.

Logistic Planning Factors and Usage Rates

CLASS VI - PERSONAL DEMAND ITEMS

AAFES CLASS VI SUPPORT WILL NOT BE PROVIDED TO VII MAF UNTIL WELL INTO PERIOD VI (D+11 THROUGH D+30 AND BEYOND). CLASS VI ITEMS PROVIDED DURING THE INITIAL ASSAULT AND OFFENSIVE PHASE OF OPERATION BREAKER WILL CONSIST OF THE RATION SUPPLEMENT SUNDRIES PACK (TAMCN S0060). COMBAT IN URBAN AREAS MAY REDUCE OVERALL REQUIREMENTS FOR CLASS VI ITEMS SHOULD LOCAL PURCHASES BE AUTHORIZED.

Class VI supplies are personal demand items including nonmilitary sales items. The USMC has not operated an exchange in a combat zone since 1952. USMC combatant forces have since been supported by US Army or Navy exchange services. Based on the Army assumption that a viable exchange service will not be operational until after D+59, VII MAF elements in the FBH will rely on items contained in the Ration Supplement Sundries Pack. This pack is authorized when feeding rations and exchange services are not available. Components of the package include tobacco, personal hygiene items, stationery, and general supplies. Each pack weighs 41 lb and is designed to accommodate the daily needs of 100 men. The individual share of .41 lb/man/day has been included with Class I for convenience.

On the assumption that AAFES is able to provide exchange services while the assault of SYN City is ongoing, AAFES Contingency Plan 77-1 delineates inventory mixes while the AAFES Emergency Plan would give operating procedures and inventory materiel groupings. The table on the opposite page (Source: FM 101-10-1) shows the nine groupings and the lb/man/day resupply rate for each of the item groupings.

Supplementary food and drink items account for between 67% and 74%, depending on the local climate, of the total Class VI consumption rate. Civilian clothing, accounting for between 1.7% and 3% of the class total will be prohibited for wear during the overall offensive phase of the operation. Alcoholic beverage distribution will be tightly controlled based on the guidance of the CG, VII MAF. Additional purchases of military clothing by individuals would be reduced as essential clothing would be provided as a Class II supply. Local purchase of indigenous stocks would further reduce the supply planning factor but not necessarily the consumption or usage rate. Estimated MOBA Class VI consumption rates are shown in the right-hand column of the opposite table.

There is no reason to assume that the Army planning factor will not be valid to satisfy the requirements of USMC troops involved with Operation BREAKER. Both consumption and distribution of Class VI items would decrease with increasing intensities in combat. Until the FBHL is secured, the Ration Supplement Sundries Pack is more than adequate to support forces in SYN City. Demand for exchange services would increase as VII MAF (-) prepares to defend the FBH. Theater-based Class VI demand will remain at a relatively constant level while the demand by MCATF elements would remain low. Future demand of Class VI items will not significantly change from the present level.

TABLE VII-6. CLASS VI DEMAND DURING OPERATION BREAKER

MATERIAL GROUP	CLIMATE			URBAN OFFENSE
	EUROPE TEMPERATE	SWA/PAC TROPIC	ARCTIC	
Tobacco	.139	.139	.139	.139
Food/Drink	2.375	4.750	2.371	1.500
Pers hygiene	.168	.168	.168	.168
Mil clothing	.097	.097	.097	.050
Jewelry (watch/wallets)	.004	.005	.004	.003
Stationery	.081	.083	.081	.081
Civilian clothing	.096	.096	.096	NONE
Gen supplies	.219	.219	.438	.219
Cameras, film, radios	.028	.028	.028	.028
Total Daily Consumption	3.207	5.585	3.520	2.188

NOTE: All consumption expressed in terms of lb/man/day.

CLASS VII(W) - MAJOR EQUIPMENT ITEMS

MAJOR END ITEMS OF EQUIPMENT WILL EXPERIENCE CHANGES IN ATTRITION RATES AS A RESULT OF URBAN COMBAT. DATA ANALYSIS INDICATES THAT WHILE INDIVIDUAL ITEM USAGE MAY INCREASE OR DECREASE DEPENDING ON THE ITEM, THE OVERALL EFFECT OF URBAN COMBAT IS TO INCREASE MANY OF THE ESTABLISHED CARFs.

Class VII items include major equipment end items and final combinations of end products that are ready for their intended use. Class VII may be divided into the following subclasses:

Class VII(A) - Air	Class VII(K) - Tactical Vehicles
VII(B) - Ground Support Material	VII(L) - Missiles
VII(D) - Administrative Vehicles	VII(M) - Weapons
VII(G) - Electronics	VII(N) - Special Weapons

The focus of this section will be on ground-oriented Class VII itrems. Replacement factors for Classes VII(A), VII(L), and VII(N) are classified and would be expected to be very sensitive to the specific tactical operational concepts in Operation BREAKER. Class VII(D) administrative vehicles will not accompany the MAF into the FBH but may be utilized at theater support facilities.

Influences of urban combat on Class VII usage and replacement are many and varied. Daily usage times for selected equipment items may vary considerably from the norms given in TAM #6. Increased usage in a high-intensity environment would be expected to increase the equipment attrition rate and required replacement rate assuming no constraints on material availability. Many items of key equipment may be captured intact and used by friendly forces. Port MHE, firefighting equipment, heavy construction equipment, barges, lighters, and heavy wheeled logistic vehicles seized before sabotage or destruction efforts would supplement embarked MAF equipment and lower the replacement requirement but not necessarily the attrition rate. Seizure of utility facilities would reduce usage of generators, bath units, water purification equipment, and modular head units. Each urban area will have different characteristics and considerations that affect major equipment usage. Factors developed for a certain force structure in a particular environment should not be applied to other situations without extensive detailed analysis of differences between the two operations.

The SYN City physical environment and tactical concepts employed in Operation BREAKER will serve to alter utilization of many major equipment items. While some items will not be required during the assault phase, other items that are required will suffer attrition rates influenced by urban combat. General trends for each subclass resulting from Operation BREAKER are given below.

- Class VII(A) - Normal planning factors applicable for overall operation.
  - Outside SYN City - Heavy use fixed-wing, decreased VSTOL support.
  - SYN City - Low use fixed-wing, increased VSTOL support.
- Class VII(B) - Greater than normal usage and attrition. Lower replacement.
  - Outside SYN City - Low use air conditioning, bridging, refrigeration. High use engineer equipment (FCSSA development).
  - SYN City - Exceptionally high use engineer equipment. Availability of indigenous equipment probable.
- Class VII(D) - Negligible requirement.
  - Outside SYN City - No use anticipated.
  - SYN City - Little, if any, use anticipated.
- Class VII(G) - Greater than normal usage and attrition. Greater replacement requirement.
  - Outside SYN City - Conventional planning factors applicable.
  - SYN City - Increased use mine detectors, night vision sights, squad radios, wire communications equipment.
- Class VII(K) - Normal usage due to combined influences.
  - Outside SYN City - Greater than normal usage due to mechanized operations (Task Force "A" - MCATF). Sophisticated threat.
  - SYN City - Slightly lower usage but increased vulnerability. Less sophisticated threat.
- Class VII(L) - Lower than normal usage.
  - Outside SYN City - Conventional usage during MCATF operations.
  - SYN City - Lower than normal usage due to line-of-sight restrictions, insufficient arming distances, conditions of air superiority during assault phase.
- Class VII(M) - Normal usage due to combined influences.
  - Outside SYN City - Greater use vehicular-mounted weapons. Decreased use individual weapons.
  - SYN City - Increased use individual weapons. Conventional use artillery (firing in support of MCATF). Lower use major weapons (tank, LVT) but increased vulnerability.
- Class VII(N) - Normal usage. Lower attrition due to theater support.
  - Outside SYN City - Potential for increased use due to significant Threat counterattack capabilities.
  - SYN City - Low use due to presence of large civilian population.

Class VII - Major Equipment Items (Continued)

Usage of each equipment item must be related to the threat, environment, and tactical operation plan before a definitive statement can be made concerning usage and repalcement requirements in SYN City. Although many ground support items will experience lower usage and attrition rates, engineer construction equipment (dozers, scoop loaders, cranes) will be expected to show a higher rate since this equipment will be used extensively to clear blocked streets, restore airfields, and develop logistics installations. Similar items employed in different manners in various locations throughout the city will have different replacement factors.

During the mid-range time period many new items will be introduced and classified as Class VII items. Some of these items are shown below:

- M1 tank, LVT(X), LAV armored combat vehicles
- Light and heavy HMTT-series tactical trucks
- Like replacements for aging engineer equipment
- Medium Girder Bridge, possibly AVLBs
- State of the art communications equipment
- XM198 howitzer, M224 mortar
- 10,000 lb forklifts, trailers for heavy equipment and container transport

LVT losses during transfer operations will be decreased as LCACs assume a greater burden for ship-to-shore transfer of priority supplies. Vehicular armor should be more effective as will Threat weapons systems. Tactics for urban combat will not change appreciably nor will weapons usage in this environment.

Selected Class VII items have been analyzed to determine the MOBA impact, if any. USMC CARFs (Combat Active Replacement Factors) given in TAM #6 are presented for purposes of comparison. For a brief description of CARF determination methodology and influences affecting these values see the section in this chapter entitled "Class II - Secondary Equipment Items". BDM MOBA CARF recommendations are based on the utilization of these items in urban combat. Similar items employed in MCATF operations will experience different usage and attrition rates, and require different replacement factors.

The MOBA CARFs generated by group survey and discussion show a general increase when compared with TAM CARFs. High usage items are mine detectors, seismic intrusion devices, M202A1 portable flame weapons, mortars, and tanks. With the exception of tanks, the other items previously mentioned would be used in the "front lines" of the street fighting by individual troops and would require higher than normal replacement factors as a result of hostile action or pilferage by civilians. Tanks would provide limited support to dismounted infantry but offer lucrative targets for man-portable AT weapons as their movement is canalized by the urban building pattern.

TABLE VII-7. MOBA CARFs FOR SELECTED CLASS VII ITEMS

CLASS VII SELECTED ITEMS

NOMENCLATURE	TAMCN[1]	SUBCLASS[2]	TAM CARF[3]		MOBA CARF
			EI	ES	OFFENSE
Air conditioner, 400 HZ 18KBTU	B0004	B	.0137	.0072	.0224
Bath unit, trl mtd	B0060	B	.0500	.0250	.0310
Boat, bridge erection, 27'	B0110	B	.0612	.0215	.0579
Bridge, fixed, 60T	B0140	B	.1584	.0792	.0783
Bridge, float, M4T6	B0130	B	.1584	.0792	.0893
Bridge, float, foot	B0150	B	.0310	.0158	.0189
Carrier, cgo, M116A1	D0050	K	.0800	.0400	.1020
Carrier, cgo, M733	D0055	K	.0800	.0400	.2200
Compressor, air 250 CFM, trl	B0390	B	NL[4]	NL	.0070
Crane, RT, 30T	B0399	B	.0360	.0180	.0856
Crane, RT, 7T	B0445	B	.0518	.0275	.0864
Crane-shovel, crwl-mtd, 37-M55	B0400	B	.0600	.0300	.0192
Decon apparatus, M121A1	B0465	B	.0715	.0415	.1682
Detect set, mine, AN/PRS-7(8)	B0473	G	.2365	.1147	.2433
Detect set, mine, AN/PSS-11(Imp)	B0475	G	.1578	.0789	.2100
Detect set, seismic, AN/PSR-1A	A0490	G	.1000	.0500	.1960
DME, MRA-301	A0545	G	.0600	.0300	.0408
TAFDS, M1966	B0675	B	.0082	.0037	.0348
AAFS, M69HC	B0685	B	.0082	.0037	.0379
Generator, 3KW60, MEP-016A	B0730	B	.0504	.0261	.0541
Generator, 10KW60, MEP-003A	B0891	B	.0226	.0116	.0294
Generator, 30KW60, MEP-114A	B0971	B	.1000	.0500	.0658
Generator, 100KW60, MEP-007A	B1045	B	.1000	.0500	.0620
Grader, road, motorized, hvy	B1081	B	.0850	.0425	.0626
Heliport light set	A0815	G	.0200	.0100	.0490
HERS	B1135	B	.0082	.0037	.0538
Howitzer, SP, 8" M110A2	E0692	M	.1021	.0471	.1236
Howitzer, T, 105mm, M101A1	E0640	M	.0600	.0300	.0996
Howitzer, SP, 155mm, M109A3	E0663	M	.1335	.0632	.1537
Howitzer, T, 155mm, XM198	E0670	M	.0400	.0200	.0650
Ice cream plant, M33	B1160	B	NL	NL	.0443
Landing veh, FT, LVTC7	E0795	K	.1600	.0800	.1962
Landing veh, FT, LVTP7	E0845	K	.1600	.0800	.1940
Landing veh, FT, LVTR7	E0855	K	.1600	.0800	.2016
Launcher, rkt, M202A1	E0900	M	.4211	.1876	.2640
Launcher, TOW, M220AE1	E0935	E	.2868	.1130	.1514
Mixer, concrete, 16S-2A	B1325	B	NL	NL	.1598
MPWS	E1041	B	NL	NL	.2095
Mortar, 81mm, M29E1	E1050	M	.2837	.1349	.2118
Mortar, 60mm, M19 (XM244)	E1060	M	.2340	.1170	.2376
Night vision sight, crew svd	E1159	G	.2825	.1303	.2153
Radio set, AN/GRA-39A control	A1730	G	.0800	.0400	.1956
Radio set, AN/VRC-47	A2150	G	.1570	.0736	.1563
Recovery veh, M88A1	E1377	K	.0440	.0222	.1212

Summary

The assault and seizure of an urban area generally requires combined arms operations outside the city to isolate the city and attrite counterattacking forces. Planning factors for the overall operation must include influences from all operational environments likely to be encountered rather than the single, most visible environment. Operation BREAKER centers around SYN City, but a regimental-size force is tasked to conduct mechanized operations in the countryside west and northwest of the city. Very often, as in the case of medium antitank missiles, equipment items will be used to a different degree in each of the operational areas.

A quantifiable, "bottom line", evaluation of the Class VII planning factor is impossible without evaluating each and every CARF and relating these MOBA CARFs to the equipment density within VII MAF. An effort of this magnitude is clearly outside the scope of this contract and the results would still be subjective and without meaning until validated by the CARF Review Board at HQ USMC. It is not recommended that this effort be undertaken; rather, existing USMC CARFs should be evaluated in the light of the US Army WARF methodology. These results should then be evaluated in reference to a specific tactical situation.

TABLE VII-7. MOBA CARFs FOR SELECTED CLASS VII ITEMS (CONTINUED)

CLASS VII SELECTED ITEMS

NOMENCLATURE	TAMCN[1]	SUBCLASS[2]	TAM CARF		MOBA CARF
			EI	ES	OFFENSE
Refrigerator, prefab, 630CF	B1760	B	.0100	.0042	.0098
Roller, pneu tire	B1790	B	NL	NL	.0102
Saw, chain, port	B1830	B	NL	NL	.1516
Saw, radial, woodworking	B1840	B	.0600	.0300	.0205
Scraper, towed	B1920	B	.0273	.0166	.0250
Semi-trl, fuel, 5000G	D0215	K	.0200	.0100	.0280
Semi-trl, low bed, 40T	D0235	K	.0200	.0100	.0154
Semi-trl, 65T, M793	D0200	K	NL	NL	.0162
Switchboard, SB-22/PT	A2460	G	.0660	.0330	.0536
Tank, combat, M60A1	E1875	M	.3902	.1151	.3216
Tank, combat, M60A1 W/M9	E1876	M	.3902	.1151	.4016
Tank, fabric, collaps, 3000G	B2130	B	.0312	.0182	.0736
Tractor, MC450	B2444	B	.1000	.0500	.0866
Tractor, MC1150, MP buck	B2463	B	.1447	.0673	.0848
Tractor, Terex 82-30FM-M3	B2462	B	.0316	.0161	.0548
Tractor, Terex 72-31MP	B2465	B	.0600	.0300	.0608
Tractor, util, GSE, MF40	B2464	B	NL	NL	.1173
Trailor, water, M148A1	D0860	K	.0616	.0279	.0554
Trailer, cgo, 1 1/2T	D0860	K	.0618	.0279	.0484
Truck, util, 1/4T, M151A2 (HMTT)	D1160	K	.0748	.0491	.1526
Truck, plat, 1/2T, M274A5 (HMTT)	D1100	K	.0500	.0250	.1844
Truck, cgo, 2 1/2T M35A2C (HMTT)	D1030	K	.0400	.0200	.0804
Truck, forklift, 6000 lb., RT	B2560	B	.0600	.0300	.0938
Truck, tank, fuel, M49A2C	D1100	K	.0400	.0200	.0824
Truck, tractor, 5T, M52A2	D1130	K	.0400	.0200	.0653
Water, purif equip, 1500 GPH	B2605	B	.0500	.0250	.0526

Note 1 - From NAVMC 1017 - TAM Revision #6, 25 Nov 80
2 - Subclass commodity designator, all items Type 1 material
B - Ground support K-Tactical vehicles E - General Supplies T - Industrial Supplies
G - Electronics M - Weapons F - Clothing & textiles

Logistic Planning Factors and Usage Rates

CLASS VIII - MEDICAL SUPPLIES

CLASS VIII CONSISTS OF MEDICAL EQUIPMENT, SUPPLIES, AND MEDICAL-PECULIAR REPAIR PARTS. URBAN COMBAT WILL NOT SIGNIFICANTLY CHANGE REQUIREMENTS FOR CLASS VIII ITEMS ALTHOUGH INDIGENOUS SUPPLIES MAY BE USED ON AN EMERGENCY BASIS.

The level of medical equipment and supplies required to support a military force in a given scenario is highly dependent on Threat weapons effectiveness, the intensity of combat, tactical and strategic decisions concerning the usage of NBC warfare, availability of theater support facilities, and the concept of medical support within the area of operation. MCO 6700 dated June 22, 1981 is the current reference showing mount-out quantities of supplies and equipment. Quantities are based on a level of 20,000 casualties per MAF in a 60-day period. Equipment AMALs/ADAL (Authorized Medical/Dental Allowance Lists) are structured and equipped to provide all necessary equipment items for each specific medical or dental function. Supply AMALs/ADALs are based on the treatment of a certain number of casualties, which varies from 50 to 3000 in the case of the field dental clinic (ADAL 665).

Urban combat in general will have an insignificant impact on the overall quantity of Class VIII items required for the MAF mount-out. Actual consumption of Class VIII supplies will be dependent upon the combined effect of combat intensity, weapons utilization, and concept of medical treatment. Use of CB agents will increase the level of required supplies as will nuclear warfare. The following estimates include treatment of limited chemical casualties; heavy or sustained NBC warfare would create additional casualties and require additional supply AMALs. Dispensaries and aid stations will be located within extant structures whenever possible in an attempt to provide a sanitary and protected environment. Civilian injuries and casualties will be treated by civilian personnel using local supplies and equipment. Liaison should be affected between the 4th CAG Medical Officer (Public Health Section) and local hospital administrators.

SYN City tactical concepts involve conventional beach assault and MCATF operations, heliborne insertions, and urban street-to-street fighting. These military operations will occur within a metropolitan area of 250,000 potentially hostile civilians. Moderate casualties are expected to be inflicted on the LF in the course of the assault landing, isolation of the city, and reduction of enemy forces within the city. Casualties will be heavy if reinforcing Threat forces succeed in reentering SYN City. Mass casualties are expected if NBC weapons are used. It is unlikely that suitable air evacuation facilities would be operational much before D+15. Limited medical support will be available from assault shipping while these assets are in the area of operations.

The mid-range time period impact on medical supplies is expected to increase the overall casualty level as weapons effectiveness and combat technology progresses. Increased use of NBC weapons would cause a significant increase in the number of casualties. Specific data concerning anticipated NBC casualties is contained in a classified Hq USMC study entitled "Medical and Dental Support System (1984-1993) (U)".

Total weight and distribution by medical element for required equipment AMALs/ADALs to support the VII MAF 60-day mount-out is shown in the table below. Items marked N/A are still being developed with respect to component composition. Weights for these AMALs/ADALs have not been published as yet.

TABLE VII-8. MARINE AMPHIBIOUS FORCE EQUIPMENT AMAL/ADAL DISTRIBUTION

FUNCTION	WEIGHT	(x1)	Medical Battalion H&SCo (x5)	Medical Battalion MedCo (x1)	Medical Battalion HospCo (x3)	DenBn DenCo (x1)	GAS1/ (x5)	MABS2/ TOTAL	TOTAL WEIGHT
Operating room (AMAL 639)	2,672	2	2	6				18	48,096
Blood bank (AMAL 621)	692	2	1	3				10	6,920
Shock surgical team/triage (AMAL 631)	736	6	1	1				12	8,832
Acute care ward (AMAL 633)	1,812	2	4	10				27	48,924
X-ray (AMAL 627)	3,033	2	1	3		3	1	18	54,594
Laboratory (AMAL 618)	761	2	1	3		3	1	18	13,698
Pharmacy (AMAL 629)	327	2	1	3		3	1	18	5,886
Preventive medicine (AMAL 637)	1,962	1						1	1,962
Dental operatory (ADAL 662)	N/A				24			72	-
Dental clinic (ADAL 664)	N/A				4			12	-
Aid station	912	One per T/O medical officer (except Med Bn)						80	72,960
Medical logistics maintenance float (AMAL 683)	N/A					3		3	-
Medical logistics test and repair equipment (AMAL 691)	N/A					3		3	-
									261,872

1/ Group aid station.

2/ Marine air base squadron.

NOTE: Each MAF unit is assigned equipment AMAL/ADAL's based on its assigned mission capability. Quantities assigned are the minimum allowance.

Source: MCO 6700. HQ USMC, Washington, D.C. 20380, 22 June 1981.

Logistic Planning Factors and Usage Rates

Class VIII - Medical Supplies (Continued)

Quantities of supply AMALs/ADALs are calculated in MCO 6700, based on the treatment of 20,000 casualties in 60 days. MAF supplies are distributed as supply AMALs and line items. The MAF total is a combination of the module allowance and the line item allowance. The Medical Logistic Company holds approximately 75% of the MAF total of supply AMALs. The unit allowance is then equal to approximately 25% of the MAF total. Total weight for all supply AMALs/ADALs accompanying the MAF is 4,767,540 lbs not including AMALs/ADALs undergoing component revision.

TABLE VII-9. MARINE AMPHIBIOUS FORCE SUPPLY AMAL/ADAL DISTRIBUTION

FUNCTION	WEIGHT	Medical Battalion			GAS	DenBn	MABS	LogCo	Total	TOTAL WEIGHT
		H&SCo (x1)	MedCo (x5)	HospCo (x1)	(x1)	DenCo (x3)	(x5)	(x1)	MAF	
1. Operating room (AMAL 640)	3,370	10	12	30				300	400	1,348,000
2. Blood bank (AMAL 624)	195	10	5	15				150	200	39,000
3. Shock surgical team/ triage[1] (AMAL 632)	1,012	36	6	6				226	300	303,600
4. Ward[1] (AMAL 634)	3,653	12	16	60				[illegible]	640	2,337,920
5. X-ray[1] (AMAL 649)	1,707	6	3	9	9		3	146	200	341,400
6. Laboratory[1] (AMAL 619)	218	6	3	9	9		3	146	200	43,600
7. Pharmacy (AMAL 630)	295	4	2	3	3		1	75	100	29,500
8. Aid station[1] (AMAL 636)	1,079	One per T/O medical officer (except Med Bn)						220	300	323,700
9. Field dental operatory[1]	N/A					24		0	72	--
10. Field dental clinic[1] (ADAL 665)	N/A					4		0	12	--
11. Preventive medicine (AMAL 636)	820	1							1	820
12. Medical logistics mission/geographic related supplement (AMAL 684)	N/A							1	1	--
13. Medical logistics test and repair supplies (AMAL 692)	N/A							3	3	--
										4,767,540

NOTE: The MAF supplies are distributed as supply AMAL's and line items. The quantities and their distribution comprise approximately 25 percent of the column "Total MAF." The supply quantity held by the medical logstics company is equal to the number of modules expressed as total [illegible]e times. "Total MAF" is a combination of module allowance and line item allowance.

1/ Items that do not equal 25 percent of total supply.

SOURCE: MCO 6700. HQ USMC, Washington, D.C., 20380, 22 June 1981

Summary

The normal MAF mount-out of Class VIII items includes sufficient supplies and equipment to support the treatment of 20,000 casualties in a 60-day period. This mount-out is further divided into equipment blocks and supply blocks which are structured to support a particular medical function or activity. The Assault Echelon will embark with 15 DOS and the remainder of the Class VIII mount-out will be transported with the AFOE, scheduled to arrive in the AOA on or about D+5.

Medical support requirements during Operation BREAKER are not dissimilar enough to those in a conventional combat operation to warrant changes in the Class VIII mount-out. A moderate level of casualties is expected during the course of the operation, and urban casulaties are not largely different from nonurban casualties. Medical support planning for an urban operation should proceed under the assumption that indigenous medical supplies and equipment will be fully required to treat civilian casualties. The MAF should be self-reliant in terms of organic medical support.

The current planning factor of 1.53 lb/man/day is derived by dividing the total mount-out weight by the number of personnel in the MAF and then dividing by the 60-day treatment period. This factor is subject to minor revisions based on further AMAL/ADAL development and the aggregate MAF strength. The variation is not expected to exceed 10% of the current planning factor.

Civilian Medical Support

Annex G (Civil Affairs) to Oplan 1-81 provides the concept for civilian medical support in SYN City.

The 4th CAG is tasked, inter alia, to administer the VII MAF public health and welfare program and prepare two special emergency drug kits and a basic medical equipment package to meet immediate emergency civilian medical needs if required. The two drug lists and one equipment list together make up one complete emergency kit, which is calculated to support 30,000 refugees for 30 days. CO 4th CAG is directed to deploy one such complete kit and make provisions for airlifting at least one additional kit to the AOA if needed.

Logistic Planning Factors and Usage Rates

CLASS IX - REPAIR PARTS

THE MOST CURRENT LOGISTIC PLANNING FACTORS IN USE AT HEADQUARTERS, U.S. MARINE CORPS REFLECT CLASS IX, REPAIR PARTS, AS ACCOUNTING FOR 1.8 PERCENT OF THE TOTAL POUNDS/PER MAN/PER DAY DETERMINED TO BE REQUIRED TO SUPPORT A NOTIONAL MARINE AMPHIBIOUS FORCE. CLASS IX AND ITS SUBCLASSES ARE CURRENTLY BEING STUDIED TO RECALCULATE OR CONFIRM THE PLANNING FACTORS.

General

Class IX includes all repair parts (less Class VIII) and components to include kits, assemblies and subassemblies, reparable and nonreparable, required for maintenance support of all equipment. Logistic analysts in Headquarters, U.S. Marine Corps consider Class IX to be the most difficult to calculate and validate because of the lack of viable data.

Urban Influence

The resupply rate of spare parts in an urban combat environment will be influenced by the usage of vehicles, weapons, and equipment that are found to have utility in a given situation. Certain generalizations are possible concerning the impact of MOBA/MOUT on the subclasses of Class IX, with the understanding that fighting an urban guerrilla enemy would differ significantly from fighting a determined, modern, sophisticated force in a city.

Aviation spare parts are expected to be less in demand because of the more limited application of air power in urban settings. There is less opportunity for employing air support, and targets are generally more difficult to acquire and attack. Helicopters and VSTOL aircraft will be employed extensively; requirements for spares for these aircraft will be at a normal level. Although many ground support items will not be used extensively during the course of the assault (air conditioners, refrigerators), the heavy use of engineer equipment will cause a normal overall level of repair parts. Industrial supplies include bearings, block and tackle, cable, chain, wire, rope, screws, bolts, studs, steel rods, plates and bars, and these items will be in demand for lifting supplies to upper floors, grappling and climbing, shoring up structures, etc. Administrative and tactical vehicles should experience a decrease in repair parts requirements, principally because the close-range nature of urban combat militates against exposing large numbers of vehicles to enemy fire, and administrative vehicles will not be embarked for Operation BREAKER.

The need for electronics repair parts will increase. Rough handling of radios in confined spaces and the use of electronic detectors, particularly in periods of low visibility, will place demands on this equipment

with the concomitant increase in the need for maintenance. Missiles will be used to a significantly lesser degree. ATGMs generally have arming distances that are unsuitable for the close-quarters combat in cities. In particular, the TOW presents difficulties when it is fired in a rubbled area in which many wires and downed power lines present obstacles to a good clean shot. The subclass of weapons will require an increase in repair parts because of the greatly increased use of small arms and automatic weapons in close combat. Special weapons, however, can be expected to require only about half of the normal repairs because of lack of use in a populated area.

TABLE VII-10. MOBA CLASS IX USAGE RATE (SYN CITY OFFENSE)

SUBCLASS	CURRENT*	MOBA**	OPERATION BREAKER
IX A AVIATION	.197	.147	.190
IX B GROUND SUPPORT MATERIAL	.257	.257	.257
IX D ADMINISTRATIVE VEHICLES	.009	.0045	.001
IX G ELECTRONICS	.088	.176	.150
IX K TACTICAL VEHICLES	.772	.695	.710
IX L MISSILES	.020	.010	.150
IX M WEAPONS	.514	.642	.560
IX N SPECIAL WEAPONS	.009	.004	.006
IX T INDUSTRIAL SUPPLIES	.009	.009	.009
	1.875	1.994	2.033

* Extrapolated from planning data which reflect subclasses as percentages of the total Class IX

** Recommended MOBA factors were developed using a modified Delphi technique with particular emphasis on the SYN City model.

Logistic Planning Factors and Usage Rates

Class IX - Repair Parts (Continued)

SYN City Influence

The MOBA usage/resupply rates recommended were estimated based upon the VII MAF units that are assigned tasks that will require urban combat. Approximately 4/9 of the ground combat element will be so engaged. The likelihood of employing fixed-wing air support against targets within the old city or new city is remote, and targets within suburban areas can be attacked with faster response and greater efficiency by attack helicopters or V/STOL aircraft. As a consequence, the fixed-wing aircraft of 7th MAW will be used principally to attack Aggressor targets outside the city and beyond the FBHL. The confined areas in which urban combat will occur in SYN City will further restrict the use of air support, so that the number of helicopters being employed is expected to be less by about 25 percent than would be required in more conventional circumstances against a larger and more capable threat.

Threat doctrine calls for fighting around the clock. The Aggressor force is familiar with SYN City and has the allegiance of the local people. As a consequence, the Aggressor capability to operate overtly or covertly during hours of darkness is enhanced. Landing Force units will require the use of electronic intrusion detectors to help secure open flanks and for use inside buildings to give warning of enemy infiltration. Greater reliance may be placed on the use of wire because of the greater difficulty in communicating by radio in urban areas, but radios will be needed to communicate with supporting agencies to the degree that no decrease in the need for repair parts is forecast, while repairs to other electronic equipment is expected to double. The increase only amounts to a change from .088 to .176 pounds per man per day.

Mid-Range Class IX Considerations

Development of logistics planning factors is an evolutionary process. Factors currently in use are an average indicator of the resupply requirement rate for a notional MAF in a general combat environment. Theater multipliers permit adjustment of the general factors for each theater of operations. These factors are used for gross estimates of lift requirements and not for the determination of specific requirements for a given force in a given operation. Logistic planning factors currently in use for Class IX are being restudied.

In the mid-range period several new items of equipment will impact on Class IX requirements. The LAV and its variants, and possibly the MPGS, will be helicopter transportable. The capability for deep insertion will endow these vehicles with a measure of independence, and with it the need to maintain a high rate of operational availability. An efficient and responsive repair parts and maintenance capability will be increasingly important.

Similarly, the heavy-lift helicopter will be a key system in tactical and logistical operations, and its operational readiness must be excellent. The F/A-18 Hornet will be operational in that time frame. The Hornet was designed for low maintenance and easy access, and it is advertised as being a quantum improvement over current fleet aircraft in these areas. Regardless of the claims, the record of the aircraft must be established in terms of repair parts requirements beginning with its introduction to the fleet.

To provide accurate and reliable logistic planning factors for the mid-range period, Headquarters, U.S. Marine Corps should reevaluate the current Class IX factors and develop an automated system for recording, changing, and using the data developed. Specific data requirements for the new systems being introduced should be developed now to assure that the information needed as a basis for evaluating repair rates and problems will be available. Further, safeguards should be imposed to prevent the informal and unauthorized repair parts kits from circumventing the reporting system and rendering it invalid. Lack of responsiveness of many of the ad hoc, task organized, temporary combat service support elements provided to MAGTFs has led to the unofficial (and frowned on) practice of unit deployment kits, which enable the units to make necessary repairs and function but which defeats the reporting system upon which development of logistic planning factors depends.

In the mid-range period, the principal MOBA impact on Class IX is expected to be in the increased use of precision guided weapons and various electronic devices. The systems within which they are employed will need responsive repairs based on viable data bases.

> CLASS IX LOGISTIC PLANNING FACTORS REQUIRE FORMAL REVIEW AND POSSIBLE MODIFICATION. THEATER MODIFIERS, DEVELOPED BECAUSE OF THE ENVIRONMENT IN WHICH THE RAPID DEPLOYMENT JOINT TASK FORCE IS MOST LIKELY TO OPERATE, HAVE BEEN DEVELOPED, BUT THEY HAVE AS THEIR BASIS THE EXISTING PLANNING FACTORS. THESE FACTORS ARE USEFUL FOR DETERMINING GROSS LIFT REQUIREMENTS, BUT SPECIFIC CLASS IX REQUIREMENTS REMAIN A COMMAND DECISION FOR ANY GIVEN OPERATION OR DEPLOYMENT, THUS UNDERSCORING THE NEED FOR COMMANDS TO MAINTAIN THE BEST POSSIBLE AND MOST ACCURATE SET OF RECORDS WHICH REFLECT USAGE RATES FOR ALL REPAIR PARTS SUBCLASSES.

CHAPTER VIII
SYNTHETIC CITY (SYN CITY) TECHNICAL DATA BASE

Synthetic City (SYN City) Technical Data Base

EVALUATION

THE SYN CITY MAP PRODUCTS AND SUPPORTING DATA BASE, AS DEVELOPED BY ADVANCED TECHNOLOGY INC. UNDER CONTRACT N68305-79-C-0037, SERVED AS THE URBAN ENVIRONMENT FOR THIS ANALYSIS. AS SHOULD BE EXPECTED IN INITIATING THE USE OF A NEW PRODUCT, CERTAIN DEFICIENCIES IN THE DATA BASE HAVE BECOME EVIDENT. THESE SHORTCOMINGS DO NOT MATERIALLY DETRACT FROM THE VALUE OF THE DATA BASE, AND WITH FEW EXCEPTIONS CAN BE REMEDIED WITHOUT EXTENSIVE MODIFICATION OF THE PRODUCT.

Format and Presentation

The SYN City Information Book was well-structured and provided the majority of necessary data to complete the logistic analysis pertaining to urban warfare applications. Data base deficiency areas are noted in Figure VIII-1 and elaborated on in the pages which follow. Deficiencies of note included detailed vegetation data and ethnological characteristics of the indigenous population.

The SYN City Map Products were generally usable, although a more appropriate format would have facilitated the military analysis of the area. The recommended format is addressed in the "Style Manual for Preparation of Terrain Analysis of CONUS Installations--1979," an in-house working document prepared by the Terrain Analysis Center at the Engineer Topographic Laboratory. In this manner, the marginal information and symbology would have followed an existing method of presentation and the data analysis would have been simplified.

The map products, including all overlays, should have been prepared on stable base materials so that accurate measurements and overlay registration could have been accomplished. The overlays provided to this contractor were printed on lightweight acetate which was prone to cracking and tearing. Overprinted base maps would have been more durable and useful.

Technical Considerations

From the standpoint of preparing MAF-level operation plans, the SYN City model proved to be adequate. Lack of specific information in some areas is not unrealistic; rarely does the contingency planner have all of the information he wants. The SYN City product, however, does not provide selected information in sufficient detail to serve as a useful basis for tactical or logistical planning at levels below division/wing/FSSG.

At the small unit level, combat leaders are concerned with the thickness of walls and type of construction, existence of basements and underground sewer systems, relative heights of buildings, specific street patterns and the location and relationship of key facilities. This kind of information is absent from the model.

Actual photographs and street maps of selected urban areas can be provided to represent portions of the urban or suburban sections of SYN City, thereby enabling small unit planners to make use of the map product and technical data base for background purposes while focusing detailed planning or analysis on actual data.

The utility of the model lies in its versatility: major additions or changes to the data base can be provided on a one-time basis in the form of new overlays, tables or charts, and general and special situations. Unless the new data is intended to become a permanent part of the model, it need not be entered in the data book or prepared as a regular supplement to the map product.

DATA ELEMENT	DATA UTILIZED	REQUIRED DATA PRESENT	DATA ELEMENTS MISSING	DATA FORMAT UNCLEAR	REMARKS
I.A. Open Space-Steep Slope					No data presented
I.B. Open Space-Shallow Slope	X		X		Vegetation data incomplete
II.A.-G. Environment	X	X		X	II.G.1.-3. needs labeling
III.A. Util/Comm-Garbage			X		Equipment data missing
III.B. Util/Comm-Sewerage		X			
III.C. Util/Comm-Storm Water Disposal	X	X	X	X	Specific data missing
III.D. Util/Comm-Potable Water	X		X		Storage tank and well data missing
III.E. Util/Comm-Electric	X	X	X		Standby generating capacity
III.F. Util/Comm-Telephone	X	X			
III.G. Util/Comm-Radio/Television	X	X	X		Civilian access to receiving equipment
III.H. Util/Comm-Minor Radio		X		X	III.G.1.e. parameters unclear
IV.A. Transportation-General	X		X		Vegetation data in IV.A.5.b incomplete
IV.B. Trans-Surface Networks	X		X		Road and bridge data incomplete
IV.C. Trans-Water Routes	X	X	X		More detailed hydro data needed
IV.D. Trans-Rail Routes	X		X		Equipment data missing
IV.E. Trans-Air	X		X		Airfield 1 data incomplete
V.A.-D. Medical	X				
VI.A. Resources-Local Transportation	X		X		Equipment data incomplete
VI.B. Resources-Construction	X		X		Material type & quantity data omitted
VI.C. Resources-Industry	X				
VI.D. Resources-Foods	X		X		Farming and food stockage data missing
VI.E. Resources-Fuels	X		X		Tank capacity data missing
VI-F. Resouces-Public Buildings	X		X		Quantity of firefighting equipment
VI.G. Resources-Open Area Buildings	X				
VI.H. Resources-People	X		X		Ethnological data missing

Figure VIII-1. Summary of Data Base Utilization, Presentation, and Completion

Synthetic City (SYN City) Technical Data Base

Evaluation (Continued)

DATA ELEMENT	REMARKS
I.A. OPEN SPACE-Steep Slope	No data presented.
I.B. OPEN SPACE-Shallow Slope	Statistical data not readily usable by a military analyst. Logarithmic axes should be labled clearly, non-essential information should be deleted. What was the criteria for distinction between hard surface and soft surface? Cone penetrometer tests? Vegetation is militarily significant if ≥15 cm diameter. Overlay should show type, density, canopy closure for all vegetation types. This comment applies to data both inside and outside the metropolitan boundary.
II.A.-G. ENVIRONMENT	This data was well presented and the glossary was useful. Data columns under II.G.1.-3. not labeled.
III.A. UTIL/COMM-Garbage	How much equipment is used to accomplish this function?
III.B. UTIL/COMM-Sewerage	
III.C. UTIL/COMM-Storm Water Disposal	Detailed data not present concerning physical dimensions of storm sewers.
II.D. UTIL/COMM-Potable Water	Water tank capacities and average stockage levels? Quantity of water available at private wells? Emergency water supplies?
III.E. UTIL/COMM-Electric	Compatibility of indigenous equipment with US hardware? Location and capacity of standby generating equipment?
III.F. UTIL/COMM-Telephone	Data provided is adequate.

DATA ELEMENT	REMARKS
III.G. UTIL/COMM-Radio/Television	Percentage of population with access to radio/telephone sets?
III.H. UTIL/COMM-Minor Radio What about natural gas utilities?	Well-presented. Section III.H.1.e. needs to be clarified as to how these measurements were derived.
IV.A. TRANSPORTATION-General	Sections IV.A.4. and IV.A.5 require more detailed data as to soil trafficability and vegetation. This data should include: - Untrafficable areas. - Vegetation type, density, canopy closure, for both winter and summer seasons.
IV.B. TRANS-Surface Networks	Road classification formulas for primary routes would have been useful. How many miles of primary roads are contained within the metropolitan boundary? State of repair? Restrictions? Bridge data incomplete. Number and length of spans? State of repair? Restrictions? Horizontal clearance? Ease of bypass?
IV.C. TRANS-Water Routes	Statistical data for the tidal curve includes only 17 days out of 28 days in the lunar cycle. Hydrographic data near SYN City beach areas is not sufficiently detailed to permit an accurate analysis of movement through these areas. Channel profiles of critical areas would have been useful. Beach characteristics section should include data on beach widths, gradient, vegetation.

Synthetic City (SYN City) Technical Data Base

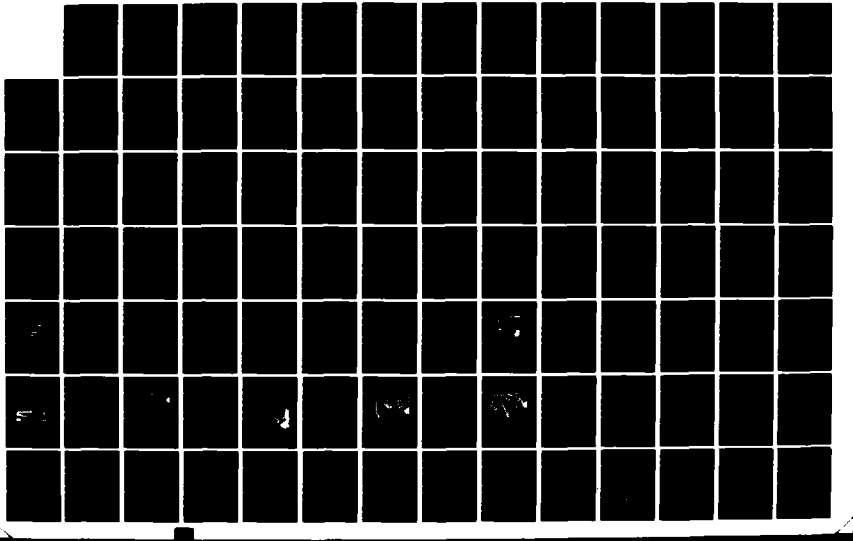
Evaluation (Continued)

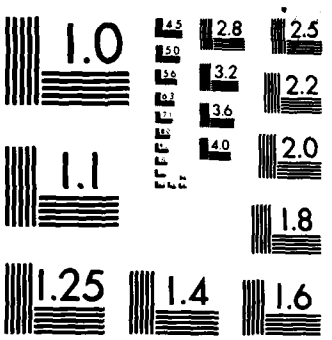
DATA ELEMENT	REMARKS
IV.D. TRANS-Rail Routes	Data concerning location and type of equipment missing. Locomotives? Rolling stock? Rehabilitative resources?
IV.E. TRANS-Air	Parking area? Types of maintenance facilities? Crash/rescue equipment? Load capacity for hardstand areas?
V.A.-D. MEDICAL	Data provided is adequate.
VI.A. RESOURCES-Local Transportation	A breakdown of the 500 trucks as to type and purpose would have been useful.
VI.B. RESOURCES-Construction	Quantities of supplies and equipment? What about engineer materials--sand, gravel, asphalt, lumber, etc.?
VI.C. RESOURCES-Industry	Data adequate.
VI.D. RESOURCES-Foods	Level of food stockage? Distribution system? Crops?
VI.E. RESOURCES-Fuels	No information provided on fuel tank capacities or level of stocks maintained.
VI.F. RESOURCES-Public Buildings	No information provided concerning construction type or typical hours of operation. Data on firefighting equipment is not adequate.
VI.G. RESOURCES-Large Open Area Buildings	Data adequate.
VI.H. RESOURCES-People	Size and distribution of paramilitary forces? Indigenous political system?

APPENDIX A

BULK FUEL ANALYSIS

AD-A133 162 GENERAL URBAN WARFARE AMPHIBIOUS LOGISTICS APPLICATIONS 6/7
VOLUME 1 TECHNICAL REPORT(U) MARINE CORPS DEVELOPMENT
AND EDUCATION COMMAND QUANTICO VA DE.. R J YEOMAN
UNCLASSIFIED 23 JUN 83 BDM/W-81-316-TR F/G 15/7 NL





Bulk Fuel Analysis

INTRODUCTION

THIS APPENDIX PROVIDES SUPPORTIVE DATA FOR THE QUANTITATIVE ANALYSIS OF BULK FUEL REQUIREMENTS SUMMARIZED IN CHAPTER VII--CLASS III(W). WHILE THE BASIC METHODOLOGY EMPLOYED BY BDM ANALYSTS WOULD BE VALID FOR ANY COMBAT SITUATION, THE DATA CONTAINED HEREIN IS BASED ON THE PROGRESSIVE LANDING OF ASSETS BY VII MAF AND THE SCHEME OF MANEUVER ENVISIONED IN OPERATION BREAKER--A DELIBERATE ASSAULT INTO SYNTHETIC CITY.

Bulk fuel requirements during an amphibious assault are influenced significantly by the debarkation schedule as well as the use of fuel consumers subsequent to the landing. The assault phase of any amphibious operation is characterized by the progressive buildup ashore of combat power, seizure of initial objectives and consolidation of associated tactical areas of responsibility, and the ultimate consolidation of the FBHL. Given the complexity of the tactical situation during the initial stages of Operation BREAKER, BDM analysts were concerned that the existing USMC Class III(W) methodology might not be sufficiently sensitive to predict the overall consumption resulting from urban combat as well as conventional combat across a wide battlefield.

The methodology employed to achieve the desired level of sensitivity is discussed in Chapter VII-Class III(POL) and is not repeated here. Data presented in the bulk fuel section of Chapter VII reflects a much condensed version of the detailed data which follow this introduction. Overall consumption and storage requirements are given in Chapter VII while consumption by equipment category is provided herein.

Supportive data in this appendix include:

- Printout of computer program (BASIC) used to generate data.
- Fuel consumption quantities and comparisons (BDM vs TAM) by major unit, tactical area of responsibility, and assault period.
  - Suppressed Format - Category by category comparisons have been omitted. Only area totals are given.
  - Expanded Format - Includes consumption comparisons for 23 identified equipment categories as well as area totals.
- An excursion into the impact of dieselization of light wheeled vehicles (≤1 1/4T) and marginal terrain vehicles expected to occur by the end of the mid-range period. (Consumption listed as "MID-RANGE IMPACT".)
- A determination of the total demand, per period, on primary fuel storage facilities and associated throughput systems.
  - Units north of South River will draw fuel stored at BSA RED (or CSSA 1 once established)
  - Units south of South River will draw fuel stored at BSA BLUE (or CSSA 2 once established).

```
 1 DATA 0.77,0.100,1,0.68,0.125,1,1,0,150,1,1.25,0,100,1
 4 DATA 0.45,0,45,1,0.4,0,30,1,0.125,0,42.64,1,0.08,0,32,1
 7 DATA 0.2,0,37.2,0,0.08,0,16.4,0,0.04,0,12,0,0,48,48,1
10 DATA 0,60,60,1,0,60,60,1,0,96,96,1,0,18,18,0,0,160,160,1
13 DATA 0,700,700,1,0,52.5,52.5,0,0,15,15,0,0,18,18,1
16 DATA 0.125,0,21.98,1,0,32,32,1
19 DIM Q(23),E(23,7)
22 M4=0
23 A$="N"
25 M5=0
28 M6=0
29 M7=0
30 D5=0
31 D6=0
34 D7=0
35 D8=0
36 RESTORE 1
37 FOR I=1 TO 23
40 PRINT USING "FA,2D":"INPUT QUANTITY # ",I;
43 INPUT Q(I)
46 NEXT I
61 E=0
64 PRINT "ENTER RADIUS OF ACTION = ";
67 INPUT R
70 PRINT "ENTER RESUPPLY DISTANCE= ";
73 INPUT D
76 PRINT "ENTER NUMBER OF DAYS FOR THIS CALCULATION= ";
79 INPUT Y
82 PRINT "ENTER AREA UNDER CONSIDERATION: ";
85 INPUT Z$
88 PRINT "ENTER PERIOD UNDER CONSIDERATION(ROMAN NUMERALS): ";
91 INPUT X$
94 PRINT "DO YOU WISH NUMERIC PRINTOUT SUPPRESSION(SUB-TOTALS)?(Y OR N)"
97 INPUT S$
100 PRINT @37,26:1
103 PRINT @51,11:1
104 IF A$="Y" THEN 112
106 PRINT @51: USING "/,30X,FA":"FUEL USAGE COMPARISON - CLASS III(W)"
109 PRINT @51: USING "FA,FA":"PERIOD:  ",X$
112 PRINT @51: USING "/,FA,FA":"LOCATION: ",Z$
115 PRINT @51: USING "FA,3D.2D,FA":"RADIUS OF ACTION= ",R," KILOMETERS"
118 PRINT @51: USING "FA,3D.2D,FA":"RESUPPLY DISTANCE= ",D," KILOMETERS"
121 PRINT @51: USING "FA,1D,FA,/":"LENGTH OF PERIOD= ",Y," DAYS."
124 PRINT @51: USING 127:"SYSTEM","QUANTITY","CALC.","TAM","RATIO"
127 IMA2X,FA,2X,FA,6X,FA,12X,FA,12X,FA,12X,"CALC.",9X,"TAM",14X,"RATIO"
130 PRI @51: USI 133:"I.D.","IN AREA","CONSUMPTION","CONSUMPTION","OF"
133 IMAGE4X,FA,2X,FA,4X,FA,5X,FA,9X,FA,9X,"CONSUMPTION",6X,S
```

```
136 PRINT @51:"CONSUMPTION         OF"
139 PRINT @51: USING 142:"(MOGAS)","(MOGAS)","CALC/TAM"
142 IMAGE24X,FA,8X,FA,8X,FA,8X," (DIESEL)",7X,"(DIESEL)",8X,"CALC/TAM",/
143 R$="CONSUMPTION TOTALS="
144 F=0
145 M1=0
146 M2=0
147 D2=0
148 D3=0
151 FOR I=1 TO 23
154 READ E(I,1),E(I,2),E(I,3),E(I,7)
157 IF F=0 THEN 172
158 IF I<9 OR I>11 THEN 172
160 E(9,7)=1
163 E(10,7)=1
166 E(11,7)=1
172 IF I>21 THEN 184
175 IF I>11 THEN 181
178 GO TO I OF 187,187,193,193,193,199,205,211,217,211,211
181 GO TO 229
184 GO TO I-21 OF 223,229
187 D1=5.93*R
190 GO TO 226
192 D1=36*R/(2*R/10+4)
196 GO TO 226
199 D1=5.58*R
202 GO TO 226
205 D1=36*D/(2*D/15+0.67)
208 GO TO 226
211 D1=36*R/(2*R/15+0.5)
214 GO TO 226
217 D1=100
220 GO TO 226
223 D1=21.6*D/(2*R/15+1)
226 E(I,2)=D1*E(I,1)
229 E(I,4)=E(I,2)*Q(I)
232 E(I,5)=E(I,3)*Q(I)
234 IF E(I,5)=0 THEN 238
235 E(I,6)=E(I,4)/E(I,5)
238 IF E(I,7)<>0 THEN 259
241 M1=M1+E(I,4)
244 M2=M2+E(I,5)
247 IF S$="Y" THEN 271
250 PRINT @51: USING 253:I,Q(I),E(I,4),E(I,5),E(I,6),0,0,0
253 IMAGE 3X,2D,4X,4D,6( 8X,5D.2D)
256 GO TO 271
259 D2=D2+E(I,4)
262 D3=D3+E(I,5)
265 IF S$="Y" THEN 271
268 PRINT @51: USING 253:I,Q(I),0,0,0,E(I,4),E(I,5),E(I,6)
271 NEXT I
```

```
274 M3=M1/M2
277 D4=D2/D3
280 PRINT @51: USING 283:R$,M1*1.15,M2*1.15,M3,D2*1.15,D3*1.15,D4
283 IMAGE /,FA,2X,6(6D.2D,7X)
286 PRINT @51: USING 289:Y,Y*M1*1.15,Y*M2*1.15,Y*D2*1.15,Y*D3*1.15
289 IMAGE "FOR ",1D," DAYS,TOTALS= ",2X,2(6D.2D,7X),16X,2(6D.2D,7X)
292 IF F=1 THEN 310
293 M4=M4+M1*Y
294 M5=M5+M2*Y
295 S$="Y"
296 D5=D5+D2*Y
297 D6=D6+D3*Y
298 RESTORE 1
301 R$="MID-RANGE IMPACT  ="
304 F=1
307 GO TO 145
310 CALL "WAIT",15
313 F=0
316 S$="N"
319 PRINT @37,26:0
322 M6=M6+M1*Y
325 M7=M7+M2*Y
328 D7=D7+D2*Y
331 D8=D8+D3*Y
334 PRINT "DO YOU HAVE ADDITIONAL AREAS TO CALCULATE?(Y OR N): ";
337 INPUT A$
340 IF A$="N" THEN 352
343 IF A$="Y" THEN 36
346 PRI "ILLEGAL INPUT,BUT DON'T SWEAT IT;TRY AGAIN( Y OR N, DUMMY): ";
349 GO TO 337
352 PRINT @37,26:1
355 PRINT @51,11:1
356 PRINT @51: USING "/,30X,FA":"SUPPORTING STORAGE AREA DEMAND"
357 M4=M4*1.15
358 M5=M5*1.15
359 D5=D5*1.15
360 D6=D6*1.15
361 M6=M6*1.15
362 M7=M7*1.15
363 D7=D7*1.15
364 D8=D8*1.15
366 PRINT @51: USING 283:"CONSUMPTION TOTAL=",M4,M5,M4/M5,D5,D6,D5/D6
367 PRINT @51: USING 283:"MID-RANGE IMPACT =",M6,M7,M6/M7,D7,D8,D7/D8
369 PRINT @37,26:0
370 STOP
371 END
```

FUEL USAGE COMPARISON - CLASS III (W)

PERIOD: II

LOCATION: AIRFIELD ONE
RADIUS OF ACTION= 1.50 KILOMETERS
RESUPPLY DISTANCE= 18.00 KILOMETERS
LENGTH OF PERIOD= 1 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
CONSUMPTION TOTALS=		420.11	1353.32	0.31	5101.07	5896.19	0.87
FOR 1 DAYS, TOTALS=		420.11	1353.32		5101.07	5896.19	
MID-RANGE IMPACT =		75.90	75.90	1.00	5445.28	7173.61	0.76
FOR 1 DAYS, TOTALS=		75.90	75.90		5445.28	7173.61	

LOCATION: PORT
RADIUS OF ACTION= 3.00 KILOMETERS
RESUPPLY DISTANCE= 11.00 KILOMETERS
LENGTH OF PERIOD= 1 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
CONSUMPTION TOTALS=		380.88	810.52	0.47	2263.31	8877.66	0.25
FOR 1 DAYS, TOTALS=		380.88	810.52		2263.31	8877.66	
MID-RANGE IMPACT =		82.80	82.80	1.00	2561.39	9605.37	0.27
FOR 1 DAYS, TOTALS=		82.80	82.80		2561.39	9605.37	

LOCATION: INDUSTRIAL AREA ONE
RADIUS OF ACTION= 15.00 KILOMETERS
RESUPPLY DISTANCE= 21.00 KILOMETERS
LENGTH OF PERIOD= 1 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
CONSUMPTION TOTALS=		564.56	760.61	0.74	842.58	965.82	0.87
FOR 1 DAYS, TOTALS=		564.56	760.61		842.58	965.82	
MID-RANGE IMPACT =		37.95	37.95	1.00	1369.19	1688.48	0.81
FOR 1 DAYS, TOTALS=		37.95	37.95		1369.19	1688.48	

LOCATION: PENINSULA
RADIUS OF ACTION= 1.50 KILOMETERS
RESUPPLY DISTANCE= 5.00 KILOMETERS
LENGTH OF PERIOD= 1 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
CONSUMPTION TOTALS=		289.31	938.17	0.31	10337.13	20926.64	0.49
FOR 1 DAYS, TOTALS=		289.31	938.17		10337.13	20926.64	
MID-RANGE IMPACT =		58.65	58.65	1.00	10567.79	21806.16	0.48
FOR 1 DAYS, TOTALS=		58.65	58.65		10567.79	21806.16	

SUPPORTING STORAGE AREA DEMAND

CONSUMPTION TOTAL=		1654.86	3862.62	0.43	18544.09	36666.30	0.51
MID-RANGE IMPACT =		255.30	255.30	1.00	19943.65	40273.62	0.50

FUEL USAGE COMPARISON - CLASS III (W)

PERIOD: II

LOCATION: AIRFIELD ONE
RADIUS OF ACTION= 1 50 KILOMETERS
RESUPPLY DISTANCE= 10 00 KILOMETERS
LENGTH OF PERIOD= 1 DAYS

SYSTEM	I.D	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
1 TANK (D)	1	0	0.00	0.00	0.00	0.00	0.00	0.00
2 LVTC. P (D)	2	0	0.00	0.00	0.00	0.00	0.00	0.00
3 LVTR (D)	3	0	0.00	0.00	0.00	0.00	0.00	0.00
4 M88A1 (D)	4	0	0.00	0.00	0.00	0.00	0.00	0.00
5 M578 (D)	5	0	0.00	0.00	0.00	0.00	0.00	0.00
6 SP HOW (D)	6	0	0.00	0.00	0.00	0.00	0.00	0.00
7 HVY CGO (D)	7	33	0.00	0.00	0.00	870.68	1407.12	0.62
8 LT CGO (D)	8	6	0.00	0.00	0.00	37.03	192.00	0.19
9 MTV (M)	9	0	0.00	0.00	0.00	0.00	0.00	0.00
10 LT CGO (M)	10	7	47.20	114.00	0.38	0.00	0.00	0.00
11 LT UTILITY (M)	11	83	256.11	996.00	0.26	0.00	0.00	0.00
12 MHE (D)	12	6	0.00	0.00	0.00	288.00	268.00	1.00
13 GEN (D)	13	47	0.00	0.00	0.00	2820.00	2820.00	1.00
14 ENGR CONST (D)	14	7	0.00	0.00	0.00	420.00	420.00	1.00
15 HVY CRANE (D)	15	0	0.00	0.00	0.00	0.00	0.00	0.00
16 MISC ENGR (M)	16	2	36.00	36.00	1.00	0.00	0.00	0.00
17 LAUNDRY/BATH (D)	17	0	0.00	0.00	0.00	0.00	0.00	0.00
18 AAFS (D)	18	0	0.00	0.00	0.00	0.00	0.00	0.00
19 TAFDS (M)	19	0	0.00	0.00	0.00	0.00	0.00	0.00
20 MERS (M)	20	2	30.00	30.00	1.00	0.00	0.00	0.00
21 MP40 (GSE) (D)	21	0	0.00	0.00	0.00	0.00	0.00	0.00
22 SPEC HVY CGO (D)	22	0	0.00	0.00	0.00	0.00	0.00	0.00
23 LT CRANE (D)	23	0	0.00	0.00	0.00	0.00	0.00	0.00
CONSUMPTION TOTALS=			420.11	1353.32	0.31	5101.87	5896.19	0.87
FOR 1 DAYS, TOTALS=			420.11	1353.32		5101.87	5896.19	
MID-RANGE IMPACT =			75.98	75.98	1.00	5445.28	7173.61	0.76
FOR 1 DAYS, TOTALS=			75.98	75.98		5445.28	7173.61	

LOCATION: PORT
RADIUS OF ACTION= 3.00 KILOMETERS
RESUPPLY DISTANCE= 11.00 KILOMETERS
LENGTH OF PERIOD= 1 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
1	0	0.00	0.00	0.00	0.00	0.00	0.00
2	46	0.00	0.00	0.00	556.47	5750.00	0.10
3	1	0.00	0.00	0.00	23.48	150.00	0.16
4	0	0.00	0.00	0.00	0.00	0.00	0.00
5	0	0.00	0.00	0.00	0.00	0.00	0.00
6	0	0.00	0.00	0.00	0.00	0.00	0.00
7	9	0.00	0.00	0.00	208.50	383.76	0.54
8	10	0.00	0.00	0.00	96.00	320.00	0.30
9	0	0.00	0.00	0.00	0.00	0.00	0.00
10	2	19.20	32.00	0.59	0.00	0.00	0.00
11	50	240.00	600.00	0.40	0.00	0.00	0.00
12	0	0.00	0.00	0.00	0.00	0.00	0.00
13	11	0.00	0.00	0.00	660.00	660.00	1.00
14	6	0.00	0.00	0.00	360.00	360.00	1.00
15	0	0.00	0.00	0.00	0.00	0.00	0.00
16	4	72.00	72.00	1.00	0.00	0.00	0.00
17	0	0.00	0.00	0.00	0.00	0.00	0.00
18	0	0.00	0.00	0.00	0.00	0.00	0.00
19	0	0.00	0.00	0.00	0.00	0.00	0.00
20	0	0.00	0.00	0.00	0.00	0.00	0.00
21	0	0.00	0.00	0.00	0.00	0.00	0.00
22	3	0.00	0.00	0.00	63.64	95.94	0.66
23	0	0.00	0.00	0.00	0.00	0.00	0.00
CONSUMPTION TOTALS=		380.80	810.52	0.47	2263.31	8877.66	0.25
FOR 1 DAYS, TOTALS=		380.80	810.52		2263.31	8877.66	
MID-RANGE IMPACT =		82.80	82.80	1.00	2561.39	9605.37	0.27
FOR 1 DAYS, TOTALS=		82.80	82.80		2561.39	9605.37	

LOCATION: INDUSTRIAL AREA ONE
RADIUS OF ACTION= 15.00 KILOMETERS
RESUPPLY DISTANCE= 21.00 KILOMETERS
LENGTH OF PERIOD= 1 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
1	0	0.00	0.00	0.00	0.00	0.00	0.00
2	0	0.00	0.00	0.00	0.00	0.00	0.00
3	0	0.00	0.00	0.00	0.00	0.00	0.00
4	0	0.00	0.00	0.00	0.00	0.00	0.00
5	0	0.00	0.00	0.00	0.00	0.00	0.00
6	0	0.00	0.00	0.00	0.00	0.00	0.00
7	6	0.00	0.00	0.00	163.40	255.84	0.64
8	1	0.00	0.00	0.00	17.28	32.00	0.54
9	0	0.00	0.00	0.00	0.00	0.00	0.00
10	1	17.28	16.40	1.05	0.00	0.00	0.00
11	51	440.64	612.00	0.72	0.00	0.00	0.00
12	4	0.00	0.00	0.00	192.00	192.00	1.00
13	3	0.00	0.00	0.00	180.00	180.00	1.00
14	3	0.00	0.00	0.00	180.00	180.00	1.00
15	0	0.00	0.00	0.00	0.00	0.00	0.00
16	1	18.00	18.00	1.00	0.00	0.00	0.00
17	0	0.00	0.00	0.00	0.00	0.00	0.00
18	0	0.00	0.00	0.00	0.00	0.00	0.00
19	0	0.00	0.00	0.00	0.00	0.00	0.00
20	1	15.00	15.00	1.00	0.00	0.00	0.00
21	0	0.00	0.00	0.00	0.00	0.00	0.00
22	0	0.00	0.00	0.00	0.00	0.00	0.00
23	0	0.00	0.00	0.00	0.00	0.00	0.00
CONSUMPTION TOTALS=		564.56	760.61	0.74	842.58	965.82	0.87
FOR 1 DAYS, TOTALS=		564.56	760.61		842.58	965.82	
MID-RANGE IMPACT =		37.95	37.95	1.00	1369.19	1688.48	0.81
FOR 1 DAYS, TOTALS=		37.95	37.95		1369.19	1688.48	

LOCATION: PENINSULA
RADIUS OF ACTION= 1.50 KILOMETERS
RESUPPLY DISTANCE= 5.00 KILOMETERS
LENGTH OF PERIOD= 1 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
1	17	0.00	0.00	0.00	116.44	1700.00	0.07
2	46	0.00	0.00	0.00	278.24	5750.00	0.05
3	1	0.00	0.00	0.00	12.56	150.00	0.08
4	1	0.00	0.00	0.00	15.70	100.00	0.16
5	0	0.00	0.00	0.00	0.00	0.00	0.00
6	0	0.00	0.00	0.00	0.00	0.00	0.00
7	55	0.00	0.00	0.00	925.81	2345.20	0.39
8	15	0.00	0.00	0.00	92.57	480.00	0.19
9	0	0.00	0.00	0.00	0.00	0.00	0.00
10	2	12.34	32.80	0.38	0.00	0.00	0.00
11	61	188.23	732.00	0.26	0.00	0.00	0.00
12	34	0.00	0.00	0.00	1632.00	1632.00	1.00
13	24	0.00	0.00	0.00	1440.00	1440.00	1.00
14	40	0.00	0.00	0.00	2400.00	2400.00	1.00
15	18	0.00	0.00	0.00	1728.00	1728.00	1.00
16	2	36.00	36.00	1.00	0.00	0.00	0.00
17	0	0.00	0.00	0.00	0.00	0.00	0.00
18	4	0.00	0.00	0.00	280.00	280.00	1.00
19	0	0.00	0.00	0.00	0.00	0.00	0.00
20	1	15.00	15.00	1.00	0.00	0.00	0.00
21	0	0.00	0.00	0.00	0.00	0.00	0.00
22	6	0.00	0.00	0.00	67.50	191.88	0.35
23	0	0.00	0.00	0.00	0.00	0.00	0.00
CONSUMPTION TOTALS=		289.31	938.17	0.31	10337.13	20926.64	0.49
FOR 1 DAYS, TOTALS=		289.31	938.17		10337.13	20926.64	
MID-RANGE IMPACT =		58.65	58.65	1.00	10567.79	21806.16	0.48
FOR 1 DAYS, TOTALS=		58.65	58.65		10567.79	21806.16	

SUPPORTING STORAGE AREA DEMAND

CONSUMPTION TOTAL=	1654.86	3862.62	0.43	18544.09	36666.38	0.51
MID-RANGE IMPACT =	255.38	255.38	1.00	19943.65	40273.62	0.50

FUEL USAGE COMPARISON - CLASS III (W)

PERIOD: II

LOCATION: NAVAL STATION
RADIUS OF ACTION= 2.50 KILOMETERS
RESUPPLY DISTANCE= 8.00 KILOMETERS
LENGTH OF PERIOD= 1 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
CONSUMPTION TOTALS=		365.98	843.18	0.43	3071.78	18207.61	0.17
FOR 1 DAYS, TOTALS=		365.98	843.18		3071.78	18207.61	
MID-RANGE IMPACT =		82.80	82.80	1.00	3354.95	18967.99	0.18
FOR 1 DAYS, TOTALS=		82.80	82.80		3354.95	18967.99	

LOCATION: AIRFIELD TWO
RADIUS OF ACTION= 1.50 KILOMETERS
RESUPPLY DISTANCE= 10.50 KILOMETERS
LENGTH OF PERIOD= 1 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
CONSUMPTION TOTALS=		171.71	439.76	0.39	192.64	334.24	0.58
FOR 1 DAYS, TOTALS=		171.71	439.76		192.64	334.24	
MID-RANGE IMPACT =		75.90	75.90	1.00	288.45	698.10	0.41
FOR 1 DAYS, TOTALS=		75.90	75.90		288.45	698.10	

LOCATION: DAM AND BRIDGE THREE
RADIUS OF ACTION= 1.00 KILOMETERS
RESUPPLY DISTANCE= 20.50 KILOMETERS
LENGTH OF PERIOD= 1 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
CONSUMPTION TOTALS=		62.32	151.80	0.41	174.40	223.84	0.78
FOR 1 DAYS, TOTALS=		62.32	151.80		174.40	223.84	
MID-RANGE IMPACT =		41.40	41.40	1.00	195.32	334.24	0.58
FOR 1 DAYS, TOTALS=		41.40	41.40		195.32	334.24	

LOCATION: BLUE BEACH
RADIUS OF ACTION= 2.00 KILOMETERS
RESUPPLY DISTANCE= 2.00 KILOMETERS
LENGTH OF PERIOD= 1 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
CONSUMPTION TOTALS=		297.15	848.47	0.35	7935.83	10372.82	0.77
FOR 1 DAYS, TOTALS=		297.15	848.47		7935.83	10372.82	
MID-RANGE IMPACT =		37.95	37.95	1.00	8195.83	11183.34	0.73
FOR 1 DAYS, TOTALS=		37.95	37.95		8195.83	11183.34	

SUPPORTING STORAGE AREA DEMAND

CONSUMPTION TOTAL=		897.16	2283.21	0.39	11374.65	29138.49	0.39
MID-RANGE IMPACT =		238.05	238.05	1.00	12033.75	31183.65	0.39

FUEL USAGE COMPARISON - CLASS III (W)

PERIOD: II

LOCATION: NAVAL STATION
RADIUS OF ACTION= 2.50 KILOMETERS
RESUPPLY DISTANCE= 8.00 KILOMETERS
LENGTH OF PERIOD= 1 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	C.S.C. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
1	17	0.00	0.00	0.00	194.06	1700.00	0.11
2	92	0.00	0.00	0.00	927.45	11500.00	0.08
3	2	0.00	0.00	0.00	40.00	300.00	0.13
4	1	0.00	0.00	0.00	25.00	100.00	0.25
5	0	0.00	0.00	0.00	0.00	0.00	0.00
6	0	0.00	0.00	0.00	0.00	0.00	0.00
7	17	0.00	0.00	0.00	352.40	724.88	0.49
8	10	0.00	0.00	0.00	86.40	320.00	0.27
9	0	0.00	0.00	0.00	0.00	0.00	0.00
10	3	25.92	49.20	0.53	0.00	0.00	0.00
11	51	220.32	612.00	0.36	0.00	0.00	0.00
12	0	0.00	0.00	0.00	0.00	0.00	0.00
13	9	0.00	0.00	0.00	540.00	540.00	1.00
14	6	0.00	0.00	0.00	360.00	360.00	1.00
15	0	0.00	0.00	0.00	0.00	0.00	0.00
16	4	72.00	72.00	1.00	0.00	0.00	0.00
17	0	0.00	0.00	0.00	0.00	0.00	0.00
18	0	0.00	0.00	0.00	0.00	0.00	0.00
19	0	0.00	0.00	0.00	0.00	0.00	0.00
20	0	0.00	0.00	0.00	0.00	0.00	0.00
21	0	0.00	0.00	0.00	0.00	0.00	0.00
22	9	0.00	0.00	0.00	145.80	287.82	0.51
23	0	0.00	0.00	0.00	0.00	0.00	0.00
CONSUMPTION TOTALS=		365.98	843.18	0.43	3071.78	18207.61	0.17
FOR 1 DAYS, TOTALS=		365.98	843.18		3071.78	18207.61	
MID-RANGE IMPACT =		82.80	82.80	1.00	3354.95	18967.99	0.18
FOR 1 DAYS, TOTALS=		82.80	82.80		3354.95	18967.99	

LOCATION: AIRFIELD TWO
RADIUS OF ACTION= 1.50 KILOMETERS
RESUPPLY DISTANCE= 10.50 KILOMETERS
LENGTH OF PERIOD= 1 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
1	0	0.00	0.00	0.00	0.00	0.00	0.00
2	0	0.00	0.00	0.00	0.00	0.00	0.00
3	0	0.00	0.00	0.00	0.00	0.00	0.00
4	0	0.00	0.00	0.00	0.00	0.00	0.00
5	0	0.00	0.00	0.00	0.00	0.00	0.00
6	0	0.00	0.00	0.00	0.00	0.00	0.00
7	1	0.00	0.00	0.00	22.83	42.64	0.54
8	4	0.00	0.00	0.00	24.69	128.00	0.19
9	0	0.00	0.00	0.00	0.00	0.00	0.00
10	1	6.17	16.40	0.38	0.00	0.00	0.00
11	25	77.14	300.00	0.26	0.00	0.00	0.00
12	0	0.00	0.00	0.00	0.00	0.00	0.00
13	1	0.00	0.00	0.00	60.00	60.00	1.00
14	1	0.00	0.00	0.00	60.00	60.00	1.00
15	0	0.00	0.00	0.00	0.00	0.00	0.00
16	2	36.00	36.00	1.00	0.00	0.00	0.00
17	0	0.00	0.00	0.00	0.00	0.00	0.00
18	0	0.00	0.00	0.00	0.00	0.00	0.00
19	0	0.00	0.00	0.00	0.00	0.00	0.00
20	2	30.00	30.00	1.00	0.00	0.00	0.00
21	0	0.00	0.00	0.00	0.00	0.00	0.00
22	0	0.00	0.00	0.00	0.00	0.00	0.00
23	0	0.00	0.00	0.00	0.00	0.00	0.00
CONSUMPTION TOTALS=		171.71	439.76	0.39	192.64	334.24	0.58
FOR 1 DAYS, TOTALS=		171.71	439.76		192.64	334.24	
MID-RANGE IMPACT =		75.90	75.90	1.00	288.45	698.10	0.41
FOR 1 DAYS, TOTALS=		75.90	75.90		288.45	698.10	

LOCATION: DAM AND BRIDGE THREE
RADIUS OF ACTION= 1.00 KILOMETERS
RESUPPLY DISTANCE= 20.50 KILOMETERS
LENGTH OF PERIOD= 1 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
1	0	0.00	0.00	0.00	0.00	0.00	0.00
2	0	0.00	0.00	0.00	0.00	0.00	0.00
3	0	0.00	0.00	0.00	0.00	0.00	0.00
4	0	0.00	0.00	0.00	0.00	0.00	0.00
5	0	0.00	0.00	0.00	0.00	0.00	0.00
6	0	0.00	0.00	0.00	0.00	0.00	0.00
7	1	0.00	0.00	0.00	27.11	42.64	0.64
8	1	0.00	0.00	0.00	4.55	32.00	0.14
9	0	0.00	0.00	0.00	0.00	0.00	0.00
10	0	0.00	0.00	0.00	0.00	0.00	0.00
11	8	18.19	96.00	0.19	0.00	0.00	0.00
12	0	0.00	0.00	0.00	0.00	0.00	0.00
13	1	0.00	0.00	0.00	60.00	60.00	1.00
14	1	0.00	0.00	0.00	60.00	60.00	1.00
15	0	0.00	0.00	0.00	0.00	0.00	0.00
16	2	36.00	36.00	1.00	0.00	0.00	0.00
17	0	0.00	0.00	0.00	0.00	0.00	0.00
18	0	0.00	0.00	0.00	0.00	0.00	0.00
19	0	0.00	0.00	0.00	0.00	0.00	0.00
20	0	0.00	0.00	0.00	0.00	0.00	0.00
21	0	0.00	0.00	0.00	0.00	0.00	0.00
22	0	0.00	0.00	0.00	0.00	0.00	0.00
23	0	0.00	0.00	0.00	0.00	0.00	0.00
CONSUMPTION TOTALS=		62.32	151.80	0.41	174.40	223.84	0.78
FOR 1 DAYS, TOTALS=		62.32	151.80		174.40	223.84	
MID-RANGE IMPACT =		41.40	41.40	1.00	195.32	334.24	0.58
FOR 1 DAYS, TOTALS=		41.40	41.40		195.32	334.24	

LOCATION: BLUE BEACH
RADIUS OF ACTION= 2.00 KILOMETERS
RESUPPLY DISTANCE= 2.00 KILOMETERS
LENGTH OF PERIOD= 1 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
1	0	0.00	0.00	0.00	0.00	0.00	0.00
2	0	0.00	0.00	0.00	0.00	0.00	0.00
3	0	0.00	0.00	0.00	0.00	0.00	0.00
4	0	0.00	0.00	0.00	0.00	0.00	0.00
5	0	0.00	0.00	0.00	0.00	0.00	0.00
6	0	0.00	0.00	0.00	0.00	0.00	0.00
7	56	0.00	0.00	0.00	538.00	2387.84	0.23
8	11	0.00	0.00	0.00	82.64	352.00	0.23
9	0	0.00	0.00	0.00	0.00	0.00	0.00
10	2	15.03	32.80	0.46	0.00	0.00	0.00
11	56	210.37	672.00	0.31	0.00	0.00	0.00
12	21	0.00	0.00	0.00	1008.00	1008.00	1.00
13	23	0.00	0.00	0.00	1380.00	1380.00	1.00
14	41	0.00	0.00	0.00	2460.00	2460.00	1.00
15	12	0.00	0.00	0.00	1152.00	1152.00	1.00
16	1	18.00	18.00	1.00	0.00	0.00	0.00
17	0	0.00	0.00	0.00	0.00	0.00	0.00
18	4	0.00	0.00	0.00	288.00	288.00	1.00
19	0	0.00	0.00	0.00	0.00	0.00	0.00
20	1	15.00	15.00	1.00	0.00	0.00	0.00
21	0	0.00	0.00	0.00	0.00	0.00	0.00
22	0	0.00	0.00	0.00	0.00	0.00	0.00
23	0	0.00	0.00	0.00	0.00	0.00	0.00
CONSUMPTION TOTALS=		297.15	848.47	0.35	7935.83	10372.82	0.77
FOR 1 DAYS, TOTALS=		297.15	848.47		7935.83	10372.82	
MID-RANGE IMPACT =		37.95	37.95	1.00	8195.03	11183.34	0.73
FOR 1 DAYS, TOTALS=		37.95	37.95		8195.03	11183.34	

SUPPORTING STORAGE AREA DEMAND

CONSUMPTION TOTAL=	897.16	2283.21	0.39	11374.65	29138.49	0.39
MID-RANGE IMPACT =	238.05	238.05	1.00	12033.75	31183.65	0.39

FUEL USAGE COMPARISON - CLASS III (W)

PERIOD: III

LOCATION: AIRFIELD ONE
RADIUS OF ACTION= 1.75 KILOMETERS
RESUPPLY DISTANCE= 18.00 KILOMETERS
LENGTH OF PERIOD= 3 DAYS

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
CONSUMPTION TOTALS=		1312.47	3570.18	0.37	11182.75	13275.97	0.84
FOR 3 DAYS, TOTALS=		3937.42	10710.53		33548.26	39827.90	
MID-RANGE IMPACT =		336.38	336.38	1.00	12158.85	16509.77	0.74
FOR 3 DAYS, TOTALS=		1009.13	1009.13		36476.56	49529.30	

LOCATION: PORT
RADIUS OF ACTION= 1.50 KILOMETERS
RESUPPLY DISTANCE= 11.00 KILOMETERS
LENGTH OF PERIOD= 3 DAYS

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
CONSUMPTION TOTALS=		3373.02	8185.47	0.41	47317.28	71674.69	0.66
FOR 3 DAYS, TOTALS=		10119.05	24556.41		141951.84	215024.08	
MID-RANGE IMPACT =		762.45	762.45	1.00	49927.84	79097.71	0.63
FOR 3 DAYS, TOTALS=		2287.35	2287.35		149783.53	237293.14	

LOCATION: INDUSTRIAL AREA ONE
RADIUS OF ACTION= 30.00 KILOMETERS
RESUPPLY DISTANCE= 21.00 KILOMETERS
LENGTH OF PERIOD= 3 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
CONSUMPTION TOTALS=		2949.06	3616.52	0.82	25343.86	23882.23	1.06
FOR 3 DAYS, TOTALS=		8847.18	10949.56		76031.64	71646.70	
MID-RANGE IMPACT =		34.50	34.50	1.00	28258.44	27464.25	1.03
FOR 3 DAYS, TOTALS=		103.50	103.50		84775.32	82392.76	

LOCATION: PENINSULA
RADIUS OF ACTION= 2.00 KILOMETERS
RESUPPLY DISTANCE= 5.00 KILOMETERS
LENGTH OF PERIOD= 3 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
CONSUMPTION TOTALS=		401.76	1257.18	0.32	11276.11	14638.21	0.77
FOR 3 DAYS, TOTALS=		1205.28	3771.54		33828.32	43914.64	
MID-RANGE IMPACT =		0.00	0.00	0.00	11677.87	15895.39	0.73
FOR 3 DAYS, TOTALS=		0.00	0.00		35033.60	47686.18	

SUPPORTING STORAGE AREA DEMAND

CONSUMPTION TOTAL=		24106.93	49888.04	0.48	285360.86	370413.32	0.77
MID-RANGE IMPACT =		3399.98	3399.98	1.00	306069.01	416901.38	0.73

FUEL USAGE COMPARISON - CLASS III (W)

PERIOD: III

LOCATION: AIRFIELD ONE
RADIUS OF ACTION= 1.75 KILOMETERS
RESUPPLY DISTANCE= 18.00 KILOMETERS
LENGTH OF PERIOD= 3 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
1	0	0.00	0.00	0.00	0.00	0.00	0.00
2	0	0.00	0.00	0.00	0.00	0.00	0.00
3	0	0.00	0.00	0.00	0.00	0.00	0.00
4	0	0.00	0.00	0.00	0.00	0.00	0.00
5	0	0.00	0.00	0.00	0.00	0.00	0.00
6	0	0.00	0.00	0.00	0.00	0.00	0.00
7	76	0.00	0.00	0.00	2005.21	3240.64	0.62
8	3	0.00	0.00	0.00	20.62	96.00	0.21
9	0	0.00	0.00	0.00	0.00	0.00	0.00
10	20	137.45	328.00	0.42	0.00	0.00	0.00
11	207	711.33	2484.00	0.29	0.00	0.00	0.00
12	11	0.00	0.00	0.00	528.00	528.00	1.00
13	82	0.00	0.00	0.00	4920.00	4920.00	1.00
14	20	0.00	0.00	0.00	1200.00	1200.00	1.00
15	0	0.00	0.00	0.00	0.00	0.00	0.00
16	10	180.00	180.00	1.00	0.00	0.00	0.00
17	0	0.00	0.00	0.00	0.00	0.00	0.00
18	2	0.00	0.00	0.00	140.00	140.00	1.00
19	1	52.50	52.50	1.00	0.00	0.00	0.00
20	4	60.00	60.00	1.00	0.00	0.00	0.00
21	6	0.00	0.00	0.00	108.00	108.00	1.00
22	16	0.00	0.00	0.00	630.49	511.68	1.23
23	0	0.00	0.00	0.00	0.00	0.00	0.00
CONSUMPTION TOTALS=		1312.47	3570.18	0.37	10385.16	12355.97	0.89
FOR 3 DAYS, TOTALS=		3937.42	10710.53		32955.49	37067.90	
MID-RANGE IMPACT =		336.38	336.38	1.00	11961.26	15589.77	0.77
FOR 3 DAYS, TOTALS=		1009.13	1009.13		35883.79	46769.30	

LOCATION: PORT
RADIUS OF ACTION= 1.50 KILOMETERS
RESUPPLY DISTANCE= 11.00 KILOMETERS
LENGTH OF PERIOD= 3 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
1	53	0.00	0.00	0.00	363.00	5300.00	0.07
2	64	0.00	0.00	0.00	387.11	8000.00	0.05
3	4	0.00	0.00	0.00	50.23	600.00	0.08
4	5	0.00	0.00	0.00	78.49	500.00	0.16
5	0	0.00	0.00	0.00	0.00	0.00	0.00
6	0	0.00	0.00	0.00	0.00	0.00	0.00
7	339	0.00	0.00	0.00	7853.59	14454.96	0.54
8	25	0.00	0.00	0.00	154.29	800.00	0.19
9	45	900.00	1674.00	0.54	0.00	0.00	0.00
10	72	444.34	1180.80	0.38	0.00	0.00	0.00
11	300	925.71	3600.00	0.26	0.00	0.00	0.00
12	14	0.00	0.00	0.00	672.00	672.00	1.00
13	369	0.00	0.00	0.00	22140.00	22140.00	1.00
14	55	0.00	0.00	0.00	3300.00	3300.00	1.00
15	10	0.00	0.00	0.00	960.00	960.00	1.00
16	36	648.00	648.00	1.00	0.00	0.00	0.00
17	22	0.00	0.00	0.00	3520.00	3520.00	1.00
18	0	0.00	0.00	0.00	0.00	0.00	0.00
19	0	0.00	0.00	0.00	0.00	0.00	0.00
20	1	15.00	15.00	1.00	0.00	0.00	0.00
21	0	0.00	0.00	0.00	0.00	0.00	0.00
22	57	0.00	0.00	0.00	1410.75	1822.86	0.77
23	8	0.00	0.00	0.00	256.00	256.00	1.00
CONSUMPTION TOTALS=		3373.02	8185.47	0.41	47317.28	71674.69	0.66
FOR 3 DAYS, TOTALS=		10119.05	24556.41		141951.84	215024.08	
MID-RANGE IMPACT =		762.45	762.45	1.00	49927.84	79097.71	0.63
FOR 3 DAYS, TOTALS=		2287.35	2287.35		149783.53	237293.14	

LOCATION: INDUSTRIAL AREA ONE
RADIUS OF ACTION= 30.00 KILOMETERS
RESUPPLY DISTANCE= 21.00 KILOMETERS
LENGTH OF PERIOD= 3 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
1	70	0.00	0.00	0.00	9588.81	7000.00	1.37
2	46	0.00	0.00	0.00	5564.71	5750.00	0.97
3	1	0.00	0.00	0.00	108.00	150.00	0.72
4	5	0.00	0.00	0.00	675.00	500.00	1.35
5	0	0.00	0.00	0.00	0.00	0.00	0.00
6	6	0.00	0.00	0.00	401.76	180.00	2.23
7	74	0.00	0.00	0.00	2015.27	3155.36	0.64
8	11	0.00	0.00	0.00	211.20	352.00	0.60
9	0	0.00	0.00	0.00	0.00	0.00	0.00
10	7	134.40	114.80	1.17	0.00	0.00	0.00
11	250	2400.00	3000.00	0.80	0.00	0.00	0.00
12	5	0.00	0.00	0.00	240.00	240.00	1.00
13	36	0.00	0.00	0.00	2160.00	2160.00	1.00
14	16	0.00	0.00	0.00	960.00	960.00	1.00
15	0	0.00	0.00	0.00	0.00	0.00	0.00
16	0	0.00	0.00	0.00	0.00	0.00	0.00
17	0	0.00	0.00	0.00	0.00	0.00	0.00
18	0	0.00	0.00	0.00	0.00	0.00	0.00
19	0	0.00	0.00	0.00	0.00	0.00	0.00
20	2	30.00	30.00	1.00	0.00	0.00	0.00
21	0	0.00	0.00	0.00	0.00	0.00	0.00
22	10	0.00	0.00	0.00	113.40	319.80	0.35
23	0	0.00	0.00	0.00	0.00	0.00	0.00
CONSUMPTION TOTALS=		2949.06	3616.52	0.82	25343.88	23882.23	1.06
FOR 3 DAYS, TOTALS=		8847.18	10849.56		76031.64	71646.70	
MID-RANGE IMPACT =		34.50	34.50	1.00	28258.44	27464.25	1.03
FOR 3 DAYS, TOTALS=		103.50	103.50		84775.32	82392.76	

LOCATION: PENINSULA
RADIUS OF ACTION= 2.00 KILOMETERS
RESUPPLY DISTANCE= 5.00 KILOMETERS
LENGTH OF PERIOD= 3 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
1	0	0.00	0.00	0.00	0.00	0.00	0.00
2	0	0.00	0.00	0.00	0.00	0.00	0.00
3	0	0.00	0.00	0.00	0.00	0.00	0.00
4	0	0.00	0.00	0.00	0.00	0.00	0.00
5	3	0.00	0.00	0.00	22.09	135.00	0.16
6	12	0.00	0.00	0.00	53.57	360.00	0.15
7	75	0.00	0.00	0.00	1262.47	3198.00	0.39
8	18	0.00	0.00	0.00	135.23	576.00	0.23
9	0	0.00	0.00	0.00	0.00	0.00	0.00
10	3	22.54	49.20	0.46	0.00	0.00	0.00
11	87	326.82	1044.00	0.31	0.00	0.00	0.00
12	35	0.00	0.00	0.00	1680.00	1680.00	1.00
13	28	0.00	0.00	0.00	1680.00	1680.00	1.00
14	46	0.00	0.00	0.00	2760.00	2760.00	1.00
15	18	0.00	0.00	0.00	1728.00	1728.00	1.00
16	0	0.00	0.00	0.00	0.00	0.00	0.00
17	0	0.00	0.00	0.00	0.00	0.00	0.00
18	6	0.00	0.00	0.00	420.00	420.00	1.00
19	0	0.00	0.00	0.00	0.00	0.00	0.00
20	0	0.00	0.00	0.00	0.00	0.00	0.00
21	0	0.00	0.00	0.00	0.00	0.00	0.00
22	6	0.00	0.00	0.00	63.95	191.88	0.33
23	0	0.00	0.00	0.00	0.00	0.00	0.00
CONSUMPTION TOTALS=		401.76	1257.18	0.32	11276.11	14638.21	0.77
FOR 3 DAYS, TOTALS=		1205.28	3771.54		33828.32	43914.64	
MID-RANGE IMPACT =		0.00	0.00	0.00	11677.87	15895.39	0.73
FOR 3 DAYS, TOTALS=		0.00	0.00		35033.60	47686.18	

SUPPORTING STORAGE AREA DEMAND

CONSUMPTION TOTAL=	25314.21	53659.58	0.47	310595.60	411567.96	0.77
MID-RANGE IMPACT =	3399.98	3399.98	1.00	305476.24	414141.38	0.74

FUEL USAGE COMPARISON - CLASS III (W)

PERIOD: III

LOCATION: NAVAL STATION
RADIUS OF ACTION= 4.00 KILOMETERS
RESUPPLY DISTANCE= 8.00 KILOMETERS
LENGTH OF PERIOD= 3 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
CONSUMPTION TOTALS=		711.55	1496.84	0.48	3994.65	18259.79	0.22
FOR 3 DAYS, TOTALS=		2134.64	4490.52		11983.95	54779.38	
MID-RANGE IMPACT =		0.00	0.00	0.00	4706.19	19756.63	0.24
FOR 3 DAYS, TOTALS=		0.00	0.00		14118.58	59269.90	

LOCATION: AIRFIELD TWO
RADIUS OF ACTION= 1.50 KILOMETERS
RESUPPLY DISTANCE= 10.50 KILOMETERS
LENGTH OF PERIOD= 3 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
CONSUMPTION TOTALS=		577.68	1187.38	0.49	4851.39	5568.23	0.87
FOR 3 DAYS, TOTALS=		1733.03	3562.13		14554.17	16704.69	
MID-RANGE IMPACT =		336.38	336.38	1.00	5092.69	6419.23	0.79
FOR 3 DAYS, TOTALS=		1009.13	1009.13		15278.08	19257.69	

LOCATION: DAM AND BRIDGE THREE
RADIUS OF ACTION= 1.00 KILOMETERS
RESUPPLY DISTANCE= 20.50 KILOMETERS
LENGTH OF PERIOD= 3 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
CONSUMPTION TOTALS=		23.00	42.78	0.54	935.60	955.24	0.95
FOR 3 DAYS, TOTALS=		69.00	128.34		2717.40	2865.71	
MID-RANGE IMPACT =		0.00	0.00	0.00	928.80	998.02	0.93
FOR 3 DAYS, TOTALS=		0.00	0.00		2786.40	2994.05	

LOCATION: BLUE BEACH
RADIUS OF ACTION= 2.00 KILOMETERS
RESUPPLY DISTANCE= 2.00 KILOMETERS
LENGTH OF PERIOD= 3 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
CONSUMPTION TOTALS=		788.55	1953.39	0.40	19829.29	27031.42	0.73
FOR 3 DAYS, TOTALS=		2365.65	5860.17		59487.87	81094.25	
MID-RANGE IMPACT =		162.15	162.15	1.00	20455.69	28822.66	0.71
FOR 3 DAYS, TOTALS=		486.45	486.45		61367.07	86467.97	

SUPPORTING STORAGE AREA DEMAND

CONSUMPTION TOTAL=	6302.32	14041.16	0.45	88743.38	155444.03	0.57
MID-RANGE IMPACT =	1495.58	1495.58	1.00	93550.13	167989.61	0.56

FUEL USAGE COMPARISON - CLASS III (W)

PERIOD: III

LOCATION: NAVAL STATION
RADIUS OF ACTION= 4.00 KILOMETERS
RESUPPLY DISTANCE= 8.00 KILOMETERS
LENGTH OF PERIOD= 3 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
1	17	0.00	0.00	0.00	310.49	1700.00	0.18
2	92	0.00	0.00	0.00	1483.92	11500.00	0.13
3	2	0.00	0.00	0.00	60.00	300.00	0.20
4	1	0.00	0.00	0.00	37.50	100.00	0.38
5	0	0.00	0.00	0.00	0.00	0.00	0.00
6	0	0.00	0.00	0.00	0.00	0.00	0.00
7	19	0.00	0.00	0.00	393.86	810.16	0.49
8	10	0.00	0.00	0.00	111.48	320.00	0.35
9	0	0.00	0.00	0.00	0.00	0.00	0.00
10	4	44.59	65.60	0.68	0.00	0.00	0.00
11	103	574.14	1236.00	0.46	0.00	0.00	0.00
12	0	0.00	0.00	0.00	0.00	0.00	0.00
13	11	0.00	0.00	0.00	660.00	660.00	1.00
14	6	0.00	0.00	0.00	360.00	360.00	1.00
15	0	0.00	0.00	0.00	0.00	0.00	0.00
16	0	0.00	0.00	0.00	0.00	0.00	0.00
17	0	0.00	0.00	0.00	0.00	0.00	0.00
18	0	0.00	0.00	0.00	0.00	0.00	0.00
19	0	0.00	0.00	0.00	0.00	0.00	0.00
20	0	0.00	0.00	0.00	0.00	0.00	0.00
21	0	0.00	0.00	0.00	0.00	0.00	0.00
22	4	0.00	0.00	0.00	56.35	127.92	0.44
23	0	0.00	0.00	0.00	0.00	0.00	0.00
CONSUMPTION TOTALS=		711.55	1496.84	0.48	3994.65	18259.79	0.22
FOR 3 DAYS, TOTALS=		2134.64	4490.52		11983.95	54779.38	
MID-RANGE IMPACT =		0.00	0.00	0.00	4706.19	19756.63	0.24
FOR 3 DAYS, TOTALS=		0.00	0.00		14118.58	59269.90	

LOCATION: AIRFIELD TWO
RADIUS OF ACTION= 1.50 KILOMETERS
RESUPPLY DISTANCE= 10.50 KILOMETEPS
LENGTH OF PERIOD= 3 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
1	0	0.00	0.00	0.00	0.00	0.00	0.00
2	0	0.00	0.00	0.00	0.00	0.00	0.00
3	0	0.00	0.00	0.00	0.00	0.00	0.00
4	0	0.00	0.00	0.00	0.00	0.00	0.00
5	0	0.00	0.00	0.00	0.00	0.00	0.00
6	0	0.00	0.00	0.00	0.00	0.00	0.00
7	19	0.00	0.00	0.00	433.70	810.16	0.54
8	6	0.00	0.00	0.00	37.03	192.00	0.19
9	0	0.00	0.00	0.00	0.00	0.00	0.00
10	10	61.71	164.00	0.38	0.00	0.00	0.00
11	48	148.11	576.00	0.26	0.00	0.00	0.00
12	5	0.00	0.00	0.00	240.00	240.00	1.00
13	37	0.00	0.00	0.00	2220.00	2220.00	1.00
14	13	0.00	0.00	0.00	780.00	780.00	1.00
15	0	0.00	0.00	0.00	0.00	0.00	0.00
16	10	180.00	180.00	1.00	0.00	0.00	0.00
17	0	0.00	0.00	0.00	0.00	0.00	0.00
18	2	0.00	0.00	0.00	140.00	140.00	1.00
19	1	52.50	52.50	1.00	0.00	0.00	0.00
20	4	60.00	60.00	1.00	0.00	0.00	0.00
21	6	0.00	0.00	0.00	108.00	108.00	1.00
22	11	0.00	0.00	0.00	259.88	351.78	0.74
23	0	0.00	0.00	0.00	0.00	0.00	0.00
CONSUMPTION TOTALS=		577.68	1187.38	0.49	4851.39	5568.23	0.87
FOR 3 DAYS, TOTALS=		1733.03	3562.13		14554.17	16704.69	
MID-RANGE IMPACT =		336.38	336.38	1.00	5092.69	6419.23	0.79
FOR 3 DAYS, TOTALS=		1009.13	1009.13		15278.08	19257.69	

LOCATION: DAM AND BRIDGE THREE
RADIUS OF ACTION= 1.00 KILOMETERS
RESUPPLY DISTANCE= 20.50 KILOMETERS
LENGTH OF PERIOD= 3 DAYS

SYSTEM I.D	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
1	0	0.00	0.00	0.00	0.00	0.00	0.00
2	0	0.00	0.00	0.00	0.00	0.00	0.00
3	0	0.00	0.00	0.00	0.00	0.00	0.00
4	0	0.00	0.00	0.00	0.00	0.00	0.00
5	0	0.00	0.00	0.00	0.00	0.00	0.00
6	0	0.00	0.00	0.00	0.00	0.00	0.00
7	1	0.00	0.00	0.00	27.11	42.64	0.64
8	1	0.00	0.00	0.00	4.55	32.00	0.14
9	1	20.00	37.20	0.54	0.00	0.00	0.00
10	0	0.00	0.00	0.00	0.00	0.00	0.00
11	0	0.00	0.00	0.00	0.00	0.00	0.00
12	10	0.00	0.00	0.00	480.00	480.00	1.00
13	0	0.00	0.00	0.00	0.00	0.00	0.00
14	3	0.00	0.00	0.00	180.00	180.00	1.00
15	1	0.00	0.00	0.00	96.00	96.00	1.00
16	0	0.00	0.00	0.00	0.00	0.00	0.00
17	0	0.00	0.00	0.00	0.00	0.00	0.00
18	0	0.00	0.00	0.00	0.00	0.00	0.00
19	0	0.00	0.00	0.00	0.00	0.00	0.00
20	0	0.00	0.00	0.00	0.00	0.00	0.00
21	0	0.00	0.00	0.00	0.00	0.00	0.00
22	0	0.00	0.00	0.00	0.00	0.00	0.00
23	0	0.00	0.00	0.00	0.00	0.00	0.00
CONSUMPTION TOTALS=		23.00	42.78	0.54	905.80	955.24	0.95
FOR 3 DAYS, TOTALS=		69.00	128.34		2717.40	2865.71	
MID-RANGE IMPACT =		0.00	0.00	0.00	928.80	998.02	0.93
FOR 3 DAYS, TOTALS=		0.00	0.00		2786.40	2994.05	

LOCATION: BLUE BEACH
RADIUS OF ACTION= 2.00 KILOMETERS
RESUPPLY DISTANCE= 2.00 KILOMETERS
LENGTH OF PERIOD= 3 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
1	0	0.00	0.00	0.00	0.00	0.00	0.00
2	0	0.00	0.00	0.00	0.00	0.00	0.00
3	1	0.00	0.00	0.00	16.36	150.00	0.11
4	2	0.00	0.00	0.00	40.91	200.00	0.20
5	1	0.00	0.00	0.00	7.36	45.00	0.16
6	6	0.00	0.00	0.00	26.78	180.00	0.15
7	139	0.00	0.00	0.00	1335.59	5926.96	0.23
8	27	0.00	0.00	0.00	282.85	864.00	0.33
9	0	0.00	0.00	0.00	0.00	0.00	0.00
10	24	180.31	393.60	0.46	0.00	0.00	0.00
11	97	364.38	1164.00	0.31	0.00	0.00	0.00
12	19	0.00	0.00	0.00	912.00	912.00	1.00
13	127	0.00	0.00	0.00	7620.00	7620.00	1.00
14	59	0.00	0.00	0.00	3540.00	3540.00	1.00
15	14	0.00	0.00	0.00	1344.00	1344.00	1.00
16	7	126.00	126.00	1.00	0.00	0.00	0.00
17	10	0.00	0.00	0.00	1600.00	1600.00	1.00
18	6	0.00	0.00	0.00	420.00	420.00	1.00
19	0	0.00	0.00	0.00	0.00	0.00	0.00
20	1	15.00	15.00	1.00	0.00	0.00	0.00
21	0	0.00	0.00	0.00	0.00	0.00	0.00
22	19	0.00	0.00	0.00	81.00	607.62	0.13
23	3	0.00	0.00	0.00	96.00	96.00	1.00
CONSUMPTION TOTALS=		788.55	1953.39	0.40	19829.29	27031.42	0.73
FOR 3 DAYS, TOTALS=		2365.65	5860.17		59487.87	81094.25	
MID-RANGE IMPACT =		162.15	162.15	1.00	20455.69	26822.66	0.71
FOR 3 DAYS, TOTALS=		486.45	486.45		61367.07	86467.97	

SUPPORTING STORAGE AREA DEMAND

CONSUMPTION TOTAL=	6302.32	14041.16	0.45	88743.38	155444.03	0.57
MID-RANGE IMPACT =	1495.58	1495.58	1.00	93550.13	167989.61	0.56

FUEL USAGE COMPARISON - CLASS III (W)

PERIOD: IV

LOCATION: AIRFIELD ONE
RADIUS OF ACTION= 1.75 KILOMETERS
RESUPPLY DISTANCE= 13.00 KILOMETERS
LENGTH OF PERIOD= 3 DAYS.

SYSTEM I.D	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
CONSUMPTION TOTALS=		2187.43	5103.24	0.43	22611.96	26278.19	0.86
FOR 3 DAYS, TOTALS=		6562.28	15309.72		67835.88	78834.57	
MID-RANGE IMPACT =		828.00	828.00	1.00	23971.39	30553.43	0.78
FOR 3 DAYS, TOTALS=		2484.00	2484.00		71914.16	91660.29	

LOCATION: PENINSULA
RADIUS OF ACTION= 2.00 KILOMETERS
RESUPPLY DISTANCE= 9.50 KILOMETERS
LENGTH OF PERIOD= 3 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
CONSUMPTION TOTALS=		361.98	1093.42	0.33	4207.92	6129.41	0.69
FOR 3 DAYS, TOTALS=		1085.94	3280.26		12623.75	18388.22	
MID-RANGE IMPACT =		20.70	20.70	1.00	4549.20	7202.13	0.63
FOR 3 DAYS, TOTALS=		62.10	62.10		13647.59	21606.38	

LOCATION: INDUSTRIAL AREA ONE
RADIUS OF ACTION= 45.00 KILOMETERS
RESUPPLY DISTANCE= 14.50 KILOMETERS
LENGTH OF PERIOD= 3 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
CONSUMPTION TOTALS=		3116.25	3687.36	0.85	34295.45	23912.64	1.43
FOR 3 DAYS, TOTALS=		9348.76	11062.08		102886.36	71737.92	
MID-RANGE IMPACT =		55.20	55.20	1.00	37356.51	27544.80	1.36
FOR 3 DAYS, TOTALS=		165.60	165.60		112069.52	82634.40	

LOCATION: PORT
RADIUS OF ACTION= 2.50 KILOMETERS
RESUPPLY DISTANCE= 2.00 KILOMETERS
LENGTH OF PERIOD= 3 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
CONSUMPTION TOTALS=		4739.33	10094.93	0.47	56886.41	94113.35	0.60
FOR 3 DAYS, TOTALS=		14216.00	30284.79		170659.22	282340.07	
MID-RANGE IMPACT =		907.35	907.35	1.00	60718.39	103300.94	0.59
FOR 3 DAYS, TOTALS=		2722.05	2722.05		182155.18	309902.81	

SUPPORTING STORAGE AREA DEMAND

CONSUMPTION TOTAL=		21214.98	59926.85	0.52	354005.22	451300.78	0.78
MID-RANGE IMPACT =		5433.75	5433.75	1.00	379786.44	505983.88	0.75

FUEL USAGE COMPARISON - CLASS III (W)

PERIOD IV

LOCATION AIRFIELD ONE
RADIUS OF ACTION= 1 75 KILOMETERS
RESUPPLY DISTANCE= 13 00 KILOMETERS
LENGTH OF PERIOD= 3 DAYS.

SYSTEM I.D	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
1	0	0.00	0.00	0.00	0.00	0.00	0.00
2	0	0.00	0.00	0.00	0.00	0.00	0.00
3	0	0.00	0.00	0.00	0.00	0.00	0.00
4	0	0.00	0.00	0.00	0.00	0.00	0.00
5	0	0.00	0.00	0.00	0.00	0.00	0.00
6	0	0.00	0.00	0.00	0.00	0.00	0.00
7	130	0.00	0.00	0.00	3164.36	5543.20	0.57
8	28	0.00	0.00	0.00	192.44	896.00	0.21
9	0	0.00	0.00	0.00	0.00	0.00	0.00
10	54	371.13	885.60	0.42	0.00	0.00	0.00
11	236	810.98	2832.00	0.29	0.00	0.00	0.00
12	30	0.00	0.00	0.00	1440.00	1440.00	1.00
13	177	0.00	0.00	0.00	10620.00	10620.00	1.00
14	31	0.00	0.00	0.00	1860.00	1860.00	1.00
15	3	0.00	0.00	0.00	288.00	288.00	1.00
16	30	540.00	540.00	1.00	0.00	0.00	0.00
17	0	0.00	0.00	0.00	0.00	0.00	0.00
18	6	0.00	0.00	0.00	420.00	420.00	1.00
19	2	105.00	105.00	1.00	0.00	0.00	0.00
20	5	75.00	75.00	1.00	0.00	0.00	0.00
21	12	0.00	0.00	0.00	216.00	216.00	1.00
22	30	0.00	0.00	0.00	853.78	959.40	0.89
23	19	0.00	0.00	0.00	608.00	608.00	1.00
CONSUMPTION TOTALS=		2187.43	5103.24	0.43	22611.96	26278.19	0.86
FOR 3 DAYS, TOTALS=		6562.28	15309.72		67835.88	78834.57	
MID-RANGE IMPACT =		828.00	828.00	1.00	23971.39	30553.43	0.78
FOR 3 DAYS, TOTALS=		2484.00	2484.00		71914.16	91660.29	

LOCATION: PENINSULA
RADIUS OF ACTION= 2.00 KILOMETERS
RESUPPLY DISTANCE= 9.50 KILOMETERS
LENGTH OF PERIOD= 3 DAYS.

SYSTEM I.D	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
1	0	0.00	0.00	0.00	0.00	0.00	0.00
2	0	0.00	0.00	0.00	0.00	0.00	0.00
3	0	0.00	0.00	0.00	0.00	0.00	0.00
4	0	0.00	0.00	0.00	0.00	0.00	0.00
5	3	0.00	0.00	0.00	22.09	135.00	0.16
6	12	0.00	0.00	0.00	53.57	360.00	0.15
7	36	0.00	0.00	0.00	794.66	1535.04	0.52
8	18	0.00	0.00	0.00	135.23	576.90	0.23
9	0	0.00	0.00	0.00	0.00	0.00	0.00
10	2	15.03	32.80	0.46	0.00	0.00	0.00
11	75	281.74	900.00	0.31	0.00	0.00	0.00
12	4	0.00	0.00	0.00	192.00	192.00	1.00
13	22	0.00	0.00	0.00	1320.00	1320.00	1.00
14	10	0.00	0.00	0.00	600.00	600.00	1.00
15	0	0.00	0.00	0.00	0.00	0.00	0.00
16	1	18.00	18.00	1.00	0.00	0.00	0.00
17	0	0.00	0.00	0.00	0.00	0.00	0.00
18	6	0.00	0.00	0.00	420.00	420.00	1.00
19	0	0.00	0.00	0.00	0.00	0.00	0.00
20	0	0.00	0.00	0.00	0.00	0.00	0.00
21	0	0.00	0.00	0.00	0.00	0.00	0.00
22	6	0.00	0.00	0.00	121.50	191.88	0.63
23	0	0.00	0.00	0.00	0.00	0.00	0.00
CONSUMPTION TOTALS=		361.98	1093.42	0.33	4207.92	6129.41	0.69
FOR 3 DAYS, TOTALS=		1085.94	3280.26		12623.75	18388.22	
MID-RANGE IMPACT =		20.70	20.70	1.00	4549.20	7202.13	0.63
FOR 3 DAYS, TOTALS=		62.10	62.10		13647.59	21606.38	

LOCATION: INDUSTRIAL AREA ONE
RADIUS OF ACTION= 45.00 KILOMETERS
RESUPPLY DISTANCE= 14.50 KILOMETERS
LENGTH OF PERIOD= 3 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
1	70	0.00	0.00	0.00	14383.22	7000.00	2.05
2	46	0.00	0.00	0.00	8347.07	5750.00	1.45
3	1	0.00	0.00	0.00	124.62	150.00	0.83
4	5	0.00	0.00	0.00	778.85	500.00	1.56
5	1	0.00	0.00	0.00	56.00	45.00	1.25
6	6	0.00	0.00	0.00	602.64	180.00	3.35
7	70	0.00	0.00	0.00	1754.48	2984.80	0.59
8	12	0.00	0.00	0.00	239.26	384.00	0.62
9	0	0.00	0.00	0.00	0.00	0.00	0.00
10	6	119.63	98.40	1.22	0.00	0.00	0.00
11	255	2542.15	3060.00	0.83	0.00	0.00	0.00
12	15	0.00	0.00	0.00	720.00	720.00	1.00
13	25	0.00	0.00	0.00	1500.00	1500.00	1.00
14	14	0.00	0.00	0.00	840.00	840.00	1.00
15	0	0.00	0.00	0.00	0.00	0.00	0.00
16	1	18.00	18.00	1.00	0.00	0.00	0.00
17	0	0.00	0.00	0.00	0.00	0.00	0.00
18	6	0.00	0.00	0.00	420.00	420.00	1.00
19	0	0.00	0.00	0.00	0.00	0.00	0.00
20	2	30.00	30.00	1.00	0.00	0.00	0.00
21	0	0.00	0.00	0.00	0.00	0.00	0.00
22	10	0.00	0.00	0.00	55.93	319.00	0.17
23	0	0.00	0.00	0.00	0.00	0.00	0.00
CONSUMPTION TOTALS=		3116.25	3687.36	0.85	34295.45	23912.64	1.43
FOR 3 DAYS, TOTALS=		9348.76	11062.08		102986.36	71737.92	
MID-RANGE IMPACT =		55.20	55.20	1.00	37356.51	27544.80	1.36
FOR 3 DAYS, TOTALS=		165.60	165.60		112069.52	82634.40	

LOCATION: PORT
RADIUS OF ACTION= 2.50 KILOMETERS
RESUPPLY DISTANCE= 2.00 KILOMETERS
LENGTH OF PERIOD= 3 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
1	53	0.00	0.00	0.00	605.01	5300.00	0.11
2	64	0.00	0.00	0.00	645.18	8000.00	0.08
3	4	0.00	0.00	0.00	80.00	600.00	0.13
4	6	0.00	0.00	0.00	150.00	600.00	0.25
5	0	0.00	0.00	0.00	0.00	0.00	0.00
6	0	0.00	0.00	0.00	0.00	0.00	0.00
7	480	0.00	0.00	0.00	4612.10	20467.20	0.23
8	60	0.00	0.00	0.00	518.40	1920.00	0.27
9	45	900.00	1674.00	0.54	0.00	0.00	0.00
10	58	501.12	951.20	0.53	0.00	0.00	0.00
11	447	1931.04	5364.00	0.36	0.00	0.00	0.00
12	42	0.00	0.00	0.00	2016.00	2016.00	1.00
13	473	0.00	0.00	0.00	26388.00	26388.00	1.00
14	80	0.00	0.00	0.00	4800.00	4800.00	1.00
15	26	0.00	0.00	0.00	2496.00	2496.00	1.00
16	43	774.00	774.00	1.00	0.00	0.00	0.00
17	23	0.00	0.00	0.00	3680.00	3680.00	1.00
18	1	0.00	0.00	0.00	700.00	700.00	1.00
19	0	0.00	0.00	0.00	0.00	0.00	0.00
20	1	15.00	15.00	1.00	0.00	0.00	0.00
21	0	0.00	0.00	0.00	0.00	0.00	0.00
22	75	0.00	0.00	0.00	303.75	2398.50	0.13
23	15	0.00	0.00	0.00	480.00	480.00	1.00
CONSUMPTION TOTALS=		4739.33	10094.93	0.47	56886.41	94113.35	0.60
FOR 3 DAYS, TOTALS=		14218.00	30284.79		170659.22	282340.07	
MID-RANGE IMPACT =		907.35	907.35	1.00	60718.39	101300.94	0.59
FOR 3 DAYS, TOTALS=		2722.05	2722.05		182155.18	303902.81	

SUPPORTING STORAGE AREA DEMAND

CONSUMPTION TOTAL=	31214.98	59936.85	0.52	354005.22	451309.78	0.78
MID-RANGE IMPACT =	5433.75	5433.75	1.00	379786.44	505903.88	0.75

FUEL USAGE COMPARISON - CLASS III (W)

PERIOD: IV

LOCATION: NAVAL STATION
RADIUS OF ACTION= 4.00 KILOMETERS
RESUPPLY DISTANCE= 8.00 KILOMETERS
LENGTH OF PERIOD= 3 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
CONSUMPTION TOTALS=		849.10	1736.50	0.49	3994.65	18259.79	0.22
FOR 3 DAYS, TOTALS=		2547.30	5209.50		11983.95	54779.38	
MID-RANGE IMPACT =		41.40	41.40	1.00	4802.35	19954.89	0.24
FOR 3 DAYS, TOTALS=		124.20	124.20		14407.05	59864.68	

LOCATION: AIRFIELD TWO
RADIUS OF ACTION= 1.50 KILOMETERS
RESUPPLY DISTANCE= 10.50 KILOMETERS
LENGTH OF PERIOD= 3 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
CONSUMPTION TOTALS=		1221.30	2350.60	0.52	11560.66	13238.29	0.87
FOR 3 DAYS, TOTALS=		3663.90	7051.80		34681.98	39714.88	
MID-RANGE IMPACT =		724.50	724.50	1.00	12057.46	14864.39	0.81
FOR 3 DAYS, TOTALS=		2173.50	2173.50		36172.38	44593.18	

LOCATION: DAM AND BRIDGE THREE
RADIUS OF ACTION= 1.00 KILOMETERS
RESUPPLY DISTANCE= 20.50 KILOMETERS
LENGTH OF PERIOD= 3 DAYS.

SYSTEM I.D	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
CONSUMPTION TOTALS=		41.84	220.80	0.19	312.40	361.84	0.86
FOR 3 DAYS, TOTALS=		125.51	662.40		937.20	1085.51	
MID-RANGE IMPACT =		0.00	0.00	0.00	354.24	582.64	0.61
FOR 3 DAYS, TOTALS=		0.00	0.00		1062.71	1747.91	

LOCATION: BLUE BEACH
RADIUS OF ACTION= 2.00 KILOMETERS
RESUPPLY DISTANCE= 2.00 KILOMETERS
LENGTH OF PERIOD= 3 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
CONSUMPTION TOTALS=		1015.68	2480.32	0.41	21785.91	30089.64	0.72
FOR 3 DAYS, TOTALS=		3047.04	7440.96		65357.73	90268.90	
MID-RANGE IMPACT =		220.80	220.80	1.00	22580.79	32349.16	0.70
FOR 3 DAYS, TOTALS=		662.40	662.40		67742.37	97047.46	

SUPPORTING STORAGE AREA DEMAND

CONSUMPTION TOTAL=	9383.75	20364.66	0.46	112960.86	185948.67	0.61
MID-RANGE IMPACT =	2960.10	2960.10	1.00	119384.51	203253.23	0.59

FUEL USAGE COMPARISON - CLASS III (W)

PERIOD: IV

LOCATION: NAVAL STATION
RADIUS OF ACTION= 4.00 KILOMETERS
RESUPPLY DISTANCE= 8.00 KILOMETERS
LENGTH OF PERIOD= 3 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
1	17	0.00	0.00	0.00	310.49	1700.00	0.18
2	92	0.00	0.00	0.00	1483.92	11500.00	0.13
3	2	0.00	0.00	0.00	60.00	300.00	0.20
4	1	0.00	0.00	0.00	37.50	100.00	0.38
5	0	0.00	0.00	0.00	0.00	0.00	0.00
6	0	0.00	0.00	0.00	0.00	0.00	0.00
7	19	0.00	0.00	0.00	393.86	810.16	0.49
8	10	0.00	0.00	0.00	111.48	320.00	0.35
9	0	0.00	0.00	0.00	0.00	0.00	0.00
10	5	55.74	82.00	0.68	0.00	0.00	0.00
11	116	646.61	1392.00	0.46	0.00	0.00	0.00
12	0	0.00	0.00	0.00	0.00	0.00	0.00
13	11	0.00	0.00	0.00	660.00	660.00	1.00
14	6	0.00	0.00	0.00	360.00	360.00	1.00
15	0	0.00	0.00	0.00	0.00	0.00	0.00
16	2	36.00	36.00	1.00	0.00	0.00	0.00
17	0	0.00	0.00	0.00	0.00	0.00	0.00
18	0	0.00	0.00	0.00	0.00	0.00	0.00
19	0	0.00	0.00	0.00	0.00	0.00	0.00
20	0	0.00	0.00	0.00	0.00	0.00	0.00
21	0	0.00	0.00	0.00	0.00	0.00	0.00
22	4	0.00	0.00	0.00	56.35	127.92	0.44
23	0	0.00	0.00	0.00	0.00	0.00	0.00
CONSUMPTION TOTALS=		849.10	1736.50	0.49	3994.65	18259.79	0.22
FOR 3 DAYS, TOTALS=		2547.30	5209.50		11983.95	54779.38	
MID-RANGE IMPACT =		41.40	41.40	1.00	4802.35	19954.89	0.24
FOR 3 DAYS, TOTALS=		124.20	124.20		14407.05	59864.68	

LOCATION: AIRFIELD TWO
RADIUS OF ACTION= 1.75 KILOMETERS
RESUPPLY DISTANCE= 13.00 KILOMETERS
LENGTH OF PERIOD= 3 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
1	0	0.00	0.00	0.00	0.00	0.00	0.00
2	0	0.00	0.00	0.00	0.00	0.00	0.00
3	0	0.00	0.00	0.00	0.00	0.00	0.00
4	0	0.00	0.00	0.00	0.00	0.00	0.00
5	0	0.00	0.00	0.00	0.00	0.00	0.00
6	0	0.00	0.00	0.00	0.00	0.00	0.00
7	53	0.00	0.00	0.00	1290.00	2259.92	0.57
8	10	0.00	0.00	0.00	68.73	320.00	0.21
9	0	0.00	0.00	0.00	0.00	0.00	0.00
10	35	240.55	574.00	0.42	0.00	0.00	0.00
11	70	240.55	840.00	0.29	0.00	0.00	0.00
12	18	0.00	0.00	0.00	864.00	864.00	1.00
13	80	0.00	0.00	0.00	4800.00	4800.00	1.00
14	22	0.00	0.00	0.00	1320.00	1320.00	1.00
15	3	0.00	0.00	0.00	288.00	288.00	1.00
16	25	450.00	450.00	1.00	0.00	0.00	0.00
17	0	0.00	0.00	0.00	0.00	0.00	0.00
18	6	0.00	0.00	0.00	420.00	420.00	1.00
19	2	105.00	105.00	1.00	0.00	0.00	0.00
20	5	75.00	75.00	1.00	0.00	0.00	0.00
21	12	0.00	0.00	0.00	216.00	216.00	1.00
22	18	0.00	0.00	0.00	512.27	575.64	0.89
23	14	0.00	0.00	0.00	448.00	448.00	1.00
CONSUMPTION TOTALS=		1277.75	2350.60	0.54	11761.14	13238.29	0.89
FOR 3 DAYS, TOTALS=		3833.26	7051.80		35283.43	39714.88	
MID-RANGE IMPACT =		724.50	724.50	1.00	12314.40	14964.39	0.83
FOR 3 DAYS, TOTALS=		2173.50	2173.50		36943.19	44893.18	

LOCATION: DAM AND BRIDGE THREE
RADIUS OF ACTION= 1.00 KILOMETERS
RESUPPLY DISTANCE= 20.50 KILOMETERS
LENGTH OF PERIOD= 3 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
1	0	0.00	0.00	0.00	0.00	0.00	0.00
2	0	0.00	0.00	0.00	0.00	0.00	0.00
3	0	0.00	0.00	0.00	0.00	0.00	0.00
4	0	0.00	0.00	0.00	0.00	0.00	0.00
5	0	0.00	0.00	0.00	0.00	0.00	0.00
6	0	0.00	0.00	0.00	0.00	0.00	0.00
7	1	0.00	0.00	0.00	27.11	42.64	0.64
8	1	0.00	0.00	0.00	4.55	32.00	0.14
9	0	0.00	0.00	0.00	0.00	0.00	0.00
10	0	0.00	0.00	0.00	0.00	0.00	0.00
11	16	36.38	192.00	0.19	0.00	0.00	0.00
12	0	0.00	0.00	0.00	0.00	0.00	0.00
13	3	0.00	0.00	0.00	180.00	180.00	1.00
14	1	0.00	0.00	0.00	60.00	60.00	1.00
15	0	0.00	0.00	0.00	0.00	0.00	0.00
16	0	0.00	0.00	0.00	0.00	0.00	0.00
17	0	0.00	0.00	0.00	0.00	0.00	0.00
18	0	0.00	0.00	0.00	0.00	0.00	0.00
19	0	0.00	0.00	0.00	0.00	0.00	0.00
20	0	0.00	0.00	0.00	0.00	0.00	0.00
21	0	0.00	0.00	0.00	0.00	0.00	0.00
22	0	0.00	0.00	0.00	0.00	0.00	0.00
23	0	0.00	0.00	0.00	0.00	0.00	0.00
CONSUMPTION TOTALS=		41.84	220.80	0.19	312.40	361.84	0.86
FOR 3 DAYS, TOTALS=		125.51	662.40		937.20	1085.51	
MID-RANGE IMPACT =		0.00	0.00	0.00	354.24	582.64	0.61
FOR 3 DAYS, TOTALS=		0.00	0.00		1062.71	1747.91	

LOCATION: BLUE BEACH
RADIUS OF ACTION= 2.00 KILOMETERS
RESUPPLY DISTANCE= 2.00 KILOMETERS
LENGTH OF PERIOD= 3 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
1	0	0.00	0.00	0.00	0.00	0.00	0.00
2	0	0.00	0.00	0.00	0.00	0.00	0.00
3	1	0.00	0.00	0.00	16.36	150.00	0.11
4	2	0.00	0.00	0.00	40.91	200.00	0.20
5	1	0.00	0.00	0.00	7.36	45.00	0.16
6	6	0.00	0.00	0.00	26.78	180.00	0.15
7	160	0.00	0.00	0.00	1537.37	6822.40	0.23
8	31	0.00	0.00	0.00	232.90	992.00	0.23
9	0	0.00	0.00	0.00	0.00	0.00	0.00
10	32	240.42	524.80	0.46	0.00	0.00	0.00
11	120	450.78	1440.00	0.31	0.00	0.00	0.00
12	30	0.00	0.00	0.00	1440.00	1440.00	1.00
13	132	0.00	0.00	0.00	7920.00	7920.00	1.00
14	55	0.00	0.00	0.00	3300.00	3300.00	1.00
15	16	0.00	0.00	0.00	1536.00	1536.00	1.00
16	9	162.00	162.00	1.00	0.00	0.00	0.00
17	12	0.00	0.00	0.00	1920.00	1920.00	1.00
18	1	0.00	0.00	0.00	700.00	700.00	1.00
19	0	0.00	0.00	0.00	0.00	0.00	0.00
20	2	30.00	30.00	1.00	0.00	0.00	0.00
21	0	0.00	0.00	0.00	0.00	0.00	0.00
22	25	0.00	0.00	0.00	106.58	799.50	0.13
23	0	0.00	0.00	0.00	0.00	0.00	0.00
CONSUMPTION TOTALS=		1015.68	2480.32	0.41	21601.91	29905.64	0.72
FOR 3 DAYS, TOTALS=		3047.04	7440.96		64805.73	89716.90	
MID-RANGE IMPACT =		220.80	220.80	1.00	22296.79	32165.16	0.70
FOR 3 DAYS, TOTALS=		662.40	662.40		67190.37	96495.46	

SUPPORTING STORAGE AREA DEMAND

CONSUMPTION TOTAL=	9553.11	20364.66	0.47	113010.31	185296.67	0.61
MID-RANGE IMPACT =	2960.10	2960.10	1.00	119603.32	202701.23	0.59

FUEL USAGE COMPARISON - CLASS III (W)

PERIOD: V

LOCATION: AIRFIELD ONE
RADIUS OF ACTION= 1.75 KILOMETERS
RESUPPLY DISTANCE= 13.00 KILOMETERS
LENGTH OF PERIOD= 4 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
CONSUMPTION TOTALS=		2996.61	6591.34	0.45	35050.95	39889.18	0.88
FOR 4 DAYS, TOTALS=		11986.43	26365.36		140203.82	159556.70	
MID-RANGE IMPACT =		1242.00	1242.00	1.00	36805.56	45238.52	0.81
FOR 4 DAYS, TOTALS=		4968.00	4968.00		147222.25	180954.06	

LOCATION: PENINSULA
RADIUS OF ACTION= 2.00 KILOMETERS
RESUPPLY DISTANCE= 9.50 KILOMETERS
LENGTH OF PERIOD= 4 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
CONSUMPTION TOTALS=		387.90	1176.22	0.33	4276.92	6198.41	0.69
FOR 4 DAYS, TOTALS=		1551.60	4704.88		17107.67	24793.63	
MID-RANGE IMPACT =		20.70	20.70	1.00	4644.12	7353.93	0.63
FOR 4 DAYS, TOTALS=		82.80	82.80		18576.47	29415.71	

LOCATION: INDUSTRIAL AREA ONE
RADIUS OF ACTION= 45.00 KILOMETERS
RESUPPLY DISTANCE= 14.50 KILOMETERS
LENGTH OF PERIOD= 4 DAYS.

SYSTEM I.D	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
CONSUMPTION TOTALS=		2185.04	3770.16	0.84	33838.76	23449.60	1.44
FOR 4 DAYS, TOTALS=		12740.16	15080.64		135355.03	93798.42	
MID-RANGE IMPACT =		55.20	55.20	1.00	36968.60	27164.56	1.36
FOR 4 DAYS, TOTALS=		220.80	220.80		147874.39	108658.26	

LOCATION: PORT
RADIUS OF ACTION= 3.00 KILOMETERS
RESUPPLY DISTANCE= 2.00 KILOMETERS
LENGTH OF PERIOD= 4 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
CONSUMPTION TOTALS=		6468.75	13134.61	0.49	68752.44	112008.99	0.61
FOR 4 DAYS, TOTALS=		25875.00	52538.44		275009.77	448035.95	
MID-RANGE IMPACT =		907.35	907.35	1.00	74313.84	124236.25	0.60
FOR 4 DAYS, TOTALS=		3629.40	3629.40		297255.37	496944.99	

SUPPORTING STORAGE AREA DEMAND

CONSUMPTION TOTAL=		52153.19	99689.32	0.53	567676.29	726184.70	0.78
MID-RANGE IMPACT =		8901.00	8901.00	1.00	610928.48	815973.02	0.75

FUEL USAGE COMPARISON - CLASS III (W)

PERIOD: V

LOCATION: AIRFIELD ONE
RADIUS OF ACTION= 1.75 KILOMETERS
RESUPPLY DISTANCE= 12.00 KILOMETERS
LENGTH OF PERIOD= 4 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
1	0	0.00	0.00	0.00	0.00	0.00	0.00
2	0	0.00	0.00	0.00	0.00	0.00	0.00
3	0	0.00	0.00	0.00	0.00	0.00	0.00
4	0	0.00	0.00	0.00	0.00	0.00	0.00
5	0	0.00	0.00	0.00	0.00	0.00	0.00
6	0	0.00	0.00	0.00	0.00	0.00	0.00
7	183	0.00	0.00	0.00	4454.44	7803.12	0.57
8	28	0.00	0.00	0.00	192.44	896.00	0.21
9	0	0.00	0.00	0.00	0.00	0.00	0.00
10	89	611.67	1459.60	0.42	0.00	0.00	0.00
11	266	914.07	3192.00	0.29	0.00	0.00	0.00
12	53	0.00	0.00	0.00	2544.00	2544.00	1.00
13	274	0.00	0.00	0.00	16440.00	16440.00	1.00
14	44	0.00	0.00	0.00	2640.00	2640.00	1.00
15	6	0.00	0.00	0.00	576.00	576.00	1.00
16	50	900.00	900.00	1.00	0.00	0.00	0.00
17	0	0.00	0.00	0.00	0.00	0.00	0.00
18	1 2	0.00	0.00	0.00	840.00	840.00	1.00
19	2	105.00	105.00	1.00	0.00	0.00	0.00
20	5	75.00	75.00	1.00	0.00	0.00	0.00
21	18	0.00	0.00	0.00	324.00	324.00	1.00
22	44	0.00	0.00	0.00	1252.22	1407.12	0.89
23	38	0.00	0.00	0.00	1216.00	1216.00	1.00
CONSUMPTION TOTALS=		2996.61	6591.34	0.45	35050.95	39889.18	0.88
FOR 4 DAYS, TOTALS=		11986.43	26365.36		140203.82	159556.70	
MID-RANGE IMPACT =		1242.00	1242.00	1.00	36985.56	45238.52	0.81
FOR 4 DAYS, TOTALS=		4968.00	4968.00		147222.25	180954.06	

LOCATION: PENINSULA
RADIUS OF ACTION= 2.00 KILOMETERS
RESUPPLY DISTANCE= 9.50 KILOMETERS
LENGTH OF PERIOD= 4 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
1	0	0.00	0.00	0.00	0.00	0.00	0.00
2	0	0.00	0.00	0.00	0.00	0.00	0.00
3	0	0.00	0.00	0.00	0.00	0.00	0.00
4	0	0.00	0.00	0.00	0.00	0.00	0.00
5	3	0.00	0.00	0.00	22.09	135.00	0.16
6	12	0.00	0.00	0.00	53.57	360.00	0.15
7	36	0.00	0.00	0.00	794.66	1535.04	0.52
8	18	0.00	0.00	0.00	135.23	576.00	0.23
9	0	0.00	0.00	0.00	0.00	0.00	0.00
10	2	15.03	32.80	0.46	0.00	0.00	0.00
11	81	304.28	972.00	0.31	0.00	0.00	0.00
12	4	0.00	0.00	0.00	192.00	192.00	1.00
13	21	0.00	0.00	0.00	1260.00	1260.00	1.00
14	12	0.00	0.00	0.00	720.00	720.00	1.00
15	0	0.00	0.00	0.00	0.00	0.00	0.00
16	1	18.00	18.00	1.00	0.00	0.00	0.00
17	0	0.00	0.00	0.00	0.00	0.00	0.00
18	6	0.00	0.00	0.00	420.00	420.00	1.00
19	0	0.00	0.00	0.00	0.00	0.00	0.00
20	0	0.00	0.00	0.00	0.00	0.00	0.00
21	0	0.00	0.00	0.00	0.00	0.00	0.00
22	6	0.00	0.00	0.00	121.50	191.88	0.63
23	0	0.00	0.00	0.00	0.00	0.00	0.00
CONSUMPTION TOTALS=		387.90	1176.22	0.33	4276.92	6198.41	0.69
FOR 4 DAYS, TOTALS=		1551.60	4704.88		17107.67	24793.63	
MID-RANGE IMPACT =		20.70	20.70	1.00	4644.12	7353.93	0.63
FOR 4 DAYS, TOTALS=		82.80	82.80		18576.47	29415.71	

LOCATION INDUSTRIAL AREA ONE
RADIUS OF ACTION= 45.00 KILOMETERS
RESUPPLY DISTANCE= 14.50 KILOMETERS
LENGTH OF PERIOD= 4 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
1	70	0.00	0.00	0.00	14383.22	7000.00	2.05
2	46	0.00	0.00	0.00	8347.07	5750.00	1.45
3	1	0.00	0.00	0.00	124.62	150.00	0.83
4	5	0.00	0.00	0.00	778.85	500.00	1.56
5	1	0.00	0.00	0.00	56.08	45.00	1.25
6	6	0.00	0.00	0.00	602.64	180.00	3.35
7	69	0.00	0.00	0.00	1729.42	2942.16	0.59
8	13	0.00	0.00	0.00	259.20	416.00	0.62
9	0	0.00	0.00	0.00	0.00	0.00	0.00
10	6	119.63	98.40	1.22	0.00	0.00	0.00
11	261	2601.97	3132.00	0.83	0.00	0.00	0.00
12	26	0.00	0.00	0.00	1248.00	1248.00	1.00
13	9	0.00	0.00	0.00	540.00	540.00	1.00
14	10	0.00	0.00	0.00	600.00	600.00	1.00
15	0	0.00	0.00	0.00	0.00	0.00	0.00
16	1	18.00	18.00	1.00	0.00	0.00	0.00
17	0	0.00	0.00	0.00	0.00	0.00	0.00
18	1	0.00	0.00	0.00	700.00	700.00	1.00
19	0	0.00	0.00	0.00	0.00	0.00	0.00
20	2	30.00	30.00	1.00	0.00	0.00	0.00
21	0	0.00	0.00	0.00	0.00	0.00	0.00
22	10	0.00	0.00	0.00	55.93	319.80	0.17
23	0	0.00	0.00	0.00	0.00	0.00	0.00
CONSUMPTION TOTALS=		3185.04	3770.16	0.84	33838.76	23449.60	1.44
FOR 4 DAYS, TOTALS=		12740.16	15080.64		135355.03	93798.42	
MID-RANGE IMPACT =		55.20	55.20	1.00	36968.60	27164.56	1.36
FOR 4 DAYS, TOTALS=		220.80	220.80		147874.39	108658.26	

LOCATION: PORT
RADIUS OF ACTION= 3.00 KILOMETERS
RESUPPLY DISTANCE= 2.00 KILOMETERS
LENGTH OF PERIOD= 4 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
1	53	0.00	0.00	0.00	726.01	5300.00	0.14
2	64	0.00	0.00	0.00	774.22	8000.00	0.10
3	4	0.00	0.00	0.00	93.91	600.00	0.16
4	6	0.00	0.00	0.00	176.09	600.00	0.29
5	0	0.00	0.00	0.00	0.00	0.00	0.00
6	0	0.00	0.00	0.00	0.00	0.00	0.00
7	614	0.00	0.00	0.00	5899.64	26180.96	0.23
8	90	0.00	0.00	0.00	964.00	2880.00	0.30
9	45	900.00	1674.00	0.54	0.00	0.00	0.00
10	116	1113.60	1902.40	0.59	0.00	0.00	0.00
11	588	2822.40	7056.00	0.40	0.00	0.00	0.00
12	70	0.00	0.00	0.00	3360.00	3360.00	1.00
13	567	0.00	0.00	0.00	34020.00	34020.00	1.00
14	91	0.00	0.00	0.00	5460.00	5460.00	1.00
15	26	0.00	0.00	0.00	2496.00	2496.00	1.00
16	43	774.00	774.00	1.00	0.00	0.00	0.00
17	23	0.00	0.00	0.00	3680.00	3680.00	1.00
18	2	0.00	0.00	0.00	1400.00	1400.00	1.00
19	0	0.00	0.00	0.00	0.00	0.00	0.00
20	1	15.00	15.00	1.00	0.00	0.00	0.00
21	0	0.00	0.00	0.00	0.00	0.00	0.00
22	92	0.00	0.00	0.00	354.86	2942.16	0.12
23	15	0.00	0.00	0.00	480.00	480.00	1.00
CONSUMPTION TOTALS=		6468.75	13134.61	0.49	68752.44	112008.99	0.61
FOR 4 DAYS, TOTALS=		25875.00	52538.44		275009.77	448035.95	
MID-RANGE IMPACT =		907.35	907.35	1.00	74313.84	124236.25	0.60
FOR 4 DAYS, TOTALS=		3629.40	3629.40		297255.37	496944.99	

SUPPORTING STORAGE AREA DEMAND

CONSUMPTION TOTAL=	52153.19	98689.32	0.53	567676.29	726184.70	0.78
MID-RANGE IMPACT =	8901.00	8901.00	1.00	610929.48	815973.02	0.75

FUEL USAGE COMPARISON - CLASS III (W)

PERIOD: V

LOCATION: NAVAL STATION
RADIUS OF ACTION= 4.00 KILOMETERS
RESUPPLY DISTANCE= 8.00 KILOMETERS
LENGTH OF PERIOD= 4 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
CONSUMPTION TOTALS=		932.43	1915.90	0.49	3914.57	18088.17	0.22
FOR 4 DAYS, TOTALS=		3729.74	7663.60		15658.29	72352.66	
MID-RANGE IMPACT =		41.40	41.40	1.00	4805.61	19962.67	0.24
FOR 4 DAYS, TOTALS=		165.60	165.60		19222.42	79850.66	

LOCATION: AIRFIELD TWO
RADIUS OF ACTION= 1.50 KILOMETERS
RESUPPLY DISTANCE= 10.50 KILOMETERS
LENGTH OF PERIOD= 4 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
CONSUMPTION TOTALS=		1766.60	3415.50	0.52	17346.32	19833.54	0.87
FOR 4 DAYS, TOTALS=		7066.39	13662.00		69385.29	79334.18	
MID-RANGE IMPACT =		1014.30	1014.30	1.00	18098.62	22234.74	0.81
FOR 4 DAYS, TOTALS=		4057.20	4057.20		72394.47	88938.98	

LOCATION: DAM AND BRIDGE THREE
RADIUS OF ACTION= 1.00 KILOMETERS
RESUPPLY DISTANCE= 20.50 KILOMETERS
LENGTH OF PERIOD= 4 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
CONSUMPTION TOTALS=		41.84	220.80	0.19	243.40	292.84	0.83
FOR 4 DAYS, TOTALS=		167.34	883.20		973.60	1171.34	
MID-RANGE IMPACT =		0.00	0.00	0.00	285.24	513.64	0.56
FOR 4 DAYS, TOTALS=		0.00	0.00		1140.95	2054.54	

LOCATION: BLUE BEACH
RADIUS OF ACTION= 2.00 KILOMETERS
RESUPPLY DISTANCE= 2.00 KILOMETERS
LENGTH OF PERIOD= 4 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
CONSUMPTION TOTALS=		1229.85	2374.59	0.41	22372.07	33008.89	0.68
FOR 4 DAYS, TOTALS=		4919.40	11898.36		89488.29	132035.55	
MID-RANGE IMPACT =		279.45	279.45	1.00	23322.47	35704.03	0.65
FOR 4 DAYS, TOTALS=		1117.80	1117.80		93289.89	142816.11	

SUPPORTING STORAGE AREA DEMAND

CONSUMPTION TOTAL=	15882.87	34107.16	0.47	175505.47	284893.73	0.62
MID-RANGE IMPACT =	5340.60	5340.60	1.00	186047.74	313660.29	0.59

FUEL USAGE COMPARISON - CLASS III (W)

PERIOD: V

LOCATION: NAVAL STATION
RADIUS OF ACTION= 4.00 KILOMETERS
RESUPPLY DISTANCE= 8.00 KILOMETERS
LENGTH OF PERIOD= 4 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
1	17	0.00	0.00	0.00	310.49	1700.00	0.18
2	92	0.00	0.00	0.00	1483.92	11500.00	0.13
3	2	0.00	0.00	0.00	60.00	300.00	0.20
4	1	0.00	0.00	0.00	37.50	100.00	0.38
5	0	0.00	0.00	0.00	0.00	0.00	0.00
6	0	0.00	0.00	0.00	0.00	0.00	0.00
7	17	0.00	0.00	0.00	352.40	724.88	0.49
8	10	0.00	0.00	0.00	111.48	320.00	0.35
9	0	0.00	0.00	0.00	0.00	0.00	0.00
10	5	55.74	82.00	0.68	0.00	0.00	0.00
11	129	719.07	1548.00	0.46	0.00	0.00	0.00
12	0	0.00	0.00	0.00	0.00	0.00	0.00
13	11	0.00	0.00	0.00	660.00	660.00	1.00
14	6	0.00	0.00	0.00	360.00	360.00	1.00
15	0	0.00	0.00	0.00	0.00	0.00	0.00
16	2	36.00	36.00	1.00	0.00	0.00	0.00
17	0	0.00	0.00	0.00	0.00	0.00	0.00
18	0	0.00	0.00	0.00	0.00	0.00	0.00
19	0	0.00	0.00	0.00	0.00	0.00	0.00
20	0	0.00	0.00	0.00	0.00	0.00	0.00
21	0	0.00	0.00	0.00	0.00	0.00	0.00
22	2	0.00	0.00	0.00	28.17	63.96	0.44
23	0	0.00	0.00	0.00	0.00	0.00	0.00
CONSUMPTION TOTALS=		932.43	1915.90	0.49	3914.57	18088.17	0.22
FOR 4 DAYS, TOTALS=		3729.74	7663.60		15658.29	72352.66	
MID-RANGE IMPACT =		41.40	41.40	1.00	4805.61	19962.67	0.24
FOR 4 DAYS, TOTALS=		165.60	165.60		19222.42	79850.66	

LOCATION: AIRFIELD TWO
RADIUS OF ACTION= 1.50 KILOMETERS
RESUPPLY DISTANCE= 10.50 KILOMETERS
LENGTH OF PERIOD= 4 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
1	0	0.00	0.00	0.00	0.00	0.00	0.00
2	0	0.00	0.00	0.00	0.00	0.00	0.00
3	0	0.00	0.00	0.00	0.00	0.00	0.00
4	0	0.00	0.00	0.00	0.00	0.00	0.00
5	0	0.00	0.00	0.00	0.00	0.00	0.00
6	0	0.00	0.00	0.00	0.00	0.00	0.00
7	86	0.00	0.00	0.00	1963.04	3667.04	0.54
8	10	0.00	0.00	0.00	61.71	320.00	0.19
9	0	0.00	0.00	0.00	0.00	0.00	0.00
10	60	370.29	984.00	0.38	0.00	0.00	0.00
11	92	283.89	1104.00	0.26	0.00	0.00	0.00
12	32	0.00	0.00	0.00	1536.00	1536.00	1.00
13	122	0.00	0.00	0.00	7320.00	7320.00	1.00
14	22	0.00	0.00	0.00	1320.00	1320.00	1.00
15	3	0.00	0.00	0.00	288.00	288.00	1.00
16	39	702.00	702.00	1.00	0.00	0.00	0.00
17	0	0.00	0.00	0.00	0.00	0.00	0.00
18	1.2	0.00	0.00	0.00	840.00	840.00	1.00
19	2	105.00	105.00	1.00	0.00	0.00	0.00
20	5	75.00	75.00	1.00	0.00	0.00	0.00
21	18	0.00	0.00	0.00	324.00	324.00	1.00
22	24	0.00	0.00	0.00	567.00	767.52	0.74
23	27	0.00	0.00	0.00	864.00	864.00	1.00
CONSUMPTION TOTALS=		1766.68	3415.50	0.52	17346.32	19833.54	0.87
FOR 4 DAYS, TOTALS=		7066.39	13662.00		69385.29	79334.18	
MID-RANGE IMPACT =		1014.30	1014.30	1.00	18098.62	22234.74	0.81
FOR 4 DAYS, TOTALS=		4057.20	4057.20		72394.47	88938.98	

LOCATION. DAM AND BRIDGE THREE
RADIUS OF ACTION= 1.00 KILOMETERS
RESUPPLY DISTANCE= 20.50 KILOMETERS
LENGTH OF PERIOD= 4 DAYS

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
1	0	0.00	0.00	0.00	0.00	0.00	0.00
2	0	0.00	0.00	0.00	0.00	0.00	0.00
3	0	0.00	0.00	0.00	0.00	0.00	0.00
4	0	0.00	0.00	0.00	0.00	0.00	0.00
5	0	0.00	0.00	0.00	0.00	0.00	0.00
6	0	0.00	0.00	0.00	0.00	0.00	0.00
7	1	0.00	0.00	0.00	27.11	42.64	0.64
8	1	0.00	0.00	0.00	4.55	32.00	0.14
9	0	0.00	0.00	0.00	0.00	0.00	0.00
10	0	0.00	0.00	0.00	0.00	0.00	0.00
11	16	36.38	192.00	0.19	0.00	0.00	0.00
12	0	0.00	0.00	0.00	0.00	0.00	0.00
13	2	0.00	0.00	0.00	120.00	120.00	1.00
14	1	0.00	0.00	0.00	60.00	60.00	1.00
15	0	0.00	0.00	0.00	0.00	0.00	0.00
16	0	0.00	0.00	0.00	0.00	0.00	0.00
17	0	0.00	0.00	0.00	0.00	0.00	0.00
18	0	0.00	0.00	0.00	0.00	0.00	0.00
19	0	0.00	0.00	0.00	0.00	0.00	0.00
20	0	0.00	0.00	0.00	0.00	0.00	0.00
21	0	0.00	0.00	0.00	0.00	0.00	0.00
22	0	0.00	0.00	0.00	0.00	0.00	0.00
23	0	0.00	0.00	0.00	0.00	0.00	0.00
CONSUMPTION TOTALS=		41.84	220.80	0.19	243.40	292.84	0.83
FOR 4 DAYS, TOTALS=		167.34	883.20		973.60	1171.34	
MID-RANGE IMPACT =		0.00	0.00	0.00	285.24	513.64	0.56
FOR 4 DAYS, TOTALS=		0.00	0.00		1140.95	2054.54	

LOCATION: BLUE BEACH
RADIUS OF ACTION= 2.00 KILOMETERS
RESUPPLY DISTANCE= 2.00 KILOMETERS
LENGTH OF PERIOD= 4 DAYS.

SYSTEM I.D.	QUANTITY IN AREA	CALC. CONSUMPTION (MOGAS)	TAM CONSUMPTION (MOGAS)	RATIO OF CALC/TAM	CALC. CONSUMPTION (DIESEL)	TAM CONSUMPTION (DIESEL)	RATIO OF CALC/TAM
1	0	0.00	0.00	0.00	0.00	0.00	0.00
2	0	0.00	0.00	0.00	0.00	0.00	0.00
3	1	0.00	0.00	0.00	16.36	150.00	0.11
4	2	0.00	0.00	0.00	40.91	200.00	0.20
5	1	0.00	0.00	0.00	7.36	45.00	0.16
6	6	0.00	0.00	0.00	26.78	180.00	0.15
7	211	0.00	0.00	0.00	2027.40	8997.04	0.23
8	36	0.00	0.00	0.00	270.47	1152.00	0.23
9	0	0.00	0.00	0.00	0.00	0.00	0.00
10	39	293.01	639.60	0.46	0.00	0.00	0.00
11	142	533.43	1704.00	0.31	0.00	0.00	0.00
12	32	0.00	0.00	0.00	1536.00	1536.00	1.00
13	132	0.00	0.00	0.00	7920.00	7920.00	1.00
14	52	0.00	0.00	0.00	3120.00	3120.00	1.00
15	16	0.00	0.00	0.00	1536.00	1536.00	1.00
16	11	198.00	198.00	1.00	0.00	0.00	0.00
17	12	0.00	0.00	0.00	1920.00	1920.00	1.00
18	1	0.00	0.00	0.00	700.00	700.00	1.00
19	0	0.00	0.00	0.00	0.00	0.00	0.00
20	3	45.00	45.00	1.00	0.00	0.00	0.00
21	0	0.00	0.00	0.00	0.00	0.00	0.00
22	33	0.00	0.00	0.00	140.68	1055.34	0.13
23	6	0.00	0.00	0.00	192.00	192.00	1.00
CONSUMPTION TOTALS=		1229.85	2974.59	0.41	22372.07	33008.89	0.68
FOR 4 DAYS, TOTALS=		4919.40	11898.36		89488.29	132035.55	
MID-RANGE IMPACT =		279.45	279.45	1.00	23322.47	35704.03	0.65
FOR 4 DAYS, TOTALS=		1117.80	1117.80		93289.89	142816.11	

SUPPORTING STORAGE AREA DEMAND

CONSUMPTION TOTAL=	15982.87	34107.16	0.47	175505.47	284893.73	0.62
MID-RANGE IMPACT =	5340.60	5340.60	1.00	186047.74	313660.29	0.59

APPENDIX B
MINI-SCENARIOS

Mini-Scenarios

INTRODUCTION

COMBAT ACTION EXCURSIONS, MINI-SCENARIOS, WERE USED BY BDM ANALYSTS TO PROVIDE COMPARATIVE STATISTICAL ANALYSES IN THE DEVELOPMENT OF CLASS V (W) EXPENDITURES FOR ASSAULT AND CSSA DEFENSIVE ACTIONS UNIQUE TO THE SYN CITY ENVIRONMENT. THE RESULTS YIELDED DATA SPECIFYING AMMUNITION CONSUMPTION RATES AND FURTHER IDENTIFIED HIGH USAGE ITEMS OF CLASS V (W).

Based on interviews conducted by BDM analysts with logistic planners within the 2nd Force Service Support Group (FSSG) of the 2nd Marine Division, Camp Lejuene, N.C., and cognizant personnel within the BDM Corporation, analysts concluded that the use of established Class V (W) planning factors and/or consumption rates for embarkation and resupply planning may not incorporate the sensitivity required for the proposed combat actions in the SYN City environment. Analysts set about the task of devising a methodology for data development with the intent to provide statistical analyses, with supporting documentation, to be used in comparison to and coordination with existing doctrinal planning factors for calculating ground ammunition requirements unique to SYN City combat actions. The SYN City-unique planning factors and consumption rates are not intended to supplant existing doctrinal planning factors, however, they are intended to illustrate a methodology and sample data unique to combat actions in this environment and, perhaps, useful in actions envisioned by military planners for their own operations. The end product is a tool to be used, intact or modified to suit particular needs, to provide metropolitan or urban-unique ground ammunition expenditure data.

The method used to obtain these supplementary planning factors and/or ammunition expenditures was to conduct combat action excursions or mini-scenarios using snapshots in time and type of proposed assault operations within the overall concept of operations applicable to each mission set forth in Chapters III and IV. Because unique types of combat action were anticipated to occur at varying locations on the Synthetic (SYN) City Base Map, representative samples of land area and indigenous threat forces contained therein provided the key for scenario selection. Analysts concluded that six locations on the base map, influenced by threat, type of vertical construction, population density, and anticipated character of combat action, provided an adequate representation for the basis of mini-scenario development. The facing graphic illustrates the representative land areas selected for each scenario and titles applied to each scenario. A description, in detail, of each scenario will be presented in succeeding sections.

MINI-SCENARIO AREAS

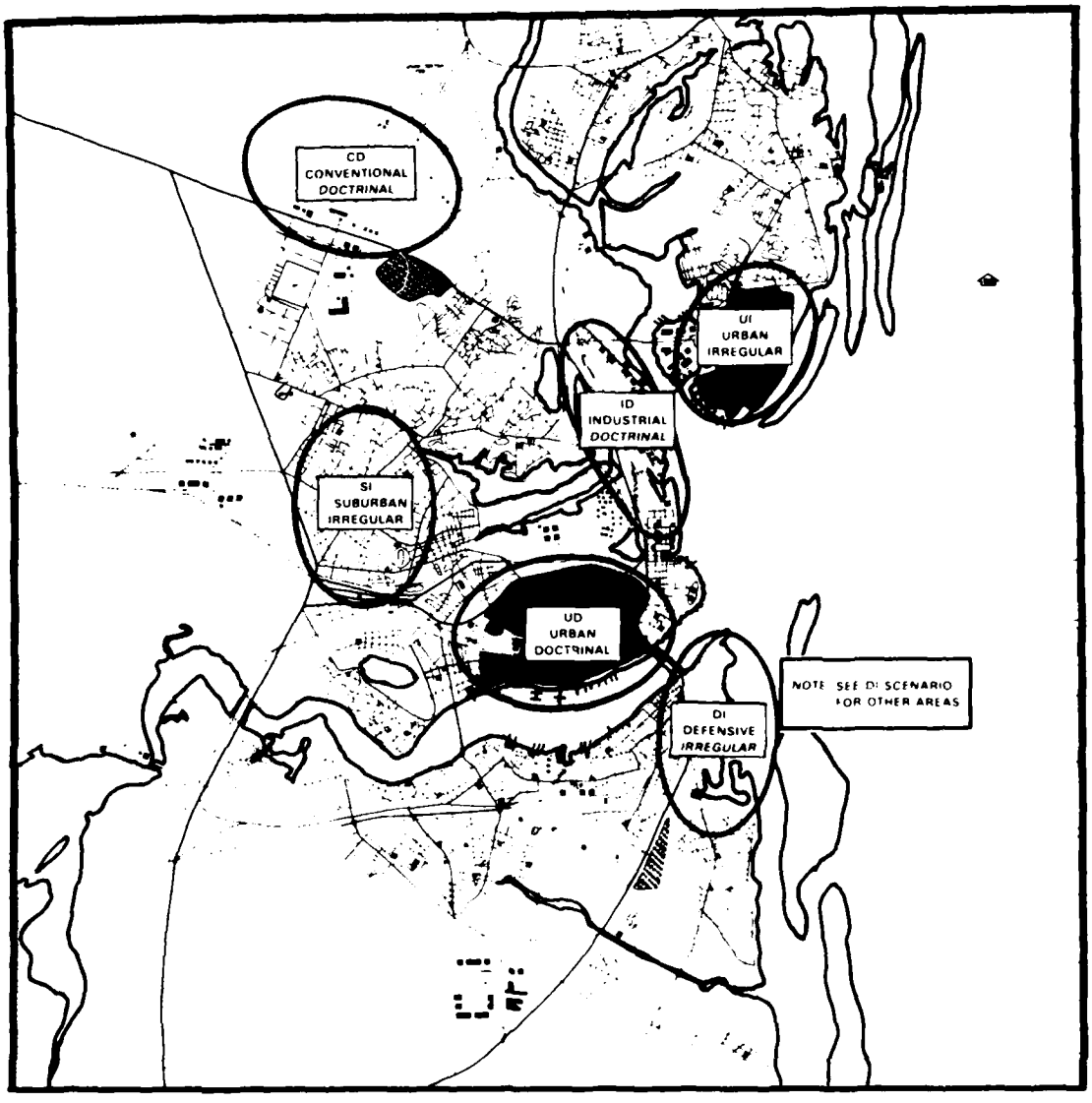


Figure B-1. Representative Mini-Scenario Areas

Mini-Scenarios

Introduction (Continued)

Mission 1, Deliberate Assault, was chosen as the base case for scenario development; other missions, both in the current time frame, and in the mid-range time frame contained similar elements of tactical missions performed in the Deliberate Assault. The title and/or actions to occur in each type of mini-scenario area were classified either by the location of combat action or the type of combat action combined with the type of enemy defense. The type of enemy defense was further classified as either Doctrinal or Irregular. For scenario purposes only, a Doctrinal defense meant that forces defending a given scenario area were of sufficient size and possessed the capability to establish a defensive strongpoint employing Soviet-patterned techniques, and an Irregular defense meant that isolated sniper teams/small pockets of resistance were estimated to be encountered in a given scenario area. Six mini-scenarios were developed; the title of each and an explanation of the classification is offered below:

CONVENTIONAL DOCTRINAL (CD)

- Friendly combat action considered conventional in nature.
- Location was not classified an urban setting.
- Enemy forces to be encountered were deployed in an organized defense.

INDUSTRIAL DOCTRINAL (ID)

- Friendly combat action in an area considered industrial in function; e.g., port area and naval station. (Naval station included because of port facility.)
- Enemy encountered were deployed in an organized defense.

URBAN DOCTRINAL (UD)

- Friendly combat action in urban setting.
- Enemy encountered were deployed in an organized defense.

SUBURBAN IRREGULAR (SI)

- Friendly combat action in a suburban setting.
- Enemy encountered were small sniper/unconventional warfare teams.

URBAN IRREGULAR (UI)

- Friendly combat action in an urban setting.
- Enemy encountered were small sniper/unconventional warfare teams.

DEFENSIVE IRREGULAR (DI)

- Friendly units deployed in a defensive posture.
- Enemy encountered were small sniper/unconventional warfare teams.

BDM analysts concluded that the scheme of maneuver for each RLT and subordinate BLTs, including those units in direct support of each RLT included a number of these mini-scenarios in a given period of operation. For example, BLT 1/1 may operate in a nonurban conventional environment at L-hour and then elements of BLT 1/1 may operate in suburban setting for the remainder of the period. The following table depicts the types and frequencies of each mini-scenario that analysts concluded combat units would encounter during a given period of operations. Frequency values were derived subjectively by a group of analysts familiar with the SYN City model. Note that Combat Service Support (CSS) units were included because the LFSP and FSSG were tasked with providing for the defense and security of their respective installations during a given period of operations within the FBHL.

TABLE B-1. ESTIMATED TYPES AND FREQUENCY OF URBAN ACTIONS

ELEMENT	PERIOD II D-DAY	PERIOD III D+1-D+3	PERIOD IV D+4-D+6	PERIOD V D+7-D+10	PERIOD VI D+11-D+30
					RLT
RLT 1 BLT 1/1	1 CD 2 DI	9 SI 4 DI	3 SI 1 DI	10 DI	193 DI
2/1		← MCATF OPERATIONS →			20 SI
3/1		← LF RESERVE →		36 DI	10 UI
					RLT
RLT 2 BLT 1/2	.4 ID	.4 ID 35 SI	4 SI 3 DI	10 DI	193 DI
2/2	.2 ID 1 DI	1.75 UD 1 DI	18 UI	24 UI 4 DI	10 SI
3/2	23 UI 1 DI	19 UI 6 DI	9 UI 10 DI	12 UI 12 DI	5 UI
					RLT
RLT 3 BLT 1/3	6 SI 1 DI	8 SI 4 DI	6 SI 2 DI	8 SI 4 DI	193 DI
2/3	.3 ID	.7 ID 2 SI 7 ID	6 SI 4 DI	8 SI 7 DI	10 SI
3/3	.3 ID	.7 ID 2 SI 8 DI	6 SI 4 DI	8 SI 7 DI	5 UI
CSS	12 DI	172 DI	214 DI	366 DI	425 DI

CD - CONVENTIONAL DOCTRINAL
ID - INDUSTIRAL DOCTRINAL
UD - URBAN DOCTRINAL
SI - SUBURBAN IRREGULAR
UI - URBAN IRREGULAR
DI - DEFENSIVE IRREGULAR

NOTES:
- DECIMALS INDICATE A SHARED ACTION, PART OF A CONTINUING ACTION, OR LESS INTENSITY THAN A FULL-SCALE ACTION.
- MORE THAN ONE TYPE ACTION MAY OCCUR DURING ANY PERIOD.
- CONVENTIONAL OPERATIONS NOT INCLUDED.
- PERIOD VI REFLECTS ESTIMATED TOTAL OF URBAN WARFARE ACTIONS OR INCIDENTS IN RLT TAOR AND CSS AREAS.

Mini-Scenarios

Introduction (Continued)

During the course of a number of mini-scenarios, the culmination of each assault was an attack or attacks on a defended strongpoint(s) or building(s). Doctrinal Army and Fleet Marine Force Manuals provided the preponderance of data and concepts for these attacks. Additional insights were gained when analysts discussed the play of a number of problems with a local police special operations division chief to obtain comparative data and examine other urban assault concepts. Topics discussed included task organization, concepts of operation, weapons/ammunition usage rates, and equipment found useful in assaulting defended structures.

The most important difference between a S.W.A.T. squad and a Marine Rifle Squad is that the S.W.A.T. squad has been optimized for individual room clearance. If given a single room in a building occupied by one to three aggressors, the S.W.A.T. squad would enter with a 3-man clearing team and a 2-man backup element. Each room would be covered outside, either from an opposing building or the street, by an observer and an antisniper (expert marksman). In contrast, Army FM 90-10 suggests that a room clearing team might consist of two squad members. While time is important for a S.W.A.T. squad to complete their mission, it is not an overriding concern. They have the luxury of devoting all assets for the clearance of one room and will take whatever time is required to clear that room.

The tactics and equipment used by S.W.A.T. squads contrasted with those that could be used by a Marine squad, shown below for a building assault (from FM 90-10), illustrate a difference in the concept of squad operations and equipment usage in a given scenario. Each squad begins a building assault from the rooftop.

MARINE RIFLE SQUAD	S.W.A.T. SQUAD
• To open skylight hatch-rifle fire or grenade.	• Use ropes or hydraulic device and then ropes to open entry point.
• To clear entry point-grenade followed by automatic rifle burst.	• Use mirrors on extendable poles and hand-held periscopes to recon before entry.
• If position of enemy is not known, each room is cleared.	• Initial room reconnaissance is performed by using electronic stethescope and a trained listener to locate aggressor(s).
• Clearing teams use automatic rifle fire to open door.	• Clearing teams use hydraulic scissors to open door.
• Clearing teams expend grenade in room followed by automatic rifle bursts upon entry.	• Clearing teams rely on diversion created by covering element, reconnoiter room with mirrors, and take necessary steps to neutralize threat. (Use of CS, physically disarm aggressor, return fire if fired upon, etc.)

BDM analysts have concluded that a squad building assault kit could be useful in attempting to conserve ammunition expenditures and minimize collateral damage by accurately locating enemy positions, thereby reducing individual room clearing/ammunition expenditures. Some items of equipment were found to be useful as a direct result of interviews held with police officials; others are equipment items suggested by BDM analysts to be included in a similar kit. Elements of each kit can be carried by dismounted squads or carried intact when mounted or when helicopter rooftop landings are required. Item quantities are subjective in nature and can be modified to suit the needs of a particular operation.

BUILDING ASSAULT KIT

ITEM	QUANTITY	USE
Mirrors or polished metal plates mounted on extendable poles	2/Fire Team (FT); Total of 6	Employed in pairs to reconnoiter spaces around corners, floors and entry points from a safe distance.
50-100 ft lengths of rope	2/FT; Total of 6	Used to open unlocked but potentially dangerous entry points and conduct vertical movement between floors or on exterior walls.
Rope or chain ladder	1/FT; Total of 3	Not used in lieu of rope. Used to facilitate vertical movements by clearing teams/squad.
Electronic stethoscope	1/FT; Total of 3	Used to fix enemy positions on a given floor and discriminate hostile activity.
Hand-held, hydraulic vise or scissors apparatus	1/FT; Total of 3	Used in combination with stethoscope and mirrors. If entry point determined benign, then device used to open door or windows.
Carrying case	1/Kit	Used for protection of equipment.

Figure B-2. MOBA Building Assault Kit (Proposed)

Mini-Scenarios

CONVENTIONAL DOCTRINAL (CD) SCENARIO

THIS MINI-SCENARIO IS INTENDED TO ILLUSTRATE CLASS V (W) EXPENDITURES IN A CONVENTIONAL COMBAT ENVIRONMENT WITH FRIENDLY FORCES PITTED AGAINST AN ORGANIZED ENEMY DEFENSE. ALTHOUGH THE SETTING IS IN AN URBAN ENVIRONMENT, THE FOCAL POINT OF THE ASSAULT IS AN ISOLATED FACILITY (AIRFIELD 1) IN A LOW-DENSITY POPULATED AREA. ASSAULT TECHNIQUES DIFFER FROM THOSE IN A MORE HIGHLY POPULATED AREA WHERE A GREATER NUMBER OF RESTRICTIONS WOULD BE IMPOSED.

Scenario Location. The Conventional Doctrinal (CD) scenario occurred only once in each scheme of maneuver for each mission set forth in Chapters III and IV. The CD scenario was located at Airfield 1. In each of the missions, Airfield 1 was occupied by an element of Aggressor committed forces deployed in an organized defensive posture. Friendly assault forces would have to employ conventional fire and maneuver techniques to reach building objectives during portions of the assault. Detailed building profiles were not offered in the Synthetic City Data Book product; therefore, analysts developed a building profile for scenario purposes only. The buildings selected for enemy defensive emplacements/friendly attacks were envisioned by analysts as representing the worst case for the attacker; e.g., the terminal building, because of its construction, did not offer the same degree of protection for a defender that a substantially constructed warehouse might. Analysts used structural classification and generic descriptions provided in OH 8-7, Military Operations on Urbanized Terrain (MOUT), to develop all profiles and select building types for attacks. The structures selected were classified as being composed of Concrete Frameless Tilt-Up construction. The location of enemy defensive emplacements and the friendly scheme of maneuver are shown in Figure B-4 . The figure below provides a general description of the type of construction selected.

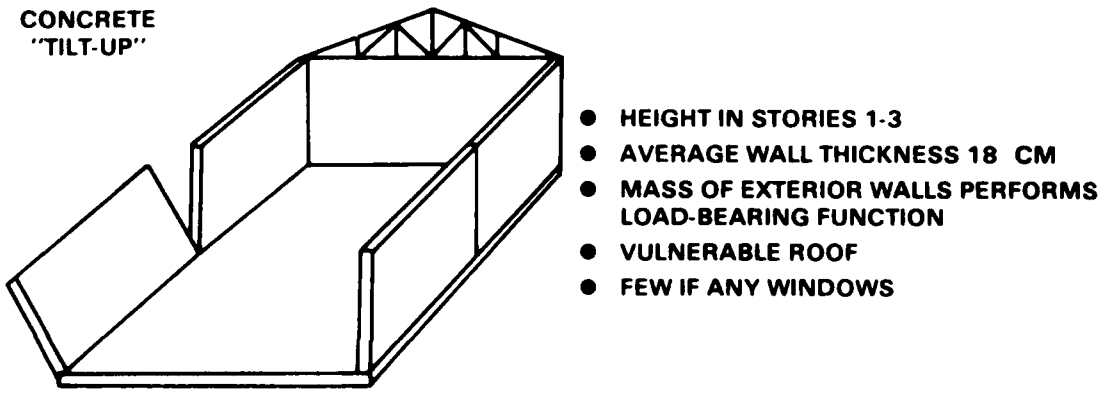


Figure B-3. Typical Building Type at Airfield 1

Friendly Scheme of Maneuver. The MAF unit involved in this scenario is BLT 1/1 which conducts a vertical or heliborne assault on Airfield 1 at L-hour. The following sequence of events and actions were envisioned by analysts as occurring during movement to the objective area:

- The operation was initiated during hours of darkness.
- Begins with the helicopter insertion of a Force Recon Team north of the airfield. Team was deployed to the airfield to provide initial terminal guidance for first helicopter flights.
- Flights touched down at Airfield 1, Landing Zone VULTURE. The flights landed reinforced infantry companies, essential support/attached vehicles, and an attached artillery battery.
- AH-1 Cobra helicopters provided HLZ suppressive fires and attacked tank/APC targets as they presented themselves near the sewage treatment pumping station, preventing immediate mechanized reinforcement.

The selected course of action for BLT 1/1, once in the HLZ, included the following steps.

- As helicopter flights landed, troops immediately deployed seeking and utilizing defilade positions behind the maintenance buildings and/or uneven ground surfaces offering some degree of protection.
- The attack on fortified warehouse positions was conducted by three rifle companies (minus) with attachments.
- The attacking companies were supported by fires from attached TOW elements, Dragons, and 81mm mortars from the Weapons Company.
- Elements of the third rifle company were deployed as the BLT reserve and were tasked with establishing interlocking defensive firing positions on the flanks and in the rear.

Conventional Doctrinal Scenario (Continued)

Enemy Defensive Positions. The positioning of enemy units at the airfield served two purposes. The first was that the airfield is in proximity to two major high speed avenues of approach to the port area and a feasible location for a mechanized reinforcing/counterattacking force. Second, the airfield is of strategic importance to either force, therefore, it must be defended by some element of the committed Aggressor force.

Enemy units were positioned to defend the airfield as follows:

- A Motorized Rifle (MR) platoon, reinforced with a tank section, was deployed within and between three warehouse structures on the southeastern end of the airfield.
- A tank platoon, minus one section of tanks, was deployed in the vicinity of the sewage pumping station east of the airfield.
- Unoccupied strongpoints, used for deceptive purposes, were eventually used to cover the defenders' withdrawal.

The facing graphic illustrates both the friendly scheme of maneuver and enemy defensive strongpoints for the play of the CD scenario. Analysts elected the following enemy course of action for the play of the scenario:

- Troops were deployed dismounted in designated buildings with interlocking firing positions cut through the walls (embrasures).
- BMPs and tanks were not fixed but given multiple firing positions within and between buildings.
- Fall-back or delaying positions were located in the industrial area and road junctions south of the airfield with the suburban area being used to provide cover for a forced withdrawal.
- The unoccupied strongpoints were manned by mounted squad elements to cover the platoon withdrawal as the scenario developed.
- The tank platoon (minus) was located in positions to direct fires on high speed avenues of approach, bridges in proximity to the airfield, and potential helicopter landing sites.
- Enemy units were to defend until their positions became untenable.

Figure B-4. Threat Deployment at Airfield 1

Conventional Doctrinal Scenario (Continued)

Parameters for Scenario. BDM analysts concluded that a number of guidelines had to be established in the CD scenario to limit this action to a specific snapshot in time and place. Each element can be changed to suit the users' particular needs provided that the impact on ammunition expenditure has been examined. The guidelines are as follows:

- The attack can be characterized as an assault on several fortified positions in a conventional environment. If actions are conventional in nature, then rifle companies and attachments will expend ammunition at conventional rates and units will employ standard night operation tactics.

- It is estimated that the Threat platoon commander would be able to surmise the strength of the assault force by the number of troops observed debarking from each helicopter wave and by the number of waves landing near the airstrip.

- Knowing the approximate strength of the assault force, it is estimated that the Threat platoon commander would initiate communications with higher headquarters to determine what course of action to pursue: to defend in place or to initiate delaying actions.

- The MRB commander would likely have received similar reports from the various L-hour landings sites. Analysts concluded that rather than risk the loss of his reserve, the MRB commander would order the reserve to withdraw to the northern flank of the main defensive belt.

- Analysts estimated that control of the airfield would be determined moments after the successful landing of the first three flights. It was decided that the entire engagement would last no more than 15 minutes.

- Analysts estimated that friendly rifle companies and attachments would not be able to close on the enemy rapidly enough to reach the effective range envelope of organic antitank weapons.

- The most effective use of company and battalion mortars would be to target building gaps to cause casualties to dismounted troops and to lay covering smoke and illumination fires as required.

- DRAGONs and TOWs were used to engage fleeing and otherwise exposed armored vehicles in building gaps.

- Since the Landing Force would eventually require the use of warehouse facilities, Close Air Support (CAS) aircraft were not employed to attack structures.

- Artillery assets were not employed in this scenario; the artillery battery supporting BLT 1/1 was not landed until the later helicopter flights.

Since analysts concluded that the battle for the airfield would be conventional in nature, with standard night operations fire and maneuver tactics employed, conventional ammunition expenditure rates were used for each weapon type.

Findings. During the 15-minute snapshot, analysts estimated that the rifle companies could close on each objective within 10 minutes based on short troop displacement runs of 10-15 meters. As rifle company elements displaced from one position to the next, short bursts of small arms ammunition were expended to provide covering fires for the dismounted movement. All other weapons used in this scenario were employed utilizing established firing rates for either the entire 10-minute engagement time or percentages of the time. Based on the conduct of the scenario involving movement of tactical units and subjective decisions on optimum weapons employment, analysts concluded that the following weapon systems would best be employed to seize the objective:

- M16A1 (5.56mm) Rifle
- M19 (60mm) Infantry Mortar
- M29 (81mm) Infantry Mortar
- M47 Dragon
- M220A1 TOW
- M60 (7.62mm) Machine Gun

A number of weapon systems within the BLT or attached to it were not used in this scenario for a variety of reasons. The supporting artillery battery was placed in the final helicopter flights. Analysts surmised that enemy forces would have been withdrawn before the M72A2 LAAW would be within effective range. The same rationale applied to a number of other systems.

Mini-Scenarios

Conventional Doctrinal Scenario (Continued)

The following organic or attached weapons systems were not used in the scenario or were not used to the degree that they would be in more conventional operations:

- M101A1 Lt, Towed, Howitzer
- M72A2 LAAW
- Hand Grenades
- REDEYE GM Launchers
- Engineer Demolitions
- M203 Grenade Launcher
- M40A1 7.62mm Sniper Rifle
- Pistol

The following table will illustrate the envisioned Class V (W) expenditures per weapon type for this scenario.

TABLE B-2. CLASS V(W) EXPENDITURE RATES-CONVENTIONAL DOCTRINAL SCENARIO

WEAPON	AMMO EXPENDED PER WEAPON	RATIONALE
Pistol	None (0)	
Revolver	None (0)	Weapons do not come within effective range
Shotgun	None (0)	
M16A1	120	3 round burst every 15 sec. during displacement of 10 minutes
M40A1	None (0)	
M60	1,000	10 min. @ sustained rate of 100 rnds/min
M2	None (0)	
M85	None (0)	Not organic or attached to BLT 1/1
M203	2	Battle ending when wpn within effective range
60mm Mortar	11	2 illum, 4 smoke, 5 HE
81mm Mortar	11	Same as 60 mortar
105mm How	None (0)	Battle ending when btry ready to fire
LAAW	None (0)	Wpns do not come within effective range
M202A1	None (0)	
TOW	1.875	Each BMP unmasks 5 times in 15 min.; upon each unmasking 1 TOW rnd & 1 Dragon rnd are fired.
Dragon	.469	
Redeye	None (0)	Friendly air superiority during this snapshot

None - No weapons of this type are involved in the action with BLT 1/1 at AF 1.

The following table reflects the Class V (W) total expenditures envisioned for this scenario. It should be noted that attrition factors were not included in the calculations; although normal attrition would present a more realistic expenditure total, it would not allow analysts to present a worst-case or a high expenditure rate for the end product, which would be a figure used for comparison to existing planning factors. Expenditures were assessed only for units determined by analysts to be directly involved in the assault. This meant that analysts withheld a BLT reserve element from direct involvement. The reserve element consisted of a rifle platoon with attached assault section elements from its parent company weapons platoon.

TABLE B-3. TOTAL CLASS V(W) EXPENDITURES-CONVENTIONAL DOCTRINAL SCENARIO

WEAPON	AMMO EXPENDED PER WEAPON (RNDS)	NO OF WPNS EMPLOYED	TOTAL EXPENDITURE (RNDS)	REMARKS
M16A1	120	330	39,600	Expenditures assessed for forward and flank rifle platoons w/attached assault sections from wpns platoons. Total of 8 rifle platoons.
M203	2 (HE)	72	144	Same as above
M60 MG	1,000	20	20,000	Same as above
60mm Mortar	2 (Illum) 4 (WP) 5 (HE)	12	24 48 60	
81mm Mortar	2 (Illum) 4 (WP) 5 (HE)	8	16 32 40	
TOW	1.875	8	15	TOW section attached to BLT
DRAGON	.469	32	15	

Mini-Scenarios

INDUSTRIAL DOCTRINAL (ID) SCENARIO

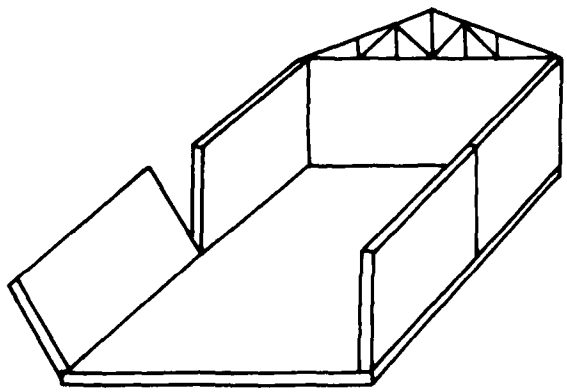
THE INDUSTRIAL DOCTRINAL SCENARIO TOOK PLACE IN THE SYN CITY PORT AREA WHERE THE PREPONDERANCE OF ENEMY COMMITTED FORCES HAD ESTABLISHED AN ORGANIZED DEFENSE. THE PROPOSED CLASS V(W) AMMUNITION EXPENDITURES IN THIS SCENARIO, WHEN COMBINED WITH EXPENDITURES IN OTHER SCENARIOS, WILL BE USED TO DEVELOP COMPARATIVE PLANNING FACTORS IN CHAPTER VII.

Scenario Location. The selection of the exact area for the scenario involved analysis of several representative industrial areas in SYN City to determine which presented the "worst case" which would require the highest rate of Class V(W) ammunition expenditure to seize. The SYN City main port area represented both an industrial-based location and the most heavily defended area in SYN City requiring a higher rate of ammunition expended when compared to all other choices.

Since the SYN City data base did not provide building profiles in the port area, analysts devised structural parameters for the ID scenario. Generic building types to be found in the port area were derived from data contained in OH 8-7, Military Operations on Urbanized Terrain (MOUT), and FM 90-10, Military Operations on Urbanized Terrain (MOUT). The majority of building types selected were warehouse and/or industrial plant facilities of frameless construction. A graphic example of this building type from each publication is offered on the facing page. Analysts concluded that the majority of buildings selected for the scenario would consist of *Concrete Tilt-Up construction.* During the course of scenario excursions, a greater variety and larger number of weapon types would be required to create penetration points for troop access. A number of modifications to the basic construction description, listed below, were incorporated to add a degree of realism to combat actions.

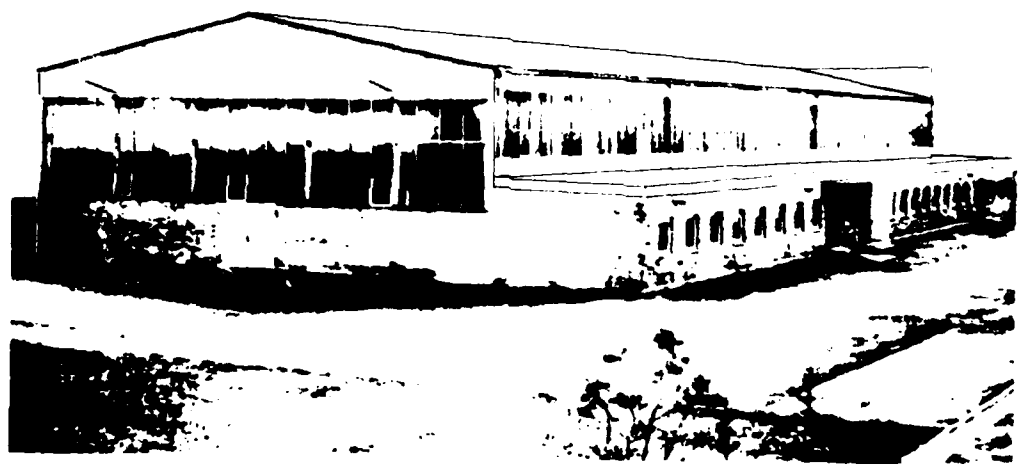
- Buildings on northern flank of the enemy defense in the port area are serviced by railroads; loading docks were incorporated into the building structure.
- Sliding bay doors were incorporated into those building structures with loading docks.
- Although not a structural change, warehouses were assumed to be at least half full; stacks of supply stocks afforded an extra degree of protection for enemy troop positions within each structure.

CONCRETE "TILT-UP"



- HEIGHT IN STORIES 1-3
- AVERAGE WALL THICKNESS 18CM
- MASS OF EXTERIOR WALLS PERFORMS LOAD-BEARING FUNCTION
- VULNERABLE ROOF
- FEW IF ANY WINDOWS

Industrial/Warehouse Building



Buildings common to newer industrial and warehouse complexes are classified as Type 9. While the type construction may vary considerably, steel framing and the use of lightweight materials for exterior walls and roofs are normal practices. Reinforced concrete floors/ceilings are frequently used in multistory buildings.

Figure B-5. Typical Building Types - Industrial/Port Area

Industrial Doctrinal Scenario (Continued)

Enemy Positions. The preponderance of Aggressor committed forces were in the mainland port area deployed in a doctrinal defensive posture and consisting of a Motorized Rifle Battalion (MRB) reinforced with a company of medium tanks. Analysts established Aggressor defensive strongpoints in harbor/industrial warehouses and other structures with forces oriented seaward. The motorized rifle platoon and tank platoon that had been ejected from Airfield 1 during the Conventional Doctrinal scenario were positioned in a defensive posture north of the main defense in the vicinity of Bridge 5. For purposes of this ID scenario, it was assumed that these units remained essentially intact.

Specific enemy troop deployments are illustrated on the facing graphic and described below.

- One motorized rifle platoon and a tank platoon were positioned just south of Bridge 5. Three dismounted squads were positioned to protect the MRB's north flank and deny Bridge 5 to the attacking force. APCs and tanks were positioned within and between buildings to destroy armored vehicles attempting to cross the bridge.

- A motorized rifle company, minus one platoon, was in supporting positions in a suburban area southwest of Bridge 5.

- A motorized rifle company, reinforced with a tank platoon, occupied strongly prepared defensive postions just north of Dock 25 to protect warehouse facilities and establish firing positions enabling them to direct fires on landing craft attempting to enter the port area.

- The third motorized rifle company, reinforced by a platoon of tanks, occupied prepared defensive positons in the built-up area inboard of Dock 25. This company acted as a covering force to keep advancing/pursuing friendly elements at bay, enabling the withdrawal of committed Aggressor elements.

In an effort to maintain consistency throughout this technical report, analysts concluded that Aggressor committed forces in the port area would fight a series of delaying actions to inflict casualties on advancing MAF forces and delay the seizure and consolidation of key facilities until a counterattack or substantial reinforcement occurred.

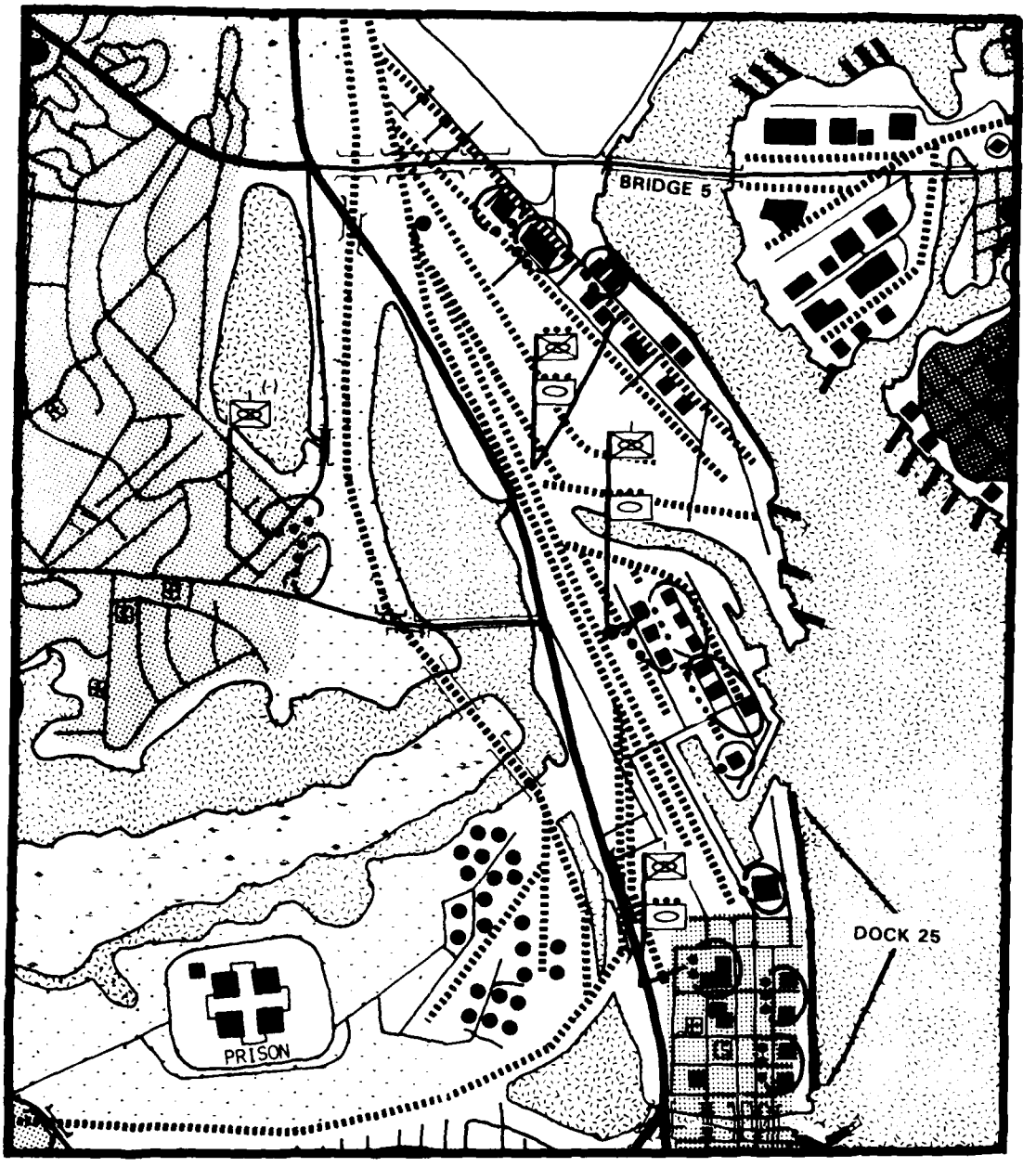


Figure B-6. Threat Deployment in Port Area

Industrial Doctrinal Scenario (Continued)

Friendly Scheme of Maneuver (Engagement 1). The scenario begins on D-day shortly after H-hour. Prior to the start of the scenario, BLT 2/2 landed with tanks and LVTs over RED Beach, isolated the old city on the north and west, and were to attempt a link-up at Bridge 5 with BLT 1/2, which landed at H-hour by helicopter in HLZs north of Bridge 5. Remnants of the Aggressor force local reserve and elements of an enemy motorized rifle company were placed in defensive positions in warehouse facilities near Bridge 5 and action began with enemy forces taking BLT 2/2 under fire from across North River. As will be noted in later discussions on the enemy course of action, committed enemy motorized rifle units were not to defend these positions to the last man. They were, however, to play an important part in delaying actions later.

Assault operations in the port area consisted of two major engagement actions. It was estimated that Aggressors near Bridge 5 could be isolated and cut off from the main body. An attack was planned on forces at Bridge 5 first, followed by a second attack farther south against the main defense. The specific scheme of maneuver for the first attack, or Engagement 1, is as follows:

- Upon landing, BLT 1/2 attacked south to the landfill area where it was taken under fire by machineguns, tanks, and antitank weapons from strongpoints located in the vicinity of Bridge 5 and southwest of Bridge 5.

- In the same time frame, the assault elements of BLT 2/2 arrived in the vicinity of Bridge 5 on the peninsula and received heavy fire from Agressor strongpoints on the mainland near Bridge 5.

- A battery of 105mm howitzers had been landed in the vicinity of Airfield 1 at L-hour. As soon as BLT 1/2 had been taken under fire, analysts employed both Naval Gunfire (NGF) and fires from the above-mentioned battery to lay indirect fires on strongpoints southwest of Bridge 5. Prior to attacks on strong points at Bridge 5, artillery forces would be shifted and serve as prep fires for the assault.

- While under the cover of supporting arms fire, BLT 1/2 moved into position to launch an assault on enemy strongpoints near Bridge 5.

- The mounted advance guard of BLT 2/2 deployed into firing positions in and around warehouse structures on the peninsula due east of Bridge 5. The force ultimately consisted of a rifle company mounted in LVTs and supported by a platoon of tanks. The company was then tasked to seize the eastern end of Bridge 5; provide direct fire support to the BLT 1/2 assault; and later, to cover the movement of BLT 2/2 across the bridge.

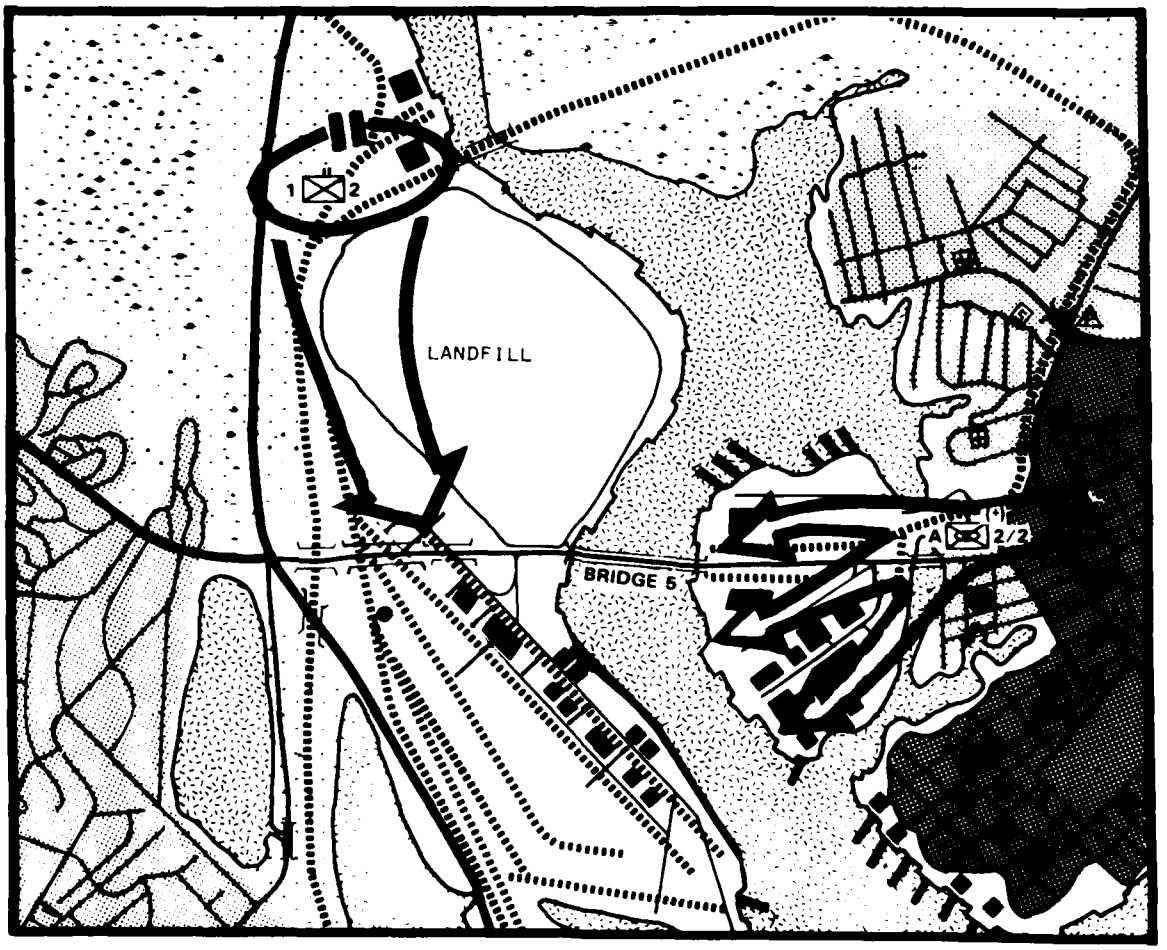


Figure B-7. Initial Movement (Friendly) Into Port Area

Industrial Doctrinal Scenario (Continued)

The assault on strongpoint positions in the vicinity of Bridge 5 was launched by the dismounted infantry elements of BLT 1/2. Preparatory fires were delivered on known Aggressor defensive strongpoints by the artillery battery at Airfield 1. Battalion and company mortars supported company movements with supplementary fires on occupied positions and screened assault units by delivering smoke on opposing building faces. A detailed description of the scheme of maneuver is offered below and a graphic illustration of tactical movements is on the facing page.

- A single envelopment was chosen to secure a lodgment at Bridge 5.
- One company from BLT 1/2, minus a reinforced platoon, maneuvered into a position to seize the western half of Bridge 5 and act as a base of fire for maneuver elements.
- A second company from BLT 1/2 acted as a flanking/assault element and was used to conduct the ground attacks on enemy occupied buildings.
- Preparatory artillery fires were directed on exposed faces, rooftops, and between buildings in an attempt to cause casualties, prevent Aggressor forces from delivering observed fires on maneuver elements, and force enemy APCs and tanks into the open.
- Airborne Forward Air Controllers [FAC(A)] directed CAS airstrikes on targets of opportunity southwest of Bridge 5 in support of the ground assault.
- The third rifle company of BLT 1/2 was deployed to the suburban area west of the railroad to engage the Aggressor MRC (-) that was in support of the two MRCs in the port/warehouse area.
- Fixed-wing aviation and NGF were employed to create a smoke screen south of Bridge 5 to obscure direct observation of the engagement area from other defending forces positioned in port facilities. Battalion mortars were used on-call to deliver obscurants supplementing those delivered by other systems.
- NGF support was shifted to enemy strongpoints south of Bridge 5, upon commencement of the assault, to neutralize enemy supporting or reinforcing forces.

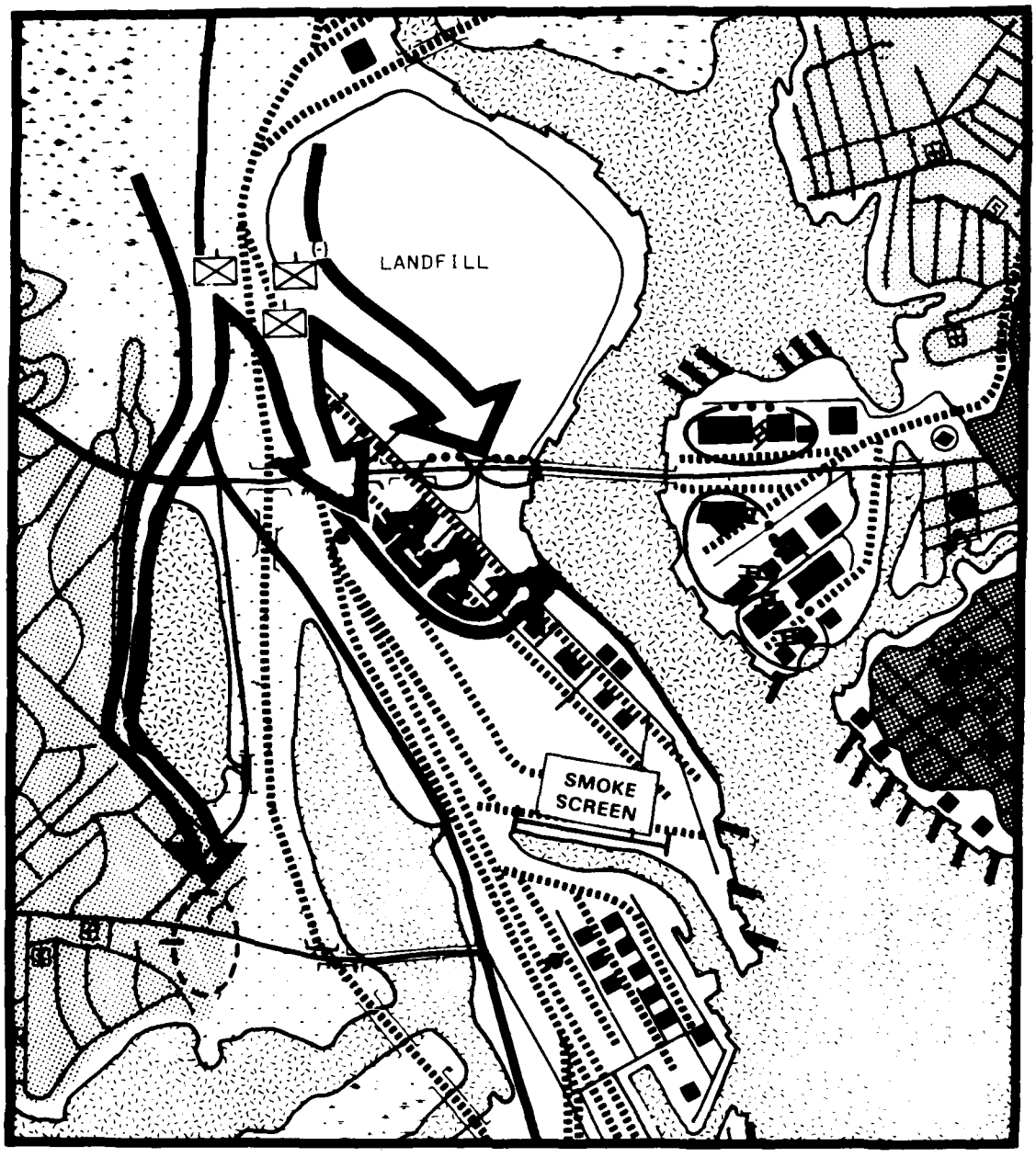


Figure B-8. Friendly Scheme of Maneuvers - Engagement No. 1 (ID)

Industrial Doctrinal Scenario (Continued)

Friendly Scheme of Maneuver (Engagement 2). Analysts envisioned a second engagement in this scenario to continue the momentum of the attack on the port area. An illustration of the selected course of action/scheme of maneuver is offered on the facing page; the explanation is as follows:

- Artillery fires were shifted, shortly after the first engagement was well-underway, to prepare main defensive positions for subsequent attacks.

- Once analysts had estimated that the warehouse facilities at Bridge 5 could have been secured, BLT 2/2 was deployed across Bridge 5.

- BLT 2/2 was divided into three elements; each with separate missions. Two company teams were deployed to the suburban area southwest of Bridge 5 to establish flanking fire support positions/base of fire positions. A third company team and the battalion headquarters remained on the peninsula in position to lay direct fires on harbor building facilities and engage exposed troops and vehicles. An element of the third company team, a heavily reinforced squad team, was deployed in LVTs to the piers just south of Dock 25 as a deceptive measure to divert attention from the attack of strongpoints from the rear.

- All friendly maneuvers during the course of this engagement were screened from direct observation by employing fixed-wing aircraft and mortars to deliver smoke on the exposed flanks of the enemy defense.

- The deception team used the cover of preparatory fires and obscurants to deploy. Simultaneously two rifle companies from BLT 1/2 moved south. The rifle companies were deployed to their attack positions opposite the defensive strongpoints prior to movement by the deception team.

- Both the deception team and BLT 1/2 (minus) were supported by fires from AT missiles and tank main guns from positions on the peninsula, mortar fires from positions at Bridge 5, AT missiles and tank main guns from the suburban area southwest of Bridge 5, and on-call direct support artillery fires.

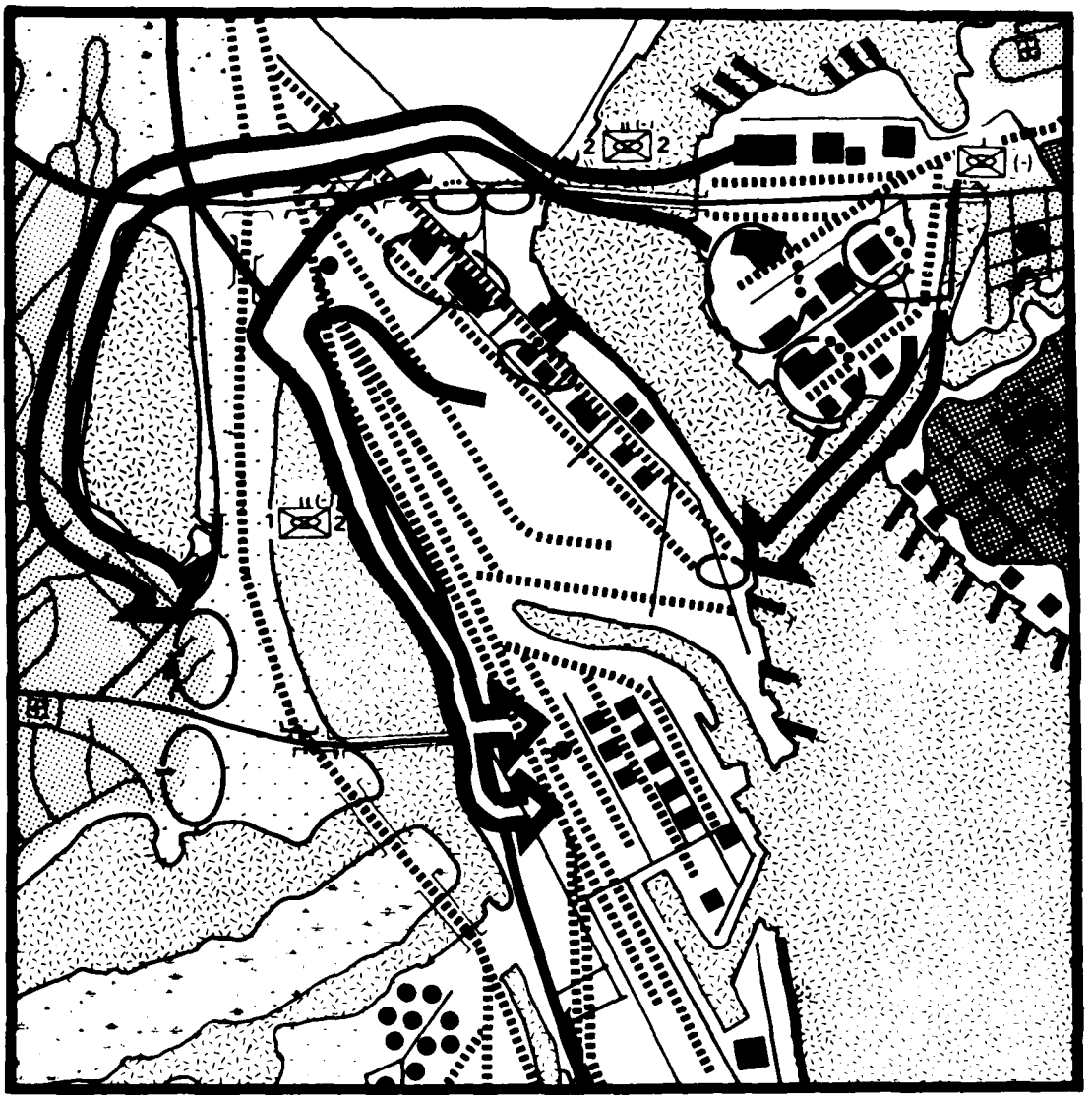


Figure B-9. Friendly Scheme of Maneuvers - Engagement No. 2 (ID)

Mini-Scenarios

Industrial Doctrinal Scenario (Continued)

Parameters for Scenario. Analysts established a number of boundaries in order to focus on the conduct of an assault in the port area and estimate ammunition expenditures; they are listed below:

- Analysts did not estimate the complete destruction of the committed force in any scenario. Several Aggressor units or elements figure in succeeding scenarios.

- Analysts subjectively concluded that only two major engagements or delaying actions could occur in the port area before Aggressors would be forced to defend from the New City.

- It was acknowledged that the committed Aggressor force could possess the capability to damage Bridge 5 seriously, which would have negated the elected course of action. In such a case analysts surmised that ammunition expenditures would reflect a marked increase in tank, artillery, and NGF ammunition to reduce defenses because maneuver elements would be unable to cross North River until the later periods of assault operations. In evaluating tradeoffs, analysts arbitrarily decided that it would be desirable to examine expenditures for a greater variety of weapons; therefore, the proposed course of action was adopted.

A number of decisions were reached regarding the duration and types of fire and actions envisioned for the first engagement; they are listed as follows:

- In the deliberate assault, a single battery of M101A1 105mm howitzers (M198 in mid-range) comprised the only artillery assets ashore during the proposed assault time frame. With assets limited to 6 tubes of artillery, analysts restricted preparatory fires to the rooftops and exposed faces of designated buildings where Aggressors had been observed.

- In an effort to examine a large variety of ammunition types, analysts subjectively decided to make wind direction and velocity favorable to the use of smoke obscurants.

- The artillery and mortar rounds placed on each of the enemy-occupied buildings were limited in number in an effort to minimize damage; the buildings were to be used as facilities to store MAF supplies in subsequent periods of operations.

- Artillery preparatory fires were subjectively limited to a 15-minute engagement based on a projected rate of advance for friendly base of fire platoons and the arrival of maneuver elements at their attack positions.

- Buildings and surrounding land areas were attacked with artillery fires in an effort to force enemy vehicles into the open. Should attacks of this nature be successful, then flanking fires from AT missiles and tank main gunfire could destroy/damage exposed vehicles from positions on the peninsula.

- To limit the size of the engagement, potential reinforcements were held in place by CAS aircraft attacks on the suburban area southwest of Bridge 5 and by smoke and NGF on forces in the main port area to degrade observation of the battle area and interdict any reinforcement attempt.

The following decisions were reached regarding the duration and type of supporting fires and action envisioned for the second engagement:

- A much larger enemy force was to be encountered in this segment of the scenario. Analysts concluded that a more tenacious defense would be likely in this engagement area; therefore, a number of tactical gambits, use of a deception team and enveloping forces deployed from the rear, were used to minimize friendly casualties and facilitate the seizure of buildings relatively intact.

- Using available data, SYN City Data Book and overlays, analysts concluded that the east bank of the inland body of water adjacent to the engagement area would provide sufficient concealment for enveloping elements to move into assault positions. It was assumed that the bank relief would be below the level of the parallel highway and when combined with the confusion caused by artillery, NGF, and mortar attacks and deceptive measures, sufficient cover and concealment could be obtained.

- The details for railroad rolling stock were not provided for in existing SYN City data. Analysts estimated, however, that a number of railroad cars would be present in the engagement area and would provide cover for enveloping assault elements.

- The same fire support considerations apply to the second engagement.

Industrial Doctrinal Scenario (Continued)

Findings (Engagement 1). A number of conclusions were drawn from examining tactics, defensive strongpoints, weapons capabilities and methods of employment, and proposed ammunition expenditures. The facing table provides ammunition expenditures calculated for this engagement and the following conclusions should shed light on rationale behind a number of the proposed expenditures.

- Artillery fires were directed against building rooftops and lines of communication between, on the flanks, and in the rear of building areas. Available data suggest that typical rooftops in these kinds of areas are vulnerable. Artillery attacks were to be under positive control of an airborne artillery spotter who would determine the success or failure of rooftop attacks and had the option to shift fires accordingly. Harrier aircraft with general purpose or other bomb types would be used in the event the artillery rounds failed to penetrate.

- Using the proposed building profiles, analysts found that each building strongpoint could be attacked in a similar manner; attached combat engineer elements would create entry points on loading dock sliding doors by using satchel charges, hand grenades could be used to clear the area immediately behind the entry point, and then buildings would be entered by lead elements using automatic fires from individual small arms to begin the final internal assault if the enemy forces had not withdrawn from fighting positions. (Standoff breaching weapons are not available but they are sorely needed in urban combat).

- Smaller AT weapons; e.g., the LAAW; were employed to the rear of buildings, attacking vehicles fleeing from firing positions inside the buildings.

- Small-arms fire from base-of-fire elements would play a minor but effective role in preventing observed enemy fires on friendly maneuver elements; aimed rifle and machinegun fires directed at firing embrasures could degrade all but APC and tank main gunfire. Since analysts described the character of fires as aimed fires, the expenditure rates would be low but the anticipated effects would be valuable for maneuver elements.

- APCs and tanks located inside facing buildings could be engaged by base-of-fire Dragons aimed at firing embrasures; although destruction of the vehicles may not be achieved, these weapons will force the threat vehicles away from the embrasures affording ground assault teams greater freedom of action.

- Company-level mortars played a major role in this engagement. Mortars targeted between buildings could strip exposed vehicles of communications antenna, damage optics, and possibly cause temporary disablement of the vehicles. These mortars were also used to supplement smoke delivered by other means.

TABLE B-4. CLASS V(W) EXPENDITURE INDUSTRIAL DOCTRINAL SCENARIO ENGAGEMENT 1

[illegible]	EXPENDITURES	RATIONALE
	PREP FIRES	
[illegible howitzers (105 mm or M198 155 mm)	12 rds HE/CP Fusing	To attack roofs of 3 enemy-occupied buildings; 6 tubes x 2 volleys.
[illegible] Tank, 105 mm	6 rds CS/CP Fusing 4 rds APDS	Same as above x 1 volley. Elms of advance guard, BLT 2/2; weapons of attached tank platoon trained on gaps between 4 observed occupied buildings; Aggressor targets (vehicles) assumed to be exposed at least one time in engagement and possibly during prep fires.
Tank	4 rds	Same as M60A1 Tank.
[illegible]	4 rds	Same as M60A1 Tank; elms of weapons company BLT 2/2.
[illegible] 4.2" Mortars	12 WP rds	Smoke delivered at gaps; supplements that delivered by CFA; 4 volleys x 3 rds.
	BASE OF FIRE	
M16 A1 Rifles	1,400 rds	Two rifle platoons on line=72 weapons; duration 15 min (estimated time for maneuver elms to move into position on flanks of objective); subjective rate of aimed fire 1 rd/10 sec x 15 min.
M203	540 HE rds	Point targets on opposing building at max effective range and surrounding area targets; duration 15 min.; subjective rate of fire 2 rds/min x 18 weapons x 15 min duration.
M60 Machineguns	5,400 rds	MG section, weapons platoon deployed to 6 sides of fire positions, 2 bridge security positions; duration 15 min x subjective aimed rate of fire of 60 rds/min x 6 base of fire positions.
M[illegible] 60 mm Mortars	288 HE rds 288 HE rds	"Walking" fires on opposite flank of [illegible] from assault teams once buildings have been entered; duration 2 min (fires on-call), max effective rate for first 2 min=[illegible] rds/min x # tubes. On-call fires between buildings; same duration, rate of fire, number of tubes as at vc.
	BUILDING ASSAULTS	
First building assault: 1 lb. Satchel Chgs Frag Grenades M16A1 Rifles LAWs	3 6 180 rds 2 rds	To create 3 entry points at [illegible] 2/entry point. 2 ARs/entry point expend 1 full magazine of 30 rds. One or more vehicles estimated to evacuate building to evacuate building when [illegible] close on firing positions; one engagement [illegible]
[illegible] building assault: 1 lb. Satchel Chgs Frag Grenades M16A1 Rifles LAWs	4 12 360 rds 4 rds	Building [illegible] the size of 1st building [illegible] with 2 squad positions (enemy) [illegible]
Third building assault: 1 lb. Satchel Chgs Frag Grenades M16A1 Rifles LAWs	3 6 180 rds 2 rds	Same rate of engagement as assigned to 1st building [illegible]

Industrial Doctrinal Scenario (Continued)

Findings (Engagement 2). Several conclusions were drawn after examining tactical gambits used, the Aggressor defensive posture, and weapons employment; all of which are listed below:

- Analysts determined that a well-positioned Aggressor motorized rifle company, reinforced with a platoon of medium tanks, could tenaciously defend the engagement area. Even though it was desirable to minimize building destruction, supporting arms would have to be employed to a greater degree in this portion of the scenario to soften the defenses for ground assaults.

- Artillery preparatory fires were employed in a similar manner to the first engagement; fires were targeted on building rooftops to create penetration gaps and rooftop attacks were followed by CS and other HE attacks to attrite exposed personnel and equipment in the buildings. Rooftop attacks were again under positive control of an airborne artillery spotter and fires could be shifted at his discretion. Fires were also "walked" north to south between buildings to attrite external defensive forces; the primary target of such attacks were exposed personnel.

- Analysts determined that it was unlikely that threat tanks and APCs could be engaged from fire support positions (BLT 2/2 on peninsula); however, tank ammunition was expended from infantry company team positions to the rear of the engagement area. Although not an optimal utilization of tank main guns, tanks were employed to fire on opposing building sliding doors in an effort to create ground assault team penetration points.

- Since detailed building profiles were not provided in the data base, analysts subjectively determined that buildings types in this area would be identical to those used in the first engagement and that building assaults would be conducted in a similar manner to the first engagement. The initial assaults, the facing group of buildings, did not require engineer preparation because tank main gun fires had been employed to create penetration points.

TABLE B-5. CLASS V(W) EXPENDITURES INDUSTRIAL DOCTRINAL SCENARIO ENGAGEMENT 2

WEAPON	EXPENDITURES	RATIONALE
	PREP FIRES	
Mortars	670 rds HE/MTF Fusing	Total of 10 buildings in engagement area; building dimensions [illegible] rds placed every [illegible] c-c spacing (planning only, it is understood every round will not impact on building); requires 67 rds of HE in an attempt to open holes in roofs for subsequent attacks.
	50 rds WP/0 Fusing 50 rds CS/0 Fusing	Mixed WP, CS attacks on each rooftop in an attempt to cause internal fires and create confusion.
	250 rds HE/0 Fusing	To be mixed with CS/WP attacks on each rooftop in an attempt to cause casualties amidst the confusion.
	24 rds WP/0 Fusing 12 rds CS/0 Fusing	Obscurant and harrassing attacks on LOCs between building flanks, area covered 400m x 600m with single pass of 6 volleys.
[illegible] Per Battery	56 WP rds	Supplements smoke delivered by fixed-wing assets. 4 tubes x [illegible], each volley produces cloud approximately 100m long.
	BASE OF FIRE	
[illegible] Tank	[illegible] HE rds	Fires directed at rear of 7 buildings; 2 sliding doors per [illegible], 2 rds expended/door.
	7 APDS rds	Exposed tank/APC in each building gap attacked during assault.
[illegible] MG	11,400 rds	Fire from suburban area SW of Bridge 5, [illegible] support ground assault; fire sustained rate 40 rds/min x [illegible] min, estimated time taken to position lead ground elements proximate [illegible] base of fire ceases fire).
	DECEPTION ELEMENT	
[illegible] MG	2400 rds	LVTP-7s of deception team [illegible] fire same length of time [illegible] support landing of team.
Rifle [illegible]	7,200 rds	One rifle squad plus attached assault section [illegible] rate (20 rds/min) for 15 min before extraction.
[illegible]	[illegible] rds	Each facing building gap targeted; should [illegible] engaged by missiles from a Dragon section.
MG [illegible]	6000 rds	Each of 2 MGs fire at maximum effective rate [illegible]
	ASSAULTS	
[illegible] Attack Chg	9	A total of 3 buildings required charges for [illegible] charges/building.
[illegible] Grenade	60	Total of 4 grenades/entry point x 2 entry point [illegible]
Small Rifle	1800 rds	[illegible] entry point expend one [illegible]
[illegible]	28 rds	Figure represents subjective calculation; [illegible] destroyed by other fires x 14 threat vehicles.

Industrial Doctrinal Scenario (Continued)

Based on analyses performed for each engagement, analysts concluded that a number of weapons would not be employed to the degree that they might be used in a more conventional environment. The reasons vary for each weapon type, however, two general statements were found to be true. The first generality is that a number of infantry weapons were not employed or were utilized to a limited extent because committed Aggressor elements had withdrawn from fighting positions before the weapons were carried within effective range. The second general statement is that a number of weapons would have no appreciable impact on the outcome or conduct of the action; e.g., M203 grenade launcher has no capability to penetrate concrete walls. The following list of weapons were found to be ineffective or were not used to the degree that they would be in a more conventional environment.

- TOW
- M16A1 Rifles
- LAAW
- M203 Grenade Launcher
- M40A1 Sniper Rifle
- Pistol

The weapons listed below were used applying conventional firing rates for varying lengths of time or analysts applied subjective firing rates based on analyses of envisioned combat actions. A heavier reliance was placed on a number of weapons in this scenario when compared to all other scenarios; e.g., this was the only scenario where artillery played a significant role, battalion and company level mortars were utilized throughout envisioned assault combat actions, M60A1 tanks were employed to a much greater extent to engage threat vehicles and, to a limited extent, prepare buildings for infantry assaults. The reader should realize that a variety of weapons in the T/E of combat support elements could supplant those used in this scenario, however, each engagement was a snapshop in time and weapons used were the only assets available during that period of assault operations. Further, CAS aircraft and naval gunfire could have been employed to a much greater extent, however, employment of these assets to a greater degree would have prevented analysts from presenting high Class V (W) expenditures for comparison purposes. The following weapons were used to the same extent that they might be employed in a more conventional environment.

- M101A1 Howitzer
- M60A1 105mm Main Gun
- M29 81mm Mortar
- M19 60mm Mortar
- Engineer Demolitions
- DRAGON

The facing table provides total expenditure data envisioned for this scenario.

TABLE B-6. TOTAL CLASS V(W) EXPENDITURES-INDUSTRIAL DOCTRINAL SCENARIO

WEAPON	AMMO EXPENDED/ WEAPON OR TYPE
Pistol	None (0)
M16A1 Rifle	16,200 rds
M40 Sniper Rifle	None (0)
MG - M60	11,400 rds
- M60D	None (0)
- M60E2	None (0)
- M2	None (0)
- M85	13,800 rds
M203 Grenade Launcher	540 HE rds
M19 60mm Mortar	576 HE rds
M29 81mm Mortar	68 WP rds
M60A1 105mm Main Gun	11 APDS rds 28 HE rds
M101A 105mm Howitzer	12 rds HE/CP Fusing 6 rds CS/CP 670 rds HE/MTSQ 74 rds WP/Q 62 rds CS/Q 250 rds HE/Q
M72A2 LAAW	36 Missiles
M220A1 TOW	4 Missiles
M47 DRAGON	12 Missiles
M33 Hand Grenade	84 FRAG
10 lb Satchel Charge	21

Mini-Scenarios

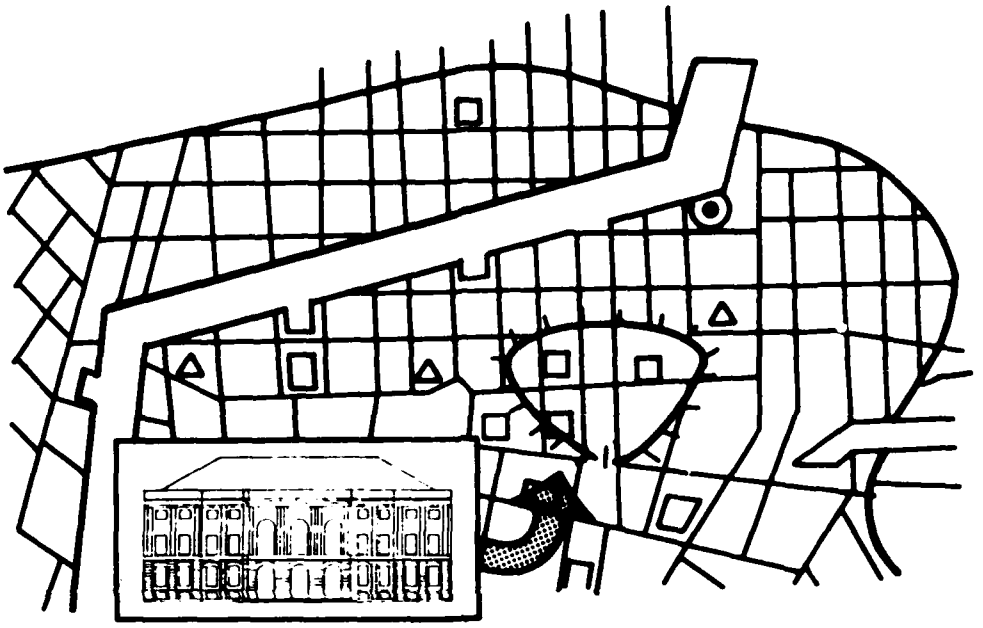
URBAN DOCTRINAL (UD) SCENARIO

THIS MINI-SCENARIO IS INTENDED TO ILLUSTRATE ONE TECHNIQUE USED TO DETERMINE CLASS V (W) EXPENDITURES IN AN URBAN ENVIRONMENT WITH FRIENDLY FORCES ASSAULTING ORGANIZED ENEMY DEFENSIVE STRONG-POINTS.

Scenario Location. New City constitutes the only densely populated area in SYN City in which urban combat could logically occur in Operation BREAKER. The Old City area is relatively isolated and is defended only by a 100-man Army ceremonial garrison. New City, however, is near the main port area and is reasonably accessible to the major forces defending the port. The New City was characterized as having closed, orderly block construction consisting of residential, commercial, and municipal buildings that form a continuous front for as much as a city block or more. Streets shown on the SYN City Base Map are arranged in a rectangular pattern and the data base indicates that streets are 7m in width. Analysts evaluated several likely construction types that may be found in the scenario area and concluded that the majority of them would not be chosen for defensive positions because they offered little protection for the defender and little challenge to the attacker. Each building selected for main defensive positions in this scenario is a municipal facility of brick construction.

This scenario has been continued from the ID scenario; Aggressors withdrew from the port area into the New City to continue delaying operations. Analysts concluded that in such a case, the defenders would likely not have had sufficient time to make elaborate defensive preparations in each building before pursuing MAF forces closed with them. Analysts prepared each building in the following manner:

- Firing embrasures were provided for as necessary for gun emplacements and small arms ports.
- Holes were punched between interior walls to permit freedom of movement between rooms.
- Wooden beams, girders, and heavy desks were placed in windows and doorways to afford a limited amount of protection against small arms fire.
- Grenade ports were provided since flooring may not accommodate sumps. Ports were created on exterior walls where riflemen could throw the grenade through the port for detonation outside of the building.



EACH BUILDING

- **THICK WALLS**
- **DEEPLY RECESSED WINDOWS**
- **BRICK CONSTRUCTION**

Figure B-10. Location of Urban Doctrinal Scenario

Urban Doctrinal Scenario (Continued)

Enemy Positions. Enemy defenses were organized and deployed in accordance with examples contained in a OH 8-7 and FM 90-10. The following summary highlights defensive considerations and tactical deployments used:

- The remnants of the MRB were deployed in two echelons; the first echelon consists of reinforced platoon or company strongpoints with elements deployed in a perimeter defense; the second echelon was the battalion reserve located in separate strongpoints.
- Numerous firing positions were designated for mortars and AT weapons.
- Dummy strongpoints were prepared for deception purposes.
- Positions for securing and defending entrances/exits to underground LOCs were established and these LOCs were used for maneuvering sniper/sapper teams.
- Each Aggressor platoon defended one building within a strongpoint.
- Strongpoints were prepared in solidly constructed buildings with ambushes prepared between buildings.
- Enemy fires were planned with a combination of flanking, interlocking, and layered/tiered positions.
- The defenses were reinforced with a tank platoon from the original tank company attached to the MRB. The tanks were employed as either roving guns or were positioned within the defensive strongpoints.
- SA-7 GRAIL positions were established on designated buildings as a deterent to vertical assaults.
- Since analysts continued this scenario from the ID scenario, it was estimated that the defenders would not have the time to implement an elaborate barrier plan. A number of obstacles could have been rigged in the path of advancing friendly columns; e.g., sappers were deployed through the sewer systems to hand emplace mines in street intersections, indigenous automobiles were overturned in street intersections, booby-trapped, and anchored with expedient devices.

- Fire team-sized combat outposts (COPs) were established within the security zone to act as snipers, covering obstacles to delay and harass the advancing columns.

- BMPs and tanks were positioned at a perpendicular angle to key rear area intersections affording each vehicle full traverse of its turret; vehicles could quickly mask after firing.

- Both friendly and enemy mounted AT missiles were of major importance in this scenario because once fired, a missile would have to be tracked thereby exposing the host platform to counter-fires.

The following graphic illustrates the deployment of threat weapons and forces in this scenario.

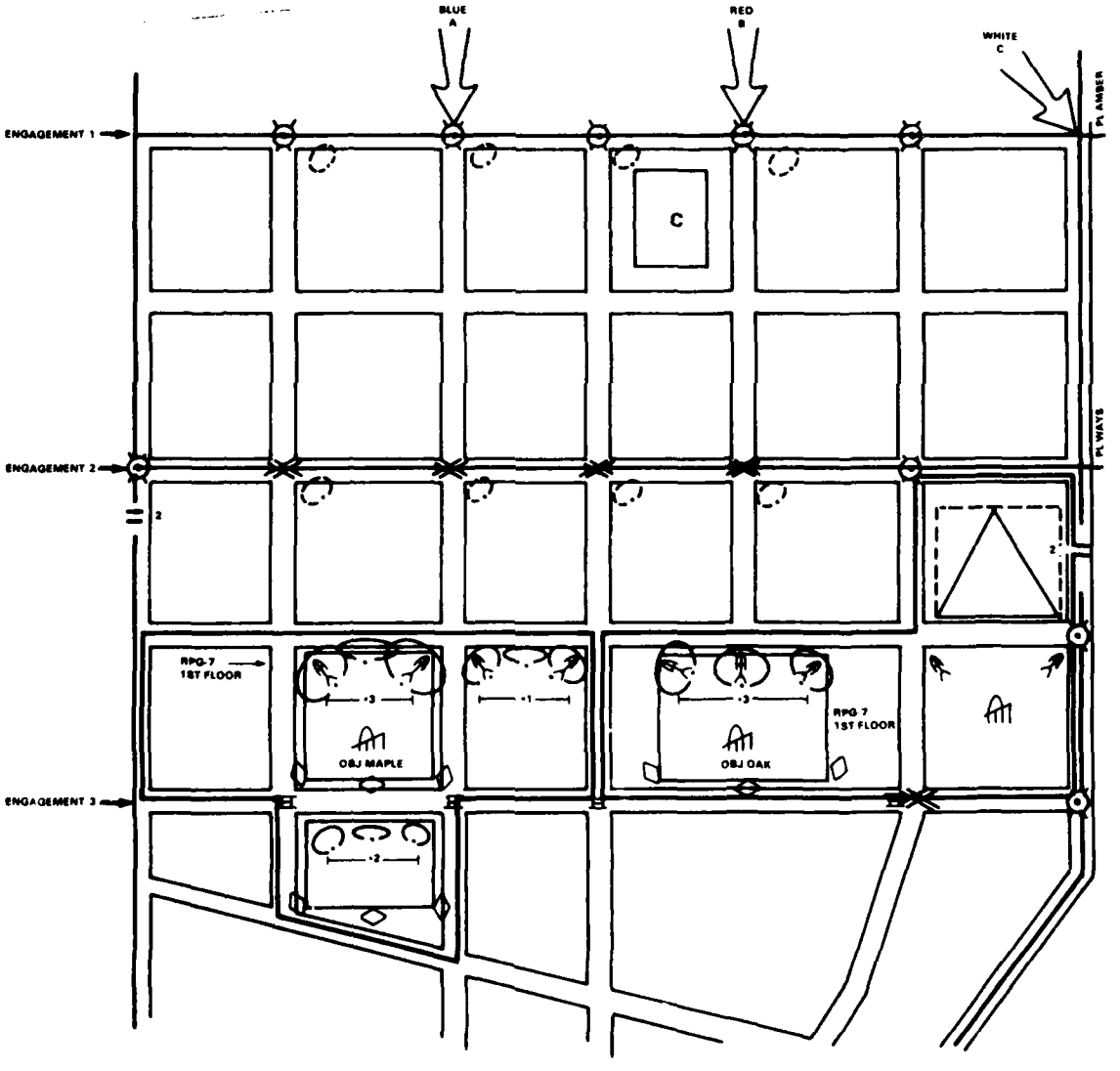


Figure B-11. Deployment of Enemy Forces - UD Scenario

Urban Doctrinal Scenario (Continued)

Friendly Scheme of Maneuver (Engagements 1 and 2). BLT 1/2 remained in the port area to hold and protect objectives seized during port area assault operations (Industrial Doctrinal scenario). The pursuing MAF force was BLT 2/2. Analysts concluded that a minimum of one reinforced Aggressor motorized rifle company could have evaded previous Landing Forces assaults. The scenario is focused on a BLT assault to isolate a company-sized strongpoint. The BLT would later attack to the west to penetrate the remainder of the defense established in the New City or pursue Aggressors should they elect to leave the New City and breakout to the northwest to join forces outside the FBHL.

The mounted rifle companies of BLT 2/2 were task-organized to provide an optimal structure for the inner city assaults. The specifics are illustrated on the facing page and a brief description of organization is offered below.

- BLT 2/2 was deployed with two reinforced companies, reinforced with elements of one tank platoon and a tank team from another tank platoon.
- The tank team consisted of an attached tank platoon reinforced with an infantry platoon element and other attachments.
- The command element was divided into an "A" command element deployed forward with assault teams and a "B" command element that remained with the trains element in the rear and served as a backup command group.

Each of the companies and the tank team were tasked with missions described below; the facing graphic offers an illustration of the scheme of maneuver.

- "A" Company attacked south on axis BLUE to seize and consolidate objective MAPLE and assume a temporary defensive posture in preparation for an anticipated counterattack.
- "B" Company attacked south on axis RED to seize objective OAK and prepare for the counterattack.
- Tank team "C" attacked south on axis WHITE to screen the eastern flank of BLT 2/2's Zone Of Action (ZOA) and conduct an armored counterattack on defenders attempting to maneuver against assault teams.
- The Scout and Target Acquisition Platoon (S & TA), an element of the "A" Command Group (ACG), was deployed forward of the battalion assault teams to reconnoiter the axes of advance and enemy strongpoints.

The assault was launched from a Line of Departure (LOD) on the northern flank of New City. Phase Lines (PL) were used for coordination and movement control.

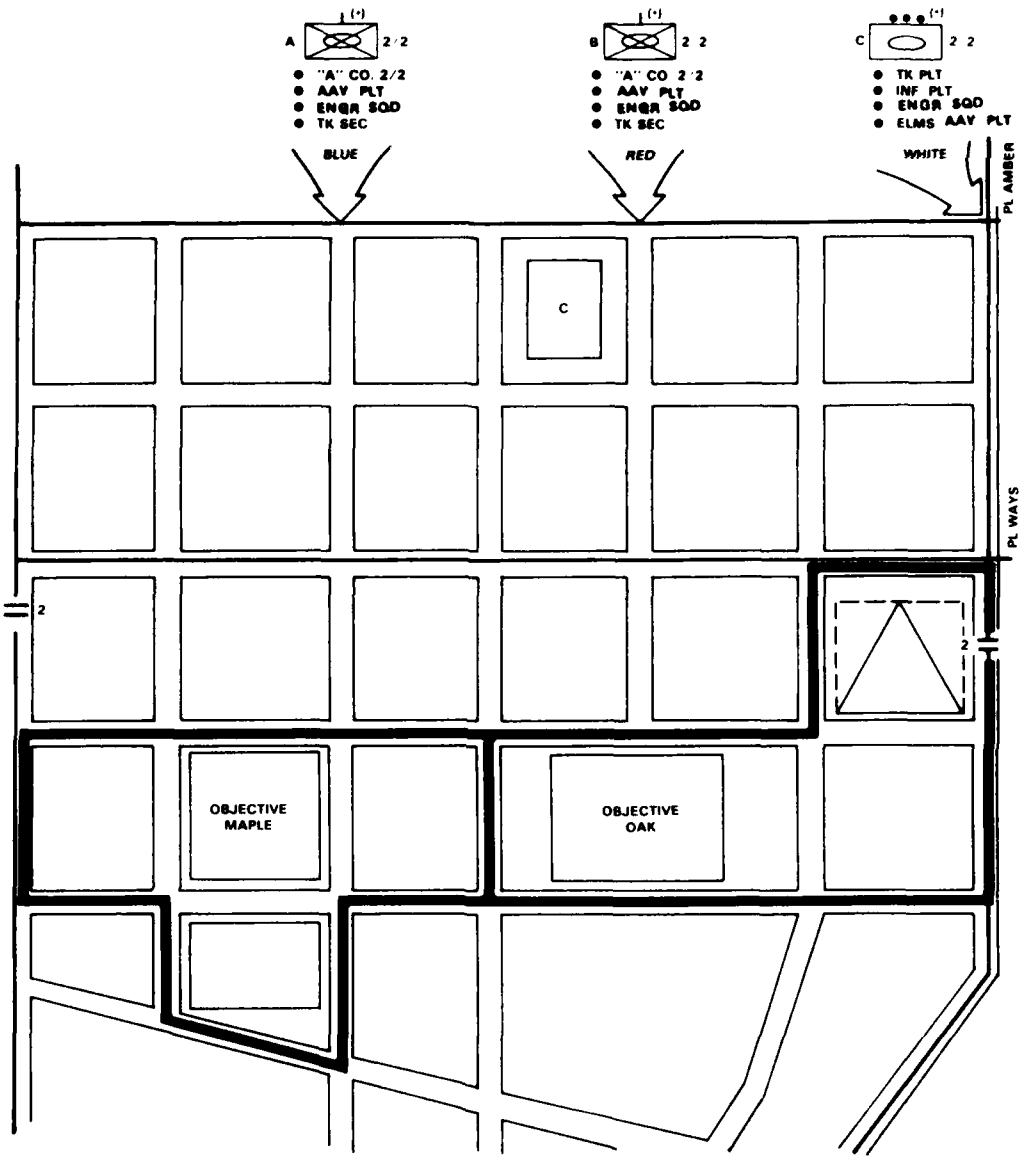


Figure B-12. Friendly Task Organization and Scheme of Maneuver - UD Scenario

Urban Doctrinal Scenario (Continued)

Analysts concluded that three engagements would logically occur in this scenario. The first two engagements would be similar in nature, therefore, the description of actions to occur during the first engagement would be mirrored in the second. The strength and frontage of each strongpoint could likely be determined in an actual situation by reconnaissance assets available to the BLT commander. The deployment and strength of Aggressor forces on PL AMBER and PL WAYS militate in favor of isolating these pockets of resistance while the assault companies continue to attack south on their assigned axes of advance.

The first engagement occurred on PL AMBER and the following considerations were taken into account before analysts maneuvered friendly assault forces:

- Excerpts from OH 8-7 were used to develop building profiles for engagements on PLs AMBER and WAYS. Buildings included concrete/steel (light cladding) modern commercial structures with glass frontages and strong inner core areas. Because of the limited enemy opposition, a number of direct fire and indirect fire support weapons were not considered appropriate for use in this portion of the scenario.

- One structure is a church, as indicated on Overlay 10 to the SYN City Base Map, and Rules of Engagement (ROE) that have been detailed in Oplan 1-81 prohibit the use of supporting arms on such structures without permission. Although this church could be attacked and/or destroyed because the Aggressor force is using it for military purposes, it was cleared using small arms in this scenario since the defenders were limited in number.

- The potential inner-city fire hazard precluded the use of incendiaries within building spaces.

Although the strength of Aggressor forces had been forecast, the engagement began with the lead vehicle of each company team column being disabled by an enemy mine emplaced in an intersection.

- Standard small unit tactics for MOUT were used in this engagement. (Excerpts from FM 90-10.)

- Analysts deployed a platoon from each company forward to establish a base-of-fire in buildings opposing those containing known enemy positions. A reinforced squad became the base of fire to support the maneuver elements.

- All movements were screened by smoke obscurants delivered by company-level mortars on the intersections where action was occurring. The base-of-fire squad also expended smoke grenades to thicken the screen.

- The buildings were rushed by dismounted, heavily reinforced, rifle squads tasked with seizing the exits to the building in an attempt to catch fleeing Aggressors.

- Light rifle squads were used to follow in trace, once suppressive fires succeeded in eliminating hostile fires, to escort engineer elements into the intersections to reconnoiter for other obstacles. Engineers were to place charges and clear obstacles in the path of the columns.

- Engineers were also used to enter street manholes and rig underground LOCs, storm sewer systems, with boobytraps to prevent Aggressors from exfiltrating by that means or infiltrating behind each column's rear.

- The columns then proceeded down their axes of advance; tanks are used to push the disabled vehicles clear of the intersection.

The second engagement on PL WAYS occurred in the same manner, however, instead of a mine disabling the lead vehicle, an overturned vehicle covered by sniper fires stopped forward movement. Mortar fires and tank main gun-fires were used to reduce the obstacles, after which tanks would push the obstacle remnants clear of the intersections. The following graphic illustrates the events occurring during one engagement; the second is a mirror of the first with the exception of the deployment of combat engineers.

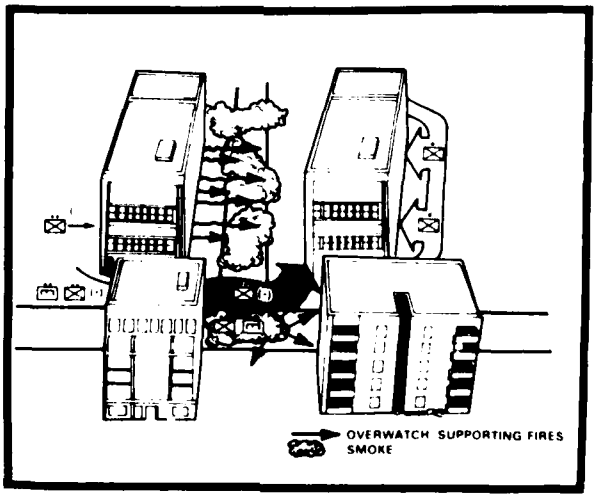


Figure B-13. Friendly Assault at Engagements 1 and 2 (UD Scenario)

Urban Doctrinal Scenario (Continued)

Friendly Scheme of Maneuver (Engagement 3). The third and final engagement in this scenario was the attack on the main Aggressor company strongpoint. The following events occurred:

- The lead vehicles on axes BLUE and RED were taken under tank main gunfire. Each company deployed seeking concealed positions behind adjacent buildings, in alleyways, and between buildings.
- The tank team on axis WHITE was deployed forward to establish firing positions perpendicular to the other two axes of advance and attack exposed threat vehicular targets.
- Based on the building dimensions of the strongpoints and the estimated number of rooms that platoons could occupy in a determined defense of such buildings, it was assumed that civilians would have been either evacuated or would have been moved down to the basement level of each building.
- The attack on building strongpoints was preceded by 81mm mortar fires directed on the rooftops of occupied buildings in an effort to make surface-to-air missile firing positions untenable.
- Company mortars were employed to deliver smoke obscurants at street intersections to cover the movements of maneuver elements into attack positions and during building rushes.
- For each company, a platoon was dismounted to infiltrate opposing buildings and act as a base-of-fire while reinforced platoons enveloped Threat-held buildings from the east.
- Prior to the building rushes conducted by enveloping elements, an air-delivered smoke screen was employed, supplemented by mortar fires to create a heavy screen for enveloping forces.
- Under the cover of fires from the base-of-fire, the enveloping forces rushed opposing buildings. Tanks and LVTs were maneuvered forward and placed in firing positions so that direct machinegun and tank fires could be delivered down the axes of advance and on occupied positions in opposing buildings.

The building assaults/searches of individual buildings were conducted in accordance with existing tactical doctrine; deployments and methodology were obtained from OH 8-7 and FM 90-10. Each occupied building was assaulted in the following manner:

- The enveloping infantry elements were divided into two assault teams to conduct the search of opposing internal corridors. One squad from a team was tasked with conducting a search of basement areas in each building.

- Prior to entering the building, combat engineers supporting the enveloping platoons were used to place demolition charges on the outside of the buildings to create penetration points for infantry to enter the buildings. Other missions assigned to the engineers included eliminating boobytraps on doors and staircases and creating mouseholes for moving between rooms and floors.

- Once search teams entered each building, base-of-fire and supporting fires from tanks and LVTs were shifted to adjacent buildings in an attempt to engage Aggressor elements attempting to shift positions or reinforce defenses in buildings where penetrations had occurred.

- Individual room clearances were conducted until each building had been secured. The scenario ended with companies occupying the buildings, establishing their own temporary defensive positions, and preparing for counterattacks.

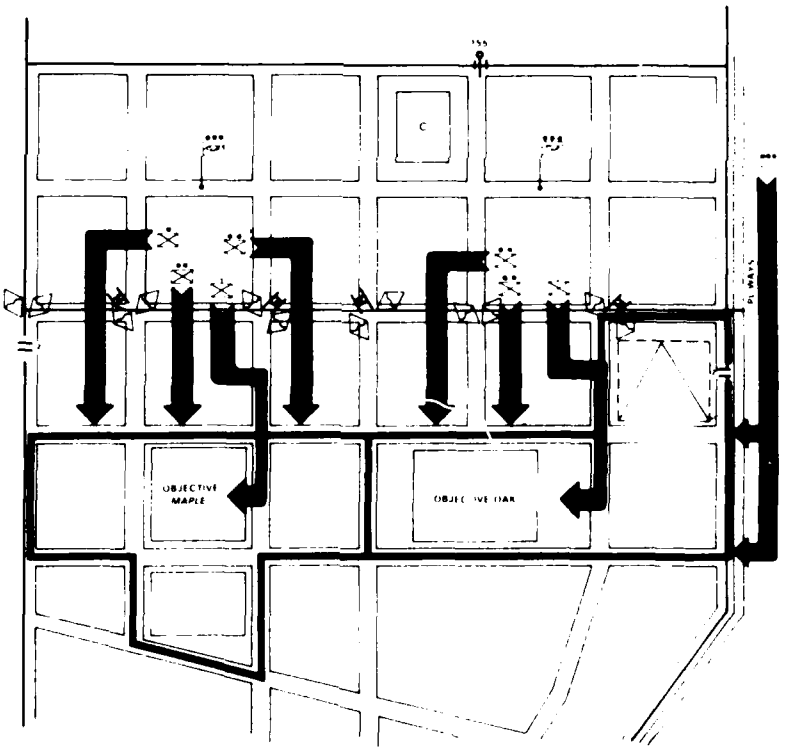


Figure B-14. Scheme of Maneuver - Engagement 3 (UD Scenario)

Urban Doctrinal Scenario (Continued)

Parameters for Scenario. The following considerations influenced development and play of the Urban Doctrinal scenario:

- In an effort to make use of company and battalion mortars, analysts subjectively set very mild wind conditions that would favor the use of smoke obscurants.

- Although building profiles were not provided in the SYN City data base, analysts assumed that the problems that plague indirect artillery fires in a typical urban environment will hold true in this scenario area as well.

- The grid pattern and location of enemy elements within the strongpoint area all but eliminates the use of frontal, direct artillery fires. Analysts did utilize artillery assets in this role but only to a limited extent.

- Since building profiles were not provided in the data base, analysts developed profiles including a floor plan for the municipal structures in the main defensive strongpoint. Ammunition expenditures within buildings assaulted were calculated using this floor plan and standard room clearing techniques set forth in FM 90-10, Military Operations on Urbanized Terrain. The floor plan is illustrated on the facing page.

- It is beyond the scope of this study to develop or modify room-clearing techniques. Analysts applied standard techniques using the building descriptions described above, subjectively determined ammunition expenditure for clearing one room, and multiplied by the number of rooms to be cleared in each defended building.

- Other modifications to accepted weapon firing rates were made to suit the envisioned weapon deployment and employment; e.g., specific targets were attacked by tank main gunfire, and machine-guns mounted on LVTs executed aimed fires for very limited amounts of time, thus providing a rate of fire much lower than that used at the maximum effective rate of fire.

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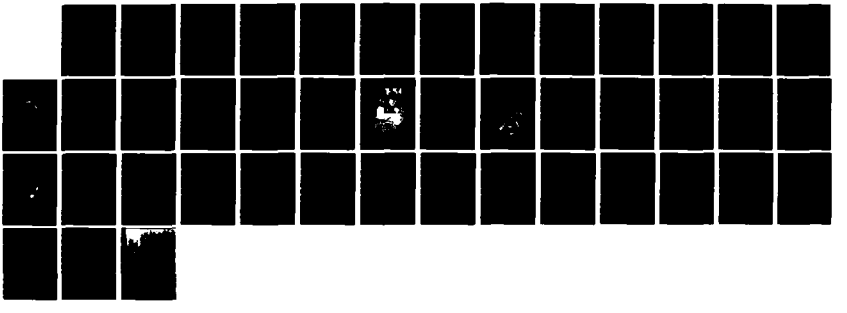
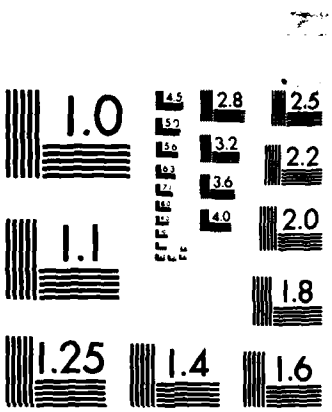




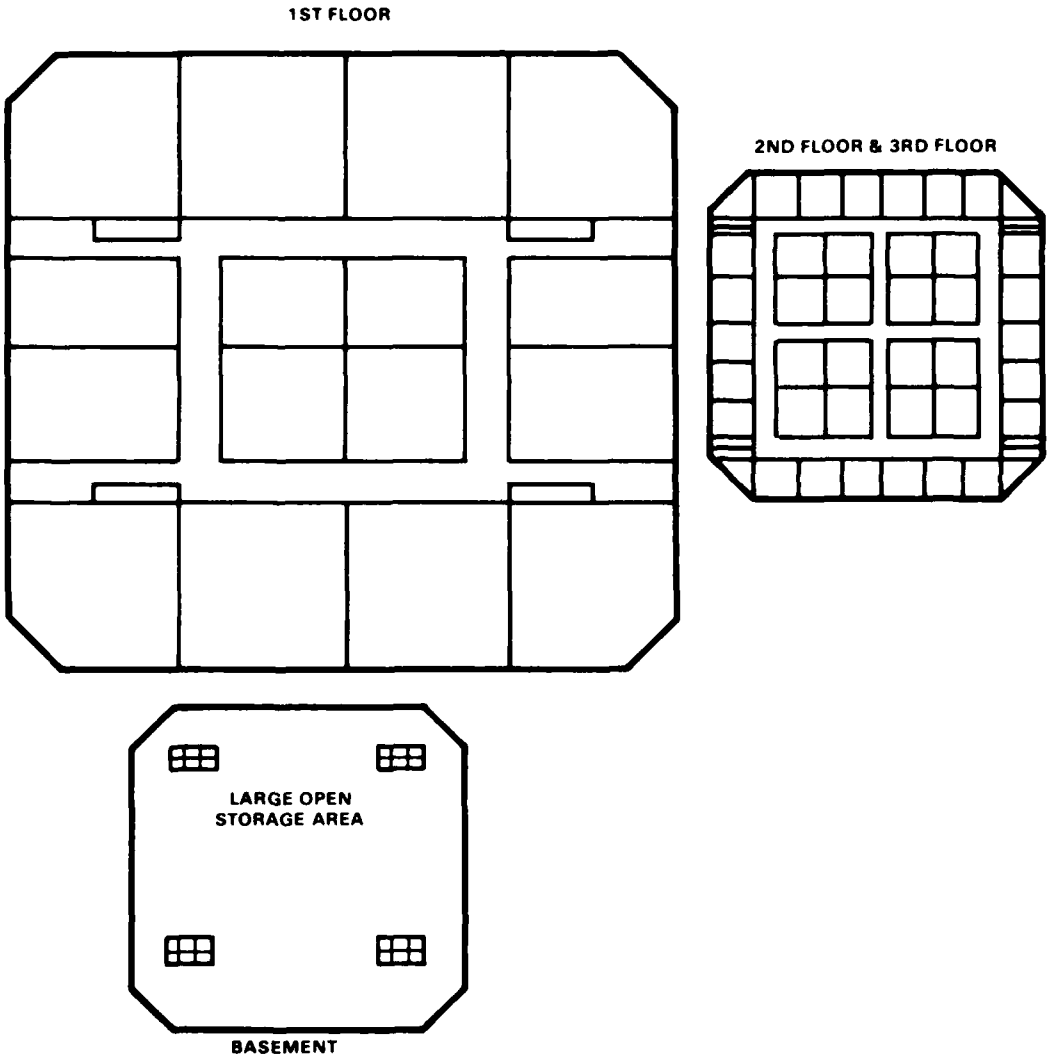


Figure B-15. Floor Plan for Typical Municipal Building in New City

Urban Doctrinal Scenario (Continued)

Findings (Engagements 1 and 2). A number of factors in the first two engagements imposed restrictions on the types and numbers of weapons that could be employed in the scenario:

- Since the buildings were described as concrete/steel (light cladding) construction and might have been occupied by civilians, a number of weapons were not employed or were used to a lesser degree than in more conventional operations.

- Weapons were used sparingly, in part to minimize destruction and the hazard to civilians and in part because the fires delivered were mainly aimed fires, which significantly lowered the rate of fire.

- The objective of maneuver and base-of-fire elements was not to defeat the threat in detail but to take only those measures required to permit continuation of the attack along the three axes of advance. By delivering aimed suppressive fires on known or suspected sniper positions and covering entrances/exits, analysts determined that the requirements to satisfy the objective were met. The result was an extremely low expenditure rate for a variety of ammunition types.

Analysts determined that the character of the preliminary engagements would be similar, because the Aggressor objective was to delay, disperse, harass, and cause casualties among the attacking forces. The dissimilarities between Aggressor obstacle emplacements in each engagement caused the only variance in ordnance expenditures.

- The obstacles in intersections on PL AMBER were mines, which were blown by engineer demolition charges.

- The obstacles in intersections on PL WAYS were overturned, booby-trapped vehicles, filled with rubble or dirt and anchored down. Battalion-level mortars were employed in a direct support role to help reduce the obstacles, cut anchoring cables, and denotate chemical mines or other booby-traps. To ensure reduction of each obstacle, tank main guns were employed after which blade tanks were used to push debris aside.

The facing table depicts ammunition expenditures and rates of fire used in these engagements.

TABLE B-7. CLASS V(W) EXPENDITURES URBAN DOCTRINAL SCENARIO ENGAGEMENTS 1 AND 2

[illegible]	[illegible]	RATIONALE
PREP FIRES		
[illegible]	36 MP RDS (PL AMBER) 16 MP RDS (PL WAYS)	USED TO CREATE SMOKE ON INTERSECTIONS ADJACENT TO SNIPER-OCCUPIED [illegible] INTERSECTIONS FOR DECEPTION, 4 RDS/INTERSECTION [illegible] TOTAL.
[illegible]	[illegible] RDS (PL WAYS)	USED TO SOFTEN PREPARED OBJECTIVES IN PATH OF AXIS OF ADVANCE [illegible] TARGETS; RDS FIRED FROM [illegible] TOTAL.
BASE OF FIRE		
[illegible]	[illegible] RDS (PLS AMBER & WAYS)	SUBJECTIVE EXPENDITURE BASED ON AGGRESSOR SNIPER TEAMS OF 4 RIFLEMEN [illegible] OF FOUR ROOMS EQUALS 4 TARGETS; 2 RIFLES ON EACH TARGET FIRING [illegible] ESTIMATED TIME FOR ENVELOPING TEAM TO MOVE ACROSS INTERSECTION, 5 MIN, [illegible] BUILDING/COMPANY AXIS OF ADVANCE.
[illegible]	[illegible] RDS (PLS AMBER & WAYS)	ONE WEAPON/SQUAD BASE OF FIRE; DURATION 5 MIN FIRING @ SUSTAINED RATE [illegible] FIRE.
[illegible] GRENADE [illegible]	[illegible] RDS (PLS AMBER & WAYS)	CS USED TO DEGRADE SNIPERS' ABILITY TO FIRE; 2 ROUNDS/SNIPER [illegible] EXCEPT CHURCH WHICH WILL NOT BE ENGAGED WITH THIS WEAPON.
[illegible]	NONE (0)	NO SUITABLE TARGET
DRAGON	NONE (0)	NO SUITABLE TARGET
[illegible]	[illegible] PLS AMBER & WAYS	SUBJECTIVE EXPENDITURE; 1/FIRE TEAM DROPPED AT RANDOM TO [illegible] OF BUILDINGS.
[illegible]	[illegible]	OUT OF RANGE
ASSAULT		
[illegible]	NONE (0)	
[illegible] RIFLE	[illegible] AMBER & WAYS	ANALYSTS ESTIMATED THE ONLY EXPENDITURE MIGHT BE TO OPEN [illegible] SUBJECTIVE EXPENDITURE OF 1 RD/EXIT x 4 EXITS x 4 BLDGS [illegible]
MG [illegible] FIRE	NONE (0)	
[illegible]	NONE (0)	
[illegible] GRENADE [illegible]	NONE (0)	
[illegible]	NONE	
[illegible]	NONE (0)	
[illegible] GRENADE	NONE (0)	
[illegible]	NONE (0)	
[illegible] [illegible] MAIN [illegible]	4 HE RDS (PL WAYS)	SUBJECTIVE EXPENDITURE, [illegible] TARGET [illegible]
[illegible]	NONE (0)	
TNT	16 1-LB BLOCKS	ENGINEERS DETONATED MINES; 4 MINES/INTERSECTION x [illegible]
[illegible] MINES	4	ENGINEERS WERE EMPLOYED TO BOOBYTRAP STORM [illegible] PL AMBER.

Urban Doctrinal Scenario (Continued)

Findings (Engagement 3). The deployment of Aggressor forces within the main defensive strongpoints, profiles and floor plans of defended buildings, and techniques used in assaulting heavily defended buildings were considered in deriving expenditures for this engagement. These factors are listed below, and the following table depicts expenditures calculated for this specific engagement in New City:

- The building profiles imposed a number of restrictions on weapons used for the base-of-fire element. The municipal structures had deeply recessed windows, which analysts determined would force small arms and machinegun fire to be carefully aimed thereby lowering the rate of fire. (It is recognized that the opposite might result, i.e., because of the restricted angle of sight, troops might spray a building face and walk the rounds toward the target window. In these cases, the usage rate might increase to a sustained level of expenditure.)

- Analysts decided that in this engagement civilians would have been evacuated or moved to basements. Fewer firing restrictions were imposed on supporting arms.

- Ammunition expenditures for building entry, individual room clearing, and staircase assaults were derived using techniques described in FM 90-10 and applying a subjective expenditure value to each individual action. The following techniques and expenditures were used in this analysis; they can be varied to accommodate other scenarios:

  - Building penetration:

    - Satchel charge to blow hole (in absence of stand-off breaching weapon).

    - Two grenades (HE) expended to suppress any return fires.

    - Burst (20 rds) automatic rifle fire to clear initial entry room.

  - Staircase Assault:

    - Burst (3 rds) automatic rifle fire to unlock/open door.

    - Fragmentation grenade expended to suppress return fires.

- ●●● Burst (20 rds) automatic rifle fire to clear base of staircase.

- ●●● One grenade to each succeeding stair level followed by (20 rd) automatic rifle burst upon reaching next level. (Concussion grenade--not in inventory--preferred to minimize danger to friendlies.)

- ●● Room Clearance:

  - ●●● Burst (3 rds) automatic rifle fire to unlock/open door.

  - ●●● Grenade (HE although concussion preferred) expended to suppress return fires.

  - ●●● Burst (20 rds) automatic rifle fire to clear room.

- Analysts determined that vertical movement inside the buildings will be complicated if concrete floors and ceilings are reinforced by rebar material. The conventional method of creating an entry hole is accomplished by blowing demolition charges. BDM analysts are of the opinion that the explosives will not likely cut the rebar which may force the attacker to use stairways or, if feasible, rapelling techniques on outside walls using windows for entry. Expenditure values for vertical movement have been expressed as options; the first value presented in expenditure tables will include staircase assaults, the second utilizes the charges and subsequent grenade/automatic rifle fires for vertical assaults.

  (Note: In attacking downward from the roof, explosive charges are more easily tamped for greater effect. In attacking upward from the ground floor, makeshift efforts such as supporting explosive charges against a ceiling using girders, poles, or other available material are not usually effective, and it is often necessary to use the stairs despite the danger.)

TABLE B-8. CLASS V(W) EXPENDITURES URBAN DOCTRINAL SCENARIO ENGAGEMENT 3

WEAPON	EXPENDITURES	RATIONALE
	PREP FIRES	
[illegible] 155 mm HOWITZER	[illegible] HE RDS/[illegible] FUSING	DIRECT FIRES DELIVERED ON OBJ. OAK; 3 RDS/FLOOR AIMED AT TWO EXTREMES AND ONE CENTERED [illegible] FIELD OF FIRE.
[illegible] mm MORTAR	[illegible] HE RDS	FIRES DELIVERED ON ROOFTOPS TO ELIMINATE AT AND AA FIRING POSITIONS; REQUIREMENT ESTIMATED FOR [illegible] SECTIONS PLUS 3 ROUNDS/SECTION TO REGISTER, 4 MORTARS TOTAL; ONE SECTION/BUILDING FIRES [illegible] VOLLEYS. 3 RDS/SECTION FOR REGISTRATION.
[illegible] mm MORTAR	14 WP RDS	FIRES DELIVERED ON STREET INTERSECTIONS ADJACENT TO OCCUPIED BUILDINGS TO SCREEN MOVEMENT [illegible] BASE OF FIRE OR ASSAULT POSITIONS; 2 SECTIONS 4 MORTARS TOTAL; 2 RDS/INTERSECTION, PLUS [illegible] ROUNDS/SECTION TO REGISTER.
	BASE OF FIRE	
[illegible]	NONE (0)	NOT WITHIN EFFECTIVE RANGE.
[illegible] RIFLE	[illegible],600 RDS	ONE PLATOON USED AS BASE OF FIRE ON EACH BUILDING; 72 WEAPONS TOTAL; RIFLES FIRE [illegible] MAX. EFFECTIVE RATE 20 RDS/MIN FOR 15 MIN, WHICH IS THE ESTIMATED TIME TAKEN TO POSITION ENVELOPING PLATOONS ON OCCUPIED BUILDING FLANKS.
[illegible] MG	[illegible],000 RDS	MACHINEGUN SQUADS EMPLOYED/FLOOR, TOTAL OF 6 WEAPONS/BUILDING FIRED @ SUSTAINING RATE OF [illegible] RDS/MIN FOR 15 MIN.
[illegible] GRENADE LAUNCHER	[illegible] HE RDS	SUBJECTIVE RATE FOR RANDOM FIRING AT OCCUPIED WINDOWS; RATE BASED ON DEXTERITY OF [illegible] ESTIMATED TO BE 2 RDS/MIN; 9 WEAPONS/PLATOON BASE OF FIRE, 2 PLATOONS FIRE FOR [illegible] RDS/MIN.
LAAW	[illegible] RDS	SUBJECTIVE RATE BASED ON ESTIMATED VEHICULAR EXPOSURES IN FIELDS OF FIRE; 1 TARGET INTERSECTION ADJACENT TO BUILDINGS; TOTAL OF 4 TARGETS ATTACKED BY 2 WEAPONS/TARGET.
DRAGON	4 RDS	SAME AS ABOVE, HOWEVER, 1 RD/TARGET USED.
M60A[illegible] 105 mm MAIN GUN	4 APDS RDS [illegible] HEP RDS	TOTAL OF 4 TANKS EMPLOYED IN BASE OF FIRE; ANALYSTS EXPOSED [illegible] VEHICULAR TARGET/INTERSECTION ADJACENT TO OCCUPIED BUILDINGS AND EXPENDED 1 RD/TARGET; TANKS ALSO EMPLOYED TO CREATE HOLES IN SIDES OF OCCUPIED BUILDING WITHIN FIELDS OF FIRES; ESTIMATED 1 RD/PENETRATION POINT ON BUILDING FLANK.
[illegible]	NONE (0)	ANALYSTS ELECTED TO USE M85 MG WITH BETTER PENETRATION CAPABILITIES.
[illegible] MG M60A[illegible]	[illegible],400 RDS	USED TO DELIVER SUPPRESSIVE FIRES ON BUILDING CORNERS AND UPPER FLOORS OF [illegible] FLANK [illegible] IN SUPPORT OF MANEUVER ELEMENTS; 4 WEAPONS FIRING @ AIMED SUSTAINED RATE OF FIRE OF 40 RDS/MIN [illegible] 15 MIN.
[illegible]	NONE (0)	VEHICLE WOULD HAVE TO UNMASK TO TRACK WEAPON AND COULD BE ENGAGED WITH COUNTERFIRE [illegible] SPAN OF TIME. TOW IS AVAILABLE, HOWEVER, IF AGGRESSOR TANK THREAT DEVELOPS.
[illegible] MG (LVTP-7)	7,[illegible] RDS	WEAPON EMPLOYED TO DELIVER SUPPLEMENTARY FIRES ON ALL THREE FLOORS OF OCCUPIED BUILDING FROM WITHIN FIELDS OF FIRE, UPPER FLOORS OF BUILDING FLANKS WITHOUT HAZARDING MANEUVER ELEMENTS, AND ADJACENT STRUCTURES TO SUPPRESS FIRES FROM ENEMY SUPPLEMENTAL POSITIONS. TOTAL OF 12 VEHICLES EMPLOYED WITH WEAPONS FIRING @ AN AIMED SUSTAINED RATE OF 40 RDS/MIN FOR 15 MIN.

TABLE B-8. CLASS V(W) EXPENDITURES URBAN DOCTRINAL SCENARIO ENGAGEMENT 3 (CONTINUED)

WEAPON	EXPENDITURES	RATIONALE
	ASSAULTS	
[illegible]	NONE [illegible]	NOT EMPLOYED.
[illegible]	4,[illegible] RD	SUBJECTIVE VALUES USED; ESTIMATED INDIVIDUAL ROOM EXPENDITURES [illegible] TO CALCULATE NUMBER OF ROOMS; 92 ROOMS x 23 RDS/ROOM WITH [illegible]
[illegible]	180 FRAG/M67 FUSING	GRENADES EXPENDED AT A RATE OF 1/ROOM AND 1/BASEMENT x 2 BLDG.
[illegible]	[illegible] RDS	*SUBJECTIVE RATE FOR STAIRCASE ASSAULTS:* EXPENDITURES FOR 3 STAIRCASE [illegible] CLEARING TEAMS OF 4 MEMBERS TOTAL; 3 WEAPONS @ 20 RDS/WEAPON, 1 WEAPON FIRE [illegible] DOOR.
[illegible] GRENADES	24 FRAG/M67 FUSING	SUBJECTIVE RATE FOR STAIRCASE ASSAULTS: 3 GRENADES/STAIRCASE x 4 STAIRCASE [illegible] BUILDINGS.
[illegible] CHARGES	24	SUBJECTIVE EXPENDITURE; 3 VERTICAL ENTRY POINTS/CORRIDOR x 2 CORRIDORS x 2 FLOOR [illegible] BUILDINGS.
[illegible]	480 RDS	FROM EACH PLATOON'S CORRIDOR; 1 CLEARING TEAM EMPLOYED/VERTICAL ENTRY POINT; 4 [illegible] BUT ONLY 12 RIFLES USED FIRING 10 RDS/RIFLE (x 2 PLATOONS).
[illegible] GRENADES	4 FRAG/M67 FUSING	ONE GRENADE EXPENDED/PARTIAL ENTRY POINT x 24 ENTRY POINTS.
[illegible] CHARGE	4	SUBJECTIVE EXPENDITURE; CHARGES USED TO CREATE 4 EXTERIOR ENTRY POINTS/BUILDING.
	CLEARING ELEMENT	
[illegible]	[illegible] HE/CP RDS	FIRES ON SUPPLEMENTARY POSITIONS LOCATED IN BUILDING ON FLANK OF ASSAULT; 1 ROUND/FLOOR x FLOORS. FIRES DELIVERED FROM LEAD TANK.
[illegible]	150 RDS	SAME AS ABOVE TO SUPPLEMENT MAIN GUN ROUNDS; SUBJECTIVE RATE OF [illegible]
[illegible]	12 APDS RDS	EACH THREAT VEHICLE EXPOSED ONCE; 4 TANKS POSITIONED PERPENDICULAR TO AXES OF ADVANCE; EACH FIRES 3 ROUNDS, ONE TANK FIRES 4.
[illegible]	[illegible] BLOCKS	ANALYSTS ESTIMATED 4 MINES/INTERSECTION WITH OBSTACLE [illegible] MINES x [illegible] INTERSECTIONS x 1 BLOCK/MINE.

[illegible] DOOR OPTION USED FOR VERTICAL MOVEMENT WITHIN EACH BUILDING WHERE TO USE THE STAIRCASES, EXPENDITURES REFLECT THOSE EXPENDED PER 4 STAIRCASE/BUILDING.

[illegible] OPTION USED FOR VERTICAL MOVEMENT WITHIN EACH BUILDING WAS TO CREATE ENTRY POINTS BETWEEN FLOORS BY USING SATCHEL CHARGE [illegible] HOLES IN CEILING; A NUMBER OF RIFLE AND GRENADE ROUNDS WERE THEN EXPENDED.

Urban Doctrinal Scenario (Continued)

Based on analyses performed for each engagement described for this scenario, analysts concluded that a number of weapons would either not be employed or would not be employed to the same degree as in a more conventional environment. The following weapons fall into this category:

- M40A1 Sniper Rifle
- M60E2 Machinegun
- M220A1 TOW

The following weapons were identified as moderate- to heavy-use items required to accomplish the assigned objectives of the scenario:

- M16A1 Rifle
- M60 Machinegun
- M203 Grenade Launcher
- M114A2 155 mm Howitzer
- M60A1 Tank, 105mm Main Gun
- M85 Machinegun
- M47 Dragon
- M33 Hand Grenades
- M19 60 mm Mortar
- M29 81 mm Mortar
- Satchel Charges

Analysts further identified a requirement for two weapons that are not currently in the inventory. Each of these weapons would facilitate operations in this scenario and in any other urban environment.

INVERTED SHAPED-CHARGED LAUNCHER

- Methods currently used to create holes in ceilings for vertical movement within a building include (excessive) automatic weapons fire or use of demolitions propped up against the ceiling by ad hoc means such as girders, beams, or other available material. These methods are not satisfactory.

- While a number of ceiling types can be penetrated easily, rebar material used for reinforcement of concrete ceilings may not be cut quickly or satisfactorily by conventional demolitions.

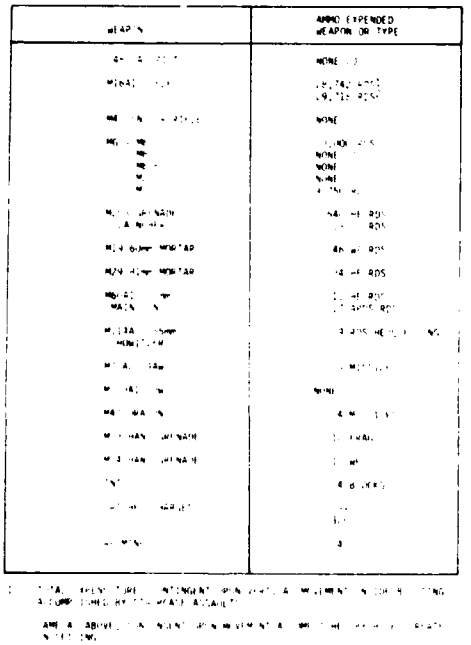
- A man-portable, suitcase-sized system utilizing shaped-charge demolitions to create penetration points would facilitate this type of movement.

- Charges would have to be designed to penetrate ceiling material and blow or cut through reinforcing material.

CONCUSSION GRENADES

- Fragmentation and CS grenades are the only grenades currently available.
- In buildings that have thin walls, fragmentation grenades are as dangerous to the user as to his potential target.
- In urban combat civilians will likely be encountered, and it is preferable to search and clear buildings without unnecessarily hazarding or injuring them.
- Use of current grenade stocks or demoliton blocks is not a satisfactory means for gaining reasonably safe entry to a room in a civilian-populated area.
- Concussion grenades, which are not now in the inventory, are highly useful weapon in urban combat; they offer the dual advantages of aiding safe entry without killing or seriously injuring the occupants of a room, and they do not constitute a hazard to the user.
- The procurement of concussion grenades and their designation as a PWRM stockage item for urban combat situations is strongly recommended.

TABLE B-9. TOTAL CLASS V(W) EXPENDITURES-URBAN DOCTRINAL SCENARIO



Mini-Scenarios

SUBURBAN IRREGULAR (SI) SCENARIO

THIS MINI-SCENARIO WAS USED TO ILLUSTRATE ONE METHOD OF DETERMINING CLASS V (W) EXPENDITURES IN A SUBURBAN ENVIRONMENT WITH FRIENDLY FORCES ASSAULTING SMALL THREAT POCKETS OF RESISTANCE IN MULTI-FAMILY DWELLINGS.

Scenario Location. In analyzing areas where a variety of engagement types could occur, it was determined that a number of combat actions would take place outside of the more densely populated urban centers. This scenario occurs northwest of the New City urban center. The populated areas within the metropolitan boundary of SYN City are an outgrowth of either the New City or the Old City. The actions described in this scenario could occur at any suburban location on the map product.

A variety of single and multi-family dwellings and commercial buildings were examined. Analysts concluded that, of the building types considered, an apartment building represented the worst case for an attacking force. A greater variety and number of weapons would have to be employed to seize such a structure.

Analysts used a combination of parameters described in FM 90-10 and OH 8-7 to a building profile for use in this scenario. The characteristics of the apartment building are listed below.

- Wall and slab concrete construction
- Average wall thickness 22-38cm
- Heights range from 1-10 stories (6 stories used)
- Solid end walls
- Slab walls and floors
- Cellular room units
- Separated from other structures by large open areas

Open spaces near suburban areas northwest of New City can and will be used as HLZs for vertical envelopment to seize occupied apartment buildings. Most suburban sections in SYN City are near to, and encompass, suitable areas for use as HLZs. The graphic on the facing page illustrates the type of building construction and area used in this scenario.

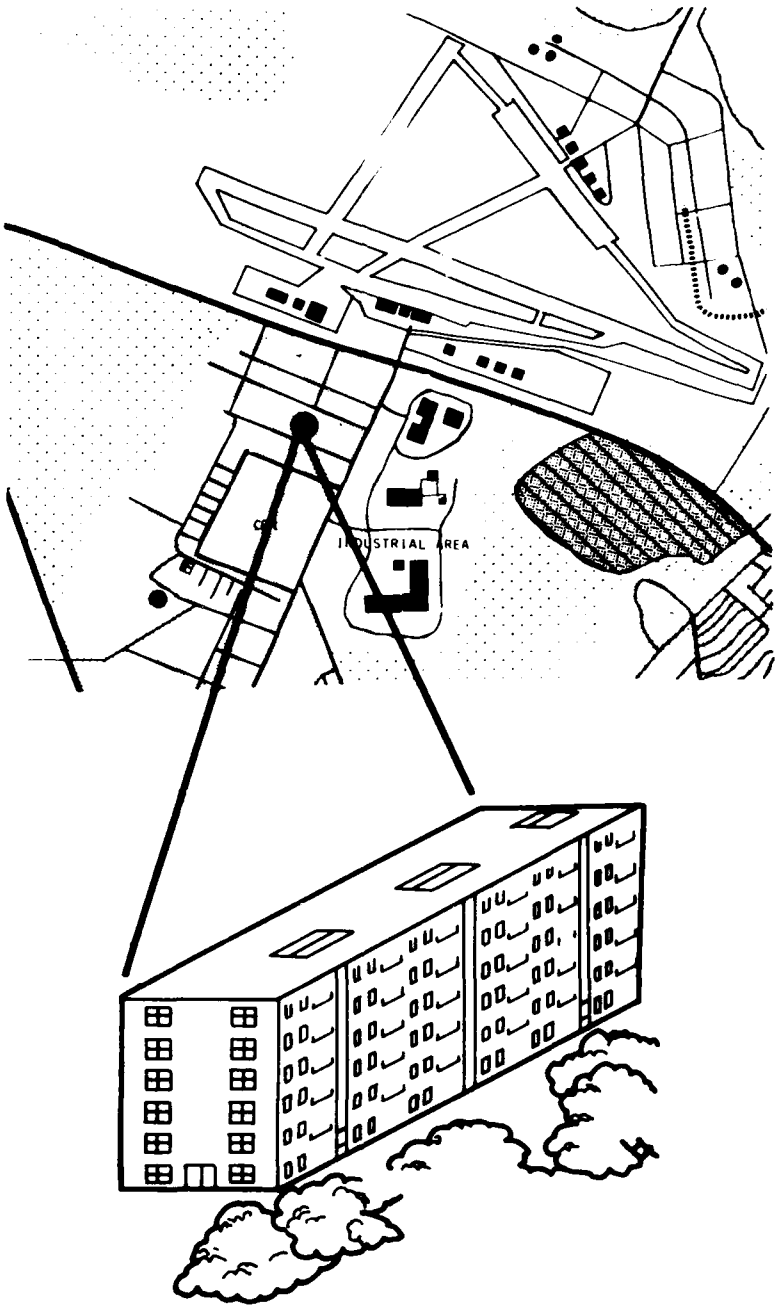


Figure B-16. Representative Building Type (SI Scenario)

Suburban Irregular Scenario (Continued)

Enemy Positions. For the sake of realism, analysts concluded that the Aggressor MRB (Rein) would not be able to establish a deliberate defense in suburban areas because their limited assets and the requirement to defend key installations. Logically, surviving defenders would be forced into suburban areas after having been ejected from positions at key installations. Analysts estimated that defenders forced into suburban areas would be fragmented elements separated from larger parent units. It was estimated that pockets of resistance would range from small fireteams to platoon-sized forces.

For this scenario, several Aggressors were considered to be located in an apartment building to conduct sniper actions. The Aggressors were armed with automatic rifles and positioned on the top and middle floors of the building.

Friendly Scheme of Maneuver. Mopping-up operations occur during the consolidation phase. Patrols reconnoiter and engage elements of resistance outside of unit TAORs. In this scenario, a rifle company moving along a street is taken under fire by an undetermined number of enemy in the apartment building.

The actions taken by the company described in this scenario are similar to those taken in the Urban Irregular (UI) Scenario and are described below:

- Company is taken under fire from snipers and automatic weapons and divides into teams tasked with specific responsibilities.
- One platoon deploys into an opposing structure to act as a base-of-fire. Two squads of that platoon deliver covering fires for maneuver elements and the third squad provides security for the friendly occupied building.
- A second platoon deploys to a position benind the friendly occupied opposing building from which it rushes the sniper-held apartment building. Each squad seizes entrances and exits to the building and assists in the evacuation of civilians escaping from individual apartments. Fireteams were then employed to clear basement storage areas and the first floor of the apartment building.
- The third platoon deployed to a nearby HLZ, embarked aboard helicopters, and was transported to the roof of the threat-held building. Analysts used a vertical envelopment tactic in this scenario to conduct a "top down" assault with 3 squads isolating and clearing the building.

- Vertical movement between floors (top-down) was accomplished by using stairwells because of the lack of capability for cutting through steel-reinforced concrete slab floors/ceilings.

The following graphic illustrates actions upon contact and subsequent maneuvers to seize the building objective and eliminate the isolated pocket of resistance.

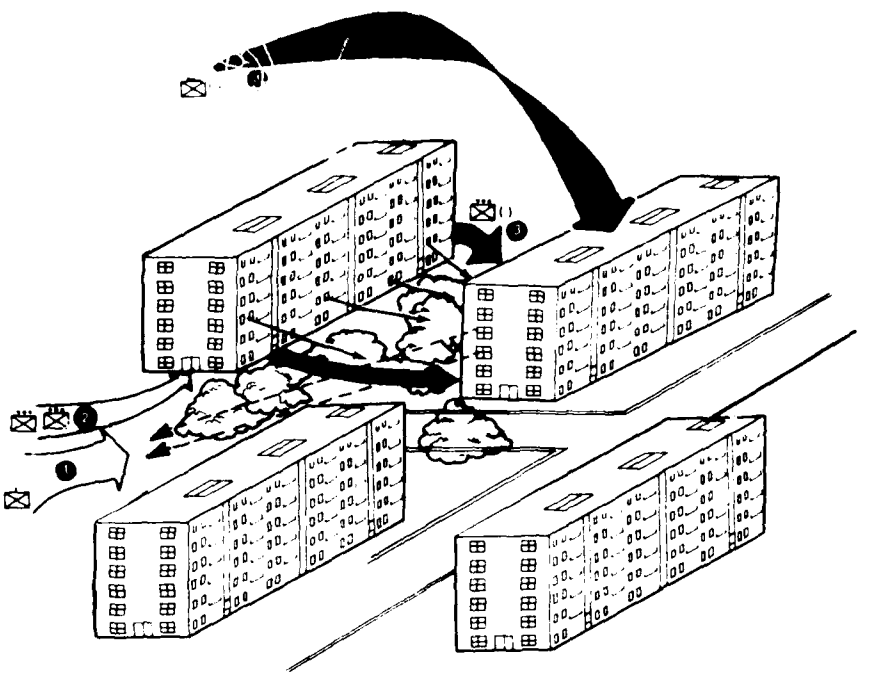


Figure B-17. Scheme of Maneuver (Friendly) - SI Scenario

Suburban Irregular Scenario (Continued)

Parameters for Scenario. Several decisions were made with regard to the organization of the company patrol element and the use of supporting arms in this scenario. Each decision will have an impact on ammunition expenditures. The decisions are listed below.

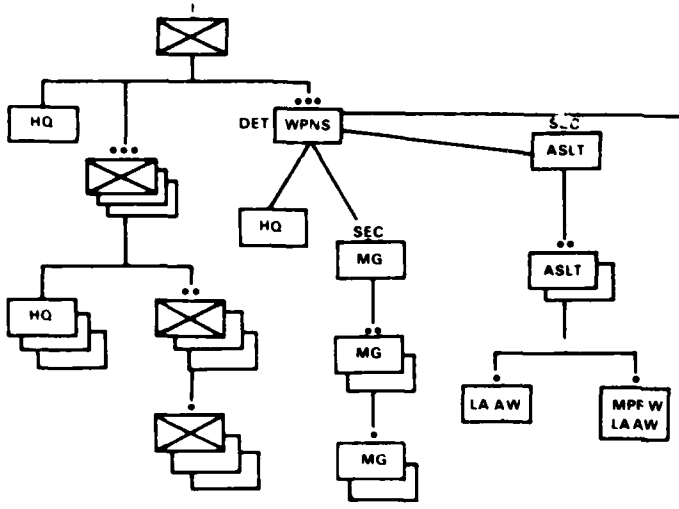
- A basic infantry rifle company was used. The rifle company's organic mortars were used mainly to smoke key intersections because they do not have a significant building-penetration capability and were of little use in this scenario.

- Artillery and battalion-level mortars were not employed in the engagement for two reasons. Analysts determined that the threat did not warrant larger caliber supporting arms and that excessive use of these weapons would consume ammunition needed for supporting continued operations northwest of the city. Unnecessary direct and collateral damage was another consideration; if minimal damage to the building occurred then it would reduce the number of displaced persons with which to contend.

- Subjective decisions were made as to the length of time required for the completion of a number of events and for the duration of supporting fires. The same helicopter availability estimates used in the Urban Irregular (UI) Scenario were applied to this scenario; it was estimated that 3 utility helicopters could touchdown in designated HLZ within 15 minutes. Analysts determined that it would take a longer period of time for the evacuations to occur, 15 minutes, and that the base of fire would require at least 15 minutes to move into position at the entrances of the opposing building.

- Profiles of single or multi-family dwellings were not provided for in the data base and on the map product. To calculate ammunition expenditures within the building, analysts created a floor plan; expenditures were subjectively based on actions envisioned within each room and multiplied by the total number of rooms in the floor plan.

The graphics on the facing page illustrate the task organization of the company patrol element used and the building floor plan from which a number of ammunition expenditures were calculated.



TOTALS	STRENGTH	45 CAL	M 16	M 203	M 60	M 202	M 19	LAAW
COMPANY HQ	2-4	4	2					
RIFLE PLTs (3)	3-129	12	117	27				
WPNS PLT DET	0-41	12	24		4	2	2	6
TOTAL	*5-174*	*28*	*143*	*27*	*4*	*2*	*2*	*6*

Figure B-18. Friendly Task Organization - SI Scenario

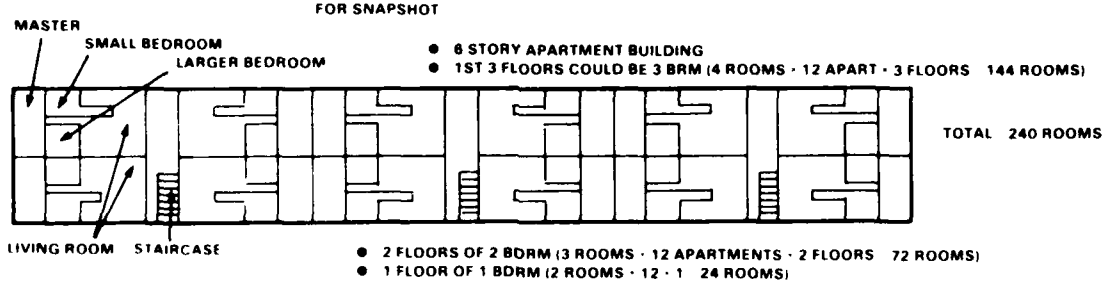


Figure B-19. Floor Plan of Typical Suburban Apartment Building

Suburban Irregular Scenario (Continued)

Findings. Based on the envisoned seizure of the apartment building and subjective decisions regarding weapons employment, the following conclusions were drawn.

- As stated in the parameters section, analysts determined that larger caliber weapon employment would be an excessive use of force in this scenario therefore the were no expenditures calculated for those supporting arms. (It is recognized that other nearby targets might be fired on and that street and building configurations could militate in favor of using artillery fires to seal off the area.)

- Although the 60mm M19 Mortar is not optimized for employment in such circumstances as an apartment building assault, analysts determined that a firing section would be useful in delivering smoke obscurant fires on adjacent intersections. Smoke would be required at street intersections to screen the movement of rush teams. The distance between the friendly and enemy-occupied buildings may impose a requirement for a greater volume of smoke that can be achieved by WP grenades.

- Antiarmor weapons organic to an infantry company were not employed in this scenario. Weapons like the LAAW cannot be used within individual apartments. The only feasible use for these weapons, in the absence of an armored threat outside the apartment building, would be to employ them from a standoff distance aimed at windows or balconies from which hostile fires originated. It was concluded that there weapons could not be optimally utilized in this manner, and that other weapons in the table of equipment of an infantry company are better suited for such a purpose.

The following weapons were found useful in this scenario:

- M16A1 Rifles
- M60 Machineguns
- M33 Fragmentation Grenades
- M34 WP Grenades
- Demolitions

Weapons in the table of equipment of an infantry rifle company but not employed or not used to the degree that they would be used in a more conventional environment include:

- .45 cal Pistol
- M203 Grenade Launcher
- M19 60mm Mortar
- M72A2 LAAW

Concussion grenades and ceiling/floor penetrator charges would have been useful items although they are not in the current inventory.

TABLE B-10. CLASS V(W) EXPENDITURES-SUBURBAN IRREGULAR SCENARIO

WEAPONS	AMMO EXPENDED/ WEAPON OR TYPE	REMARKS
Pistol	None (0)	
M16A1 Rifle	3600 rds	Two squads of one platoon were employed to establish fires for base-of-fire; fires were aimed at windows on opposing building in two floors where enemy fires were observed; all windows were targeted because enemy fires came from multiple positions; fires delivered were aimed fire of 10 rds/min for 15 minutes.
	1191 rds	Rush team open entrance/exit doors by fire; only 6 weapons employed x 3 rds/weapon. Basement cleared by 3 clearing teams from rush element; 3 basement areas: doors opened with 3 rds, each basement sprayed with 20 rds; 3 FT clear 1st floor apartments, 48 rooms x 23 rds/room from 12 weapons.
	4749 rds	Individual expenditures performed using floor plan for 5 floors; 132 rds/wpn averaged.
M60 MG	4500 rds	Employed 3 wpn/opposing floor x 2 floors; aimed firing rate of 50 rds/min x 15 min.
M203 Grenade Launcher	None (0)	
M19 60mm Mortar	12 WP rds	Employed 3 rds/intersection x 2 intersections; allowed 3 rds/intersection for registration.
M33 Hand Grenade	None (0)	Excessive force; hazard to friendlies.
M34 Hand Grenade	6 WP	3rd squad of base of fire platoon expends 2/fire team.

Mini-Scenarios

URBAN IRREGULAR (UI) SCENARIO

THIS MINI-SCENARIO WAS USED TO ILLUSTRATE ONE METHOD OF DETERMINING CLASS V (W) EXPENDITURES IN AN URBAN ENVIRONMENT WITH FRIENDLY FORCES ASSAULTING THREAT SNIPER-HELD POSITIONS.

Scenario Location. Of the two major built-up sections within the metropolitan boundary of SYN City, analysts chose to conduct this scenario in the Old City because of the nature of the threat forces occupying Old City and their envisioned tactical deployment. In each of the missions set forth in preceding chapters, the threat to the Landing Force on the peninsula was limited to a ceremonial guard detachment stationed at a garrison overlooking the entrance to the harbor. The data base indicated that the garrison was manned by a 100-man guard detachment supported by 250 civilian workers. Analysts concluded that the defensive force would not likely be capable of establishing a doctrinal defense but could conduct urban guerrilla sniper operations against friendly forces. It should be noted that similar operations can and would be conducted in New City as well.

During the course of conducting specific actions in this scenario, analysts found that similarities exist in methods used to assault buildings occupied by snipers. Based on that conclusion, a representative snapshot or engagement will be presented in this scenario to serve as the model by which all actions under similar circumstances could occur. The scenario depicts actions occuring during the assault and consolidation of Old City.

The scenario was conducted in a commercial sector of Old City using the same type of building profile and floor plan used in the UD scenario-municipal building structure of brick frameless construction with three floors and basement. The street pattern in the area is rectangular as indicated on the SYN City Map and the street widths are very narrow, ranging from 2.5m to 3m per lane. Adjacent and opposing structures were estimated to be closely spaced with alleyways separating buildings. Friendly units will be patrolling areas near open spaces that could and will be used as HLZs. The representative building to be assaulted was assumed to be occupied by some civilians, and an effort was made to evacuate civilians although that is not mandatory. The graphic on the facing page illustrates the type of construction and street pattern used in this scenario and is considered to be a typical profile of areas in any older urban population center.

Figure B-20. Typical Building Type - Urban Irregular Scenario

Urban Irregular Scenario (Continued)

Enemy Positions. As stated in the preceding section, defenders on the peninsula consisted of a 100-man ceremonial garrison. Analysts concluded that garrison forces would be most effectively employed as snipers and partisan-support organizers. Prior to and during the assault landings, the garrison force could be organized as follows:

4 5-man Partisan Support Organization Teams
1 5-man Control Element
1 5-man Coast Watcher Team
23 3-man Sniper Teams

It was estimated that a majority of the sniper teams and partisan organizers would survive the assault landings and harass friendly units operating on the peninsula. Casualties to garrison personnel could be replaced from among the 250-man civilian support force. Sniper teams would tend to operate covertly, surface for random attacks on units and/or installations, and withdraw or blend into the anonymity offered by the civilian populace. One sniper action in a representative area was chosen to illustrate this type of urban combat action. It was assumed that all other guerrilla/sniper actions in heavily urbanized areas will be similar in nature. The sniper team occupies positions in two of the three floors in one building in this scenario with one team member guarding an exit.

Friendly Scheme of Maneuver. During the consolidation of the peninsula, company and/or platoon-sized MAF elements were deployed as patrols to reconnoiter the perimeter of temporary defensive installations on the peninsula. A company-sized patrol was used for this scenario. Since there are open areas within the Old City that can be used as HLZs, the decision was made to attempt a vertical envelopment using troops landed on the building rooftop to conduct clearing operations. If analysts had not elected to conduct a vertical envelopment, then the outcome would reflect expenditures similar to one engagement in the Urban Doctrinal (UD) scenario. The vertical envelopment provided a different look at tactics and expenditures. This type of envelopment was found to be feasible because analysts concluded that these defenders had not had the time or resources to prepare elaborate defenses or antihelicopter obstacles on rooftops within Old City. The tactics used for the engagement were patterned after a combination of ground assaults and vertical assaults described in FM 90-10, Military Operations on Urbanized Terrain (MOUT).

The actions taken during the assault on the enemy sniper-held building are listed below:

- The scenario began with the point of a company patrol being taken under small-arms fire from a municipal building.

- A platoon moved quickly into an opposing building to establish a base-of-fire from the upper floors. Two squads acted as the base-of-fire while the third guarded entrances and exits on the ground floor and threw smoke grenades on adjacent intersections to screen the movement of the rush platoon.

- A second platoon from the main body deployed to the rear of the now friendly-occupied opposing building. After Aggressor fires had been suppressed, and under cover of smoke, this platoon rushed the Aggressor-occupied building and seized the ground floor entrances and exits. Each entrance and/or exit was seized by two fire teams with the main entrance covered by three fire teams. After the entrance seizure had been completed, two fire teams were employed to clear the ground floor of the building.

- Two squads of the third platoon were held in reserve but were also employed to assist bystanders attempting to evade fires from both sides and escort them out of harm's way; no more than one squad performed this function at any time.

- The third squad of the third platoon deployed to a nearby HLZ where it was transported to the rooftop of the sniper-held building. This squad was used to clear the building "top-down" and linkup with forces on the ground floor.

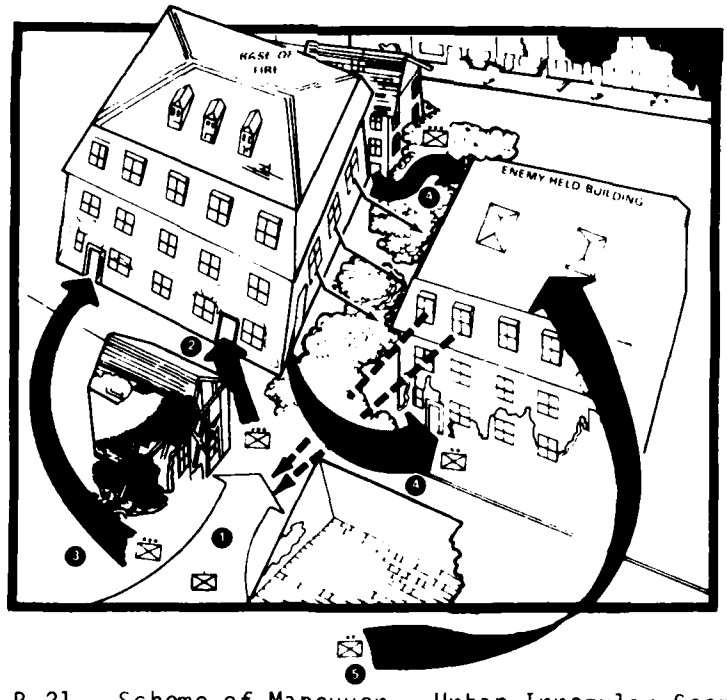


Figure B-21. Scheme of Maneuver - Urban Irregular Scenario

Urban Irregular Scenario (Continued)

Parameters for Scenario. A number of decisions made in the conduct of this scenario had an impact on ammunition expenditures. These decisions are listed below.

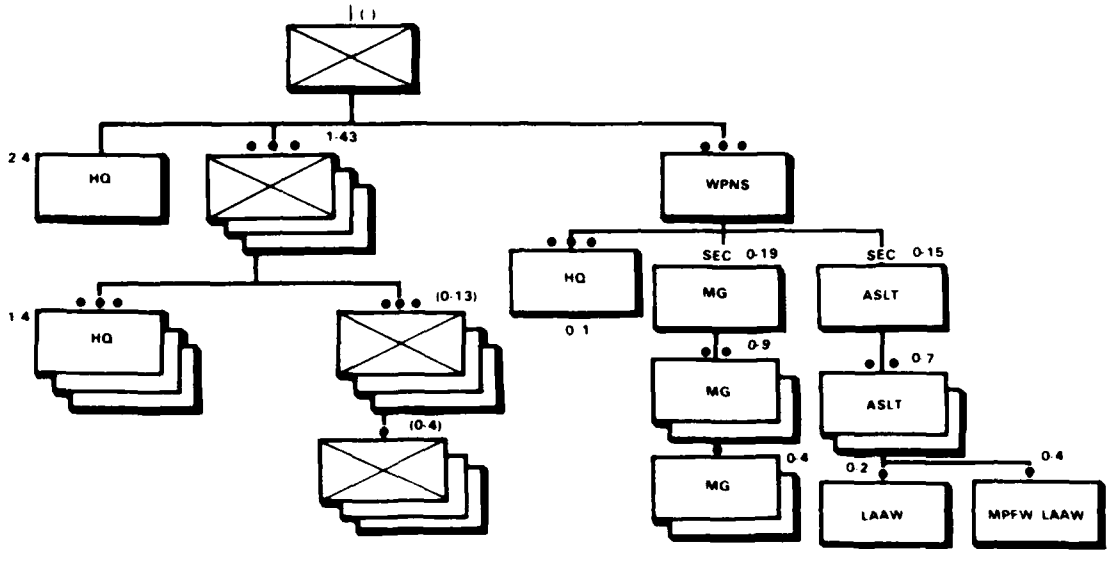
- Analysts developed a task-organized company patrol element and assigned weapons to that element for determining likely ammunition expenditure rates. The organization and equipment are illustrated on the facing page.

- The scenario could occur at any time during assault operations, however, analysts subjectively chose to conduct the assault during the consolidation phase, D+4 to D+6. Several helicopter squadrons were ashore operating out of the FBHL. Analysts estimated that helicopters at each of the airfields would be maintained at a high state of readiness. In this scenario, it was estimated that it would take 5 minutes of flight line preparation and a maximum of a 10-minute flight from either airfield to the designated HLZ to support an urban assault operation.

- Initial maneuvers were accomplished during the 15 minutes required to provide helicopter support. The assault force, base-of-fire, and enveloping elements were placed in position to launch the assault on the occupied building. Civilians inside the building were given five minutes to evacuate or move to the basement. At the end of the 5-minute time period, the base-of-fire delivered ordnance on known or suspected sniper positions and provided cover for rush-team movements. Analysts estimated that it would take a maximum of 10 minutes for the rush teams to move to and seize their objectives; base-of-fire expenditures were calculated for this 10-minute period.

- At the end of the 15-minute period of operations, a helicopter arrived in the designated HLZ, and the vertical-envelopment squad was transported to the rooftop of the enemy-occupied building to conduct the "top-down" assault.

- Analysts estimated that once the company team began to maneuver on the building, the snipers would attempt to break out of the building or join the civilians in the basement seeking refuge. This altered individual room-clearing expenditures.



TOTALS	STRENGTH	45 CAL	M-16	M-203	M-60	M 202	LAAW
COMPANY HQ	2-4	4	2				
RIFLE PLATOONS (3)	3-129	12	117	27			
WEAPONS PLT (DET)	0-35	8	20		4	2	6
	5-168	24	139	27	4	2	6

FRIENDLY COMPANY ORGANIZATION

Figure B-22. Friendly Task Organization - Urban Irregular Scenario

Urban Irregular Scenario (Continued)

Findings. Based on analyses performed for the conduct of this scenario, a number of conclusions were drawn. The table on the facing page illustrates total ammunition expenditures found in this action.

- Supporting arms in this scenario were not employed because of the building and street pattern. Artillery and mortar fires could not be observed or accurately registered because, typically, each building was very close to adjacent and opposing structures; the risk of unnecessary collateral damage would be high and rubble would provide a degree of protection for the snipers and any other partisans in the area. Each of the opposing and adjacent structures and the street pattern would tend to distort or limit line-of-sight for observation of fires. These line-of-sight limitations would have an adverse impact on the accuracy and effectiveness of supporting arms.

- Anti armor weapons, normally within the TO&E of a rifle company or attached, were not employed in this scenario. Analysts determined that the LAAW and Dragon weapons were poorly suited for internal building assaults.

- Hand grenades were used sparingly in this scenario. It was estimated that the sniper team would likely curtail fires on the company patrol once the patrol was able to position assault elements within the building, and they might seek refuge among other occupants of the building. Nevertheless, each room was cleared in a doctrinally acceptable manner, although analysts did not include the expenditure of grenades in each room because they were of the opinion that this was an excessive expenditure. Complete destruction of the room or furnishings was not required to accomplish the mission against a small-sized enemy sniper threat.

- The squad urban assault kit described in the introduction to the scenarios was devised to facilitate operations in this scenario. Analysts concluded that the use of pole-mounted mirrors and an amplified stethoscope would aid a clearing team in locating Aggressors without searching each room by fire. In addition to reducing the ammunition expenditures required for individual room clearance, the level of direct and collateral damage to the building would be minimized, which would lower the burden on reconstruction efforts if required and permit civilians to use the building for its intended purpose. This would tend to ease a number of potential civil affairs problems.

TABLE B-11. TOTAL CLASS V(W) EXPENDITURES URBAN IRREGULAR SCENARIO

WEAPON	AMMO EXPENDED/ WEAPON OR TYPE	REMARKS
.45 Cal Pistol	None (0)	Effective weapon although not assigned to clearing team members.
M16A1 Rifle	4800 rds	Analysts placed 1 sniper on 2nd and 3rd floors of building; one base-of-fire squad employed to deliver fires on each floor; 24 wpns fire @ 20 rds/min (max effective rate) for 10 minutes.
	92 rds	Rush teams deployed with 2 FTs/entrance, 4 entrances, one entrance covered by 3 FTs entrances are cleared employing only 2 rifles/entrance, 23 rds expended, 4 rifles expended 3 rds/rifle, 4 rifles x 20 rds/rifle.
	368 rds	Two fire teams of rush platoon, from same end of building clear 1st floor; 16 rooms x 23 rds/room.
	1948 rds	Total of 2 FTs clear 48 rooms with 1104 rds; 1 FT clears 28 rooms with 644 rds; 8 staircase landings cleared with 160 rds; 2 skylights cleared with 40 rds.
MG-M60	4000 rds	Base-of-fire MG Det fires from 2 floors w/2 positions per floor @ sustained rate of 100 rds/min x 10 minutes.
M203 Grenade Launcher	None (0)	Potential inability to place round into window of opposing building; threat posture did not necessitate this level of force.
M72A2 LAAW	None (0)	Not suitable for building assaults.
M33 Hand Grenade	2 (FRAG)	Expended by one clearing team; 1 grenade/skylight to open and clear of boobytraps.
M34 Hand Grenade	6 WP	The 3rd sqd from base-of-fire platoon expended 2 grenades per fire team for smoke screen.

Mini-Scenarios

DEFENSIVE IRREGULAR (DI) SCENARIO

THIS MINI-SCENARIO IS INTENDED TO ILLUSTRATE THE DEFENSE OF A LOGISTIC SUPPORT ACTIVITY OR KEY LOGISTIC SYSTEMS AGAINST INSURGENT ATTACKS BY IRREGULAR FORCES. INFORMATION CONTAINED WITHIN THIS SNAPSHOT WILL BE USED IN CHAPTER VII TO ANALYZE CLASS V (W) EXPENDITURES.

Scenario Location. Logistic installations and facilities established within the metropolitan boundary of SYN City will be likely targets for insurgent or sabotage actions by hostile forces. The dispersal of Landing Force supplies to several stockage areas decreases the risk of catastrophic loss but increases the likelihood that these areas, or key facilities within the areas, will be subject to irregular attacks throughout the course of the assault phase. Defensive forces, tasked with providing security for these areas, must be prepared for these attacks as soon as development of the logistic area commences.

The actions postulated for this scenario may occur at any or all of the BSAs, CSSAs, HLZs, ASPs, or airfield complexes within the metropolitan boundary. These locations are shown on the facing graphic. Although the logistic areas are located in functional areas of the city with different structural and population density parameters, the defense of these areas during the assault phase will have many commonalities. Relevant considerations for each of these areas are summarized below.

- Airfields 1 and 2 - Located in open areas and include support and adminstrative buildings. Defense forces located on facility perimeter.

- Ammunition Storage Points (ASPs) - Located in open or lightly wooded areas using available cover. ASPs are found within each of the BSAs and CSSAs (Class V (W)) and near each of the airfields (Class V (A)). Some Class V(W) will be stored adjacent to roads in open roads in open areas or areas from which the residents have seen evacuated.

- Beach Support Areas (BSAs) - Located in suburban and lightly wooded areas on the mainland immediately west of the beach landing areas. BSAs will not be operational as such subsequent to Period III (D+1 to D+3), although selected logistic systems (ELCAS, AAFS) will still be used to augment facilities contained within CSSAs.

- Combat Service Support Areas (CSSAs) - Elements within CSSAs are expected to be operational beginning in Period IV (D+4 to D+6). Supplies are drawn down in the BSAs while the CSSAs (1 and 2) are being developed.

  - CSSA 1 is located in the main port area and extends from the northern limit of New City to the sewage treatment pond east of Airfield 1. CSSA 1 includes elements of suburban, industrial, open, and wooded areas.

  - CSSA 2 is located south of South River east of Airfield 2 and includes open, wooded, and suburban areas.

NOTE: Hereafter, the generic terms, "logistic support area" or "CSS area" may be used when referring to BSAs, CSSAs, ASPs, etc.

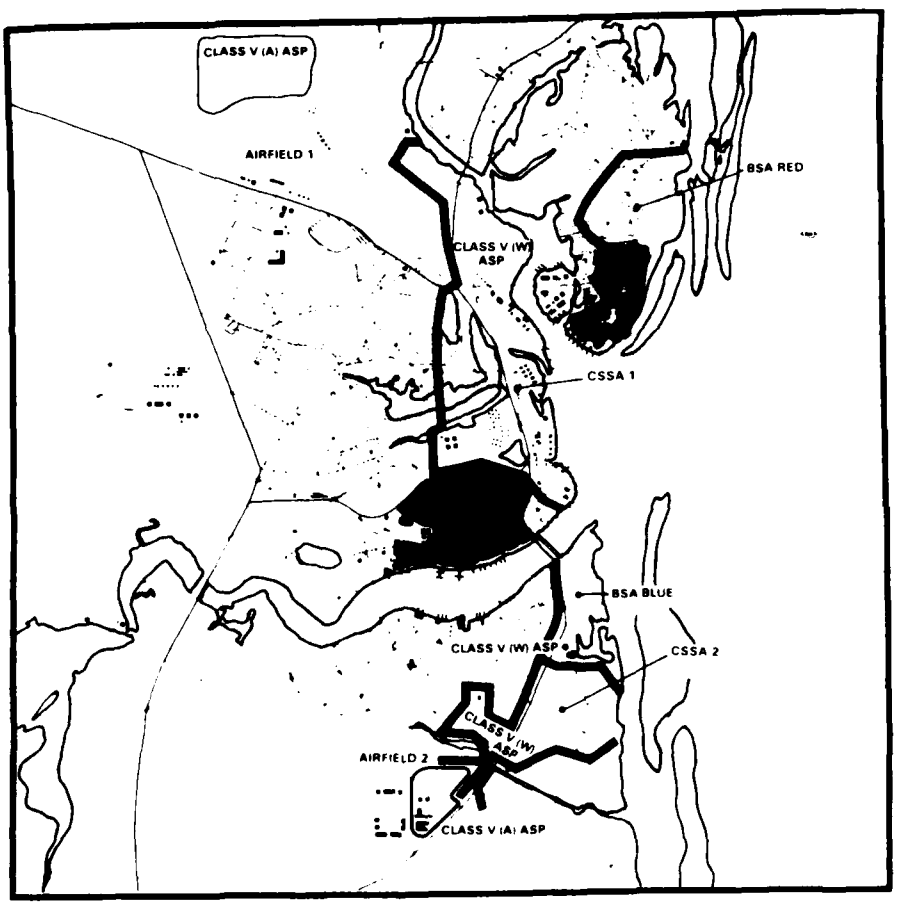


Figure B-23. Location of Logistic Areas - Operation BREAKER

Defensive Irregular Scenario (Continued)

Friendly Deployment. The deployment of friendly units tasked to provide security for logistic support areas or facilities will be dependent upon the physical layout and location of each facility. Defensive perimeters of many CSS facilities incorporate open/wooded areas as well as suburban areas with residential and commercial structures. The defense of each segment of this perimeter will be influenced by the fields of observation and fire and the ease with which enemy forces can penetrate that portion of the perimeter. Local commanders tasked with the security mission will strive to locate that perimeter so that a maximum of cleared area (300m desired) is to the front of the main defensive belt. This requirement for open frontage can be met at airfields, ASPs, BSA BLUE, and most areas of the CSSAs. Areas presenting difficulty will include BSA RED and the southeast corner of CSSA 1 in which the perimeter falls within a suburban area. Since the majority of CSS perimeters are in open areas and Phase II of this contractual effort is dedicated solely to the defense of SYN City, this mini-scenario will be based on the deployment of perimeter security forces into relatively open areas surrounding each logistic activity.

The ground defense of these logistic areas will be organized in the traditional manner with a perimeter defense of manned outposts supplemented by roving patrols and established checkpoints. The local commanders will ensure that all fires from organic ground weapons interlock and dead space is minimized. The outer perimeter will be manned on a continuous basis, and each area commander will organize and equip a ready reaction force. Weaponry associated with such a defense will consist of pistols, service rifles, grenade launchers, machineguns, and mines. Supporting fires can be requested from mortars, artillery, close air, and tanks, although the risk from inaccurate supporting fires may outweigh any benefit except in extreme cases.

The ground defense force will require support from MAF elements not directly associated with the local defense of a combat service support activity. Close coordination and integration of these units will afford the local commander the capability to escalate the response in relation to the size and capabilities of the attacking enemy force. Antiaircraft elements are dispersed throughout the SYN City area and are provided security by the ground defense force when appropriate. Close air support consists of Harrier and TOW Cobra assets initially with other fixed-wing assets located aboard the attack carriers and at theater airbases until SYN City airfields have been rehabilitated. Engineer elements are tasked to construct barriers and reinforce the existing terrain. Engineers perform their secondary mission as infantry once the attack commences.

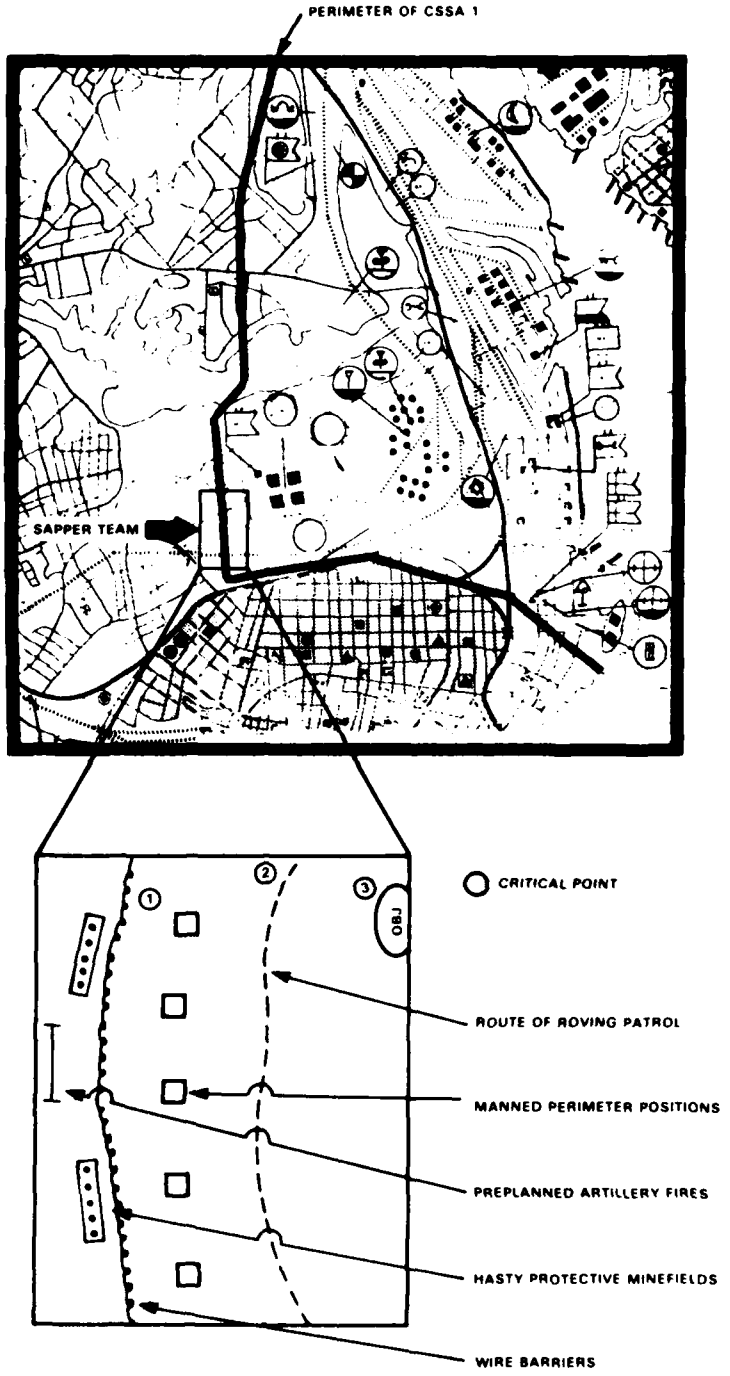


Figure B-24. Critical Points in a Typical Ground Defense

Defensive Irregular Scenario (Continued)

Threat to Logistic Areas. The threat to each logistic area must be evaluated in relation to the disposition of Aggressor forces, the activity within each area and the location of the area itself, and the stage of the assault operation. Although primary logistic support activities are dispersed throughout the SYN City metropolitan area, the threat to these areas varies based on the initial distribution of MRB, garrison, and Naval forces. These initial deployments are discussed in Chapter III and are assumed to remain valid within each peninsular land mass, i.e., garrison forces in Old City have been isolated on that peninsula and naval station elements remain south of South River. The specific threat to each logistic area is shown on the facing table.

The most lucrative targets, and those which are most easily damaged or destroyed by indigenous forces, include ammunition and bulk fuel storage sites. Locations of ASPs are noted on the graphic at the beginning of this section; bulk fuel facility locations are noted in Chapter V - Engineer Horizontal Construction. Airfields and the port complex (CSSA 1) would be likely targets for threat artillery and guided missiles. The most viable method of defense against these munitions is to attack the delivery systems with aviation or artillery assets.

Logistic areas and facilities are progressively established as the MAF builds up combat power ashore and consolidates major areas of the city. BSAs provide the only land-based logistic support from D-day to D+3 (excluding support provided by the Shore Party Teams). Both BSAs are located in areas where the primary threat is from garrison (BSA RED) or Naval personnel (BSA BLUE) equipped with small arms and light machineguns but no armored vehicles. As the consolidation of SYN City progresses, CSSAs and airfields are developed to provide a greater range of combat and logistic support. The main battles with the MRB in SYN City will be fought between D-Day and D+3 - before CSSA 1 or Airfield 1 are operational. By the time these facilities are operational, the MRB will have been severely attritted and will probably resort to irregular tactics to delay and disrupt Landing Force activities.

Thus, the most likely threat to any logistic support area will be from small (perhaps 3-man) sapper teams inserted by stealth under the cover of darkness or artillery fires (as a diversionary measure). These teams will be armed with automatic rifles, grenade launchers, and demolition charges. These weapons and equipment are organic to the MRB, but the civilians and possibly the garrison forces may not be sufficiently equipped for such missions and would require delivery of supplies by underground networks or other surreptitious means. It must be assumed that all areas within SYN City are threatened by either military or paramilitary sapper teams sufficiently equipped so as to present a significant hazard to sensitive supply stocks or other support activities.

TABLE B-12. THREAT TO LOGISTIC AREAS WITHIN SYN CITY

LOGISTIC AREA	PERIOD OF ACTION			
	P II	P III	P IV	P V
BSA RED	G, C	G, C	G, C[1]	G, C[1]
Airfield 1 & ASP	M	M, G, C	M, G, C	M, G, C
CSSA 1	Note 2	Note 2	M, G, C	M, G, C
BSA BLUE	N, C	N, C	N, C[1]	N, C[1]
Airfield 2 & ASP	N, C	N, C	N, C	N, C
CSSA 2	Note 2	Note 2	N, C	N, C

G - Garrison Forces
M - Motorized Rifle Battalion
N - Naval Station Forces
C - Armed Civilians

Note 1 - This support area will be drawn down in these periods although limited Class III and V stocks will remain.

2 - This area is not operational (in a CSS sense) in these periods.

3 - An artillery threat exists for all areas in all periods.

Defensive Irregular Scenario (Continued)

Parameters for Scenario. In order to make this scenario applicable to any or all of the logistic areas developed during Operation BREAKER, several assumptions or bounds were required concerning the specific method of attack, the attack frequency at each area, and the response of friendly elements to such an attack. As always, any assumptions would be modified to fit real-world topography and defensive task organization.

- The most probable ground attacks upon CSS activities would be made by small (≤ 5-man), lightly armed, sapper teams formed from garrison forces, naval station personnel, or remnants of the MRB.
- BDM analysts concluded that the typical (albeit simplified) ground defense of a CSS activity would present three critical points with respect to the insertion and movement of enemy sapper teams.
  - Critical point 1 will be the attempted passage through the outer defensive perimeter of the logistic activity. Perimeters will be sited in conjunction with natural barriers and obstacles whenever possible but the fast-moving combat and logistic situation may preclude elaborate development of such barrier plans in the BSAs.
  - Critical point 2 will be the attempted evasion of roving security patrols and other MAF personnel between the initial entry point and the objective. The friendly personnel density (pers/sq km) in the CSS areas will have a significant bearing upon the ability of sapper teams to move undetected towards their final objective. ASPs appear to be the most vulnerable areas in this respect.
  - Critical point 3 will be the evasion of friendly personnel in the immediate vicinity of the final objective. The probability of success at this point is greater than at the other critical points since the targets of high value (ASPs, fuel farms) do not require large numbers of personnel proximate to each and every ammunition stack or tank farm assembly.

The maximum ammunition expenditure would occur if the sapper team is detected at each critical point, fired upon by friendly forces, but manages to survive the engagement and proceed with the mission. A sapper team may be blocked and destroyed or expelled at any one of three critical points, the team might accomplish its mission and have to fight its way out, or a uniquely successful team might attack its target and withdraw safely without becoming engaged in a firefight.

Estimated Class V expenditures per sapper team incursion are shown below for engagements at the three critical points. Illumination rounds, fired from mortars or artillery, would be requested during hours of darkness.

Action at Point 1

- Sapper team is observed and ready reaction force is alerted.
- Perimeter positions A & B fire machine guns and automatic rifles at identified enemy. Two claymore mines are detonated.
- Sapper team avoids decisive engagement and succeeds in penetrating the perimeter.
- Class V expenditure:

  M60 2 wpns X 100 rnds/min X 2 min = 400 rnds
  M16A1 2 wpns X 20 rnds/min X 2 min = 80 rnds
  M18A1 mines = 2

Action at Point 2

- Much confusion within LSA after initial rounds fired. Ready reaction force nears point 2 and establishes additional checkpoints.
- Several checkpoints fire upon suspected enemy. Area commander orders that weapons fire be severely restricted in the LSA due to hazards to friendly supplies and personnel.
- Sapper team manages to elude checkpoints vicinity point 2 and continues toward objective.
- Ready reaction force identifies probable objective and moves toward point 3.
- Class V expenditure: M16A1 5 wpns X 20 rnds = 100 rnds

Action at Point 3

- Elements of the ready reaction force in conjunction with personnel in the immediate vicinity of the objective form a hasty line of defense west of the objective. No personnel are permitted to penetrate or approach the perimeter.
- Sapper team is sighted and engaged by the local defense force.
- The engagement breaks off once all enemy have been neutralized.
- Class V expenditure:

  M2 1 wpn X 100 rnds/min X 2 min = 200 rnds
  M60 2 wpn X 100 rnds/min X 2 min = 400 rnds
  M16A1 10 wpn X 20 rnds/min X 2 min = 400 rnds
  M203 2 wpn X 3 rnds/min X 2 min = 12 rnds

Defensive Irregular Scenario (Continued)

- The frequency of such attacks at each logistic area will be influenced by the resources contained within that area, the number of enemy sapper teams available within a given region, the defensive posture at each area, and the probability of success of such attacks.

  - BDM analysts estimated that 100 5-man sapper teams could be formed from garrison forces, naval personnel, and armed civilians. Sufficient weapons and munitions are available to equip these teams. Up to 75% of these teams would be directed to attack logistic areas; remaining teams attack targets of opportunity.

  - Sapper teams would not be fully operational for two to three days after the initial assault landings. Time would be required for partisan forces to coalesce, locate necessary equipment and supplies, and assess the developing situation.

  - The frequency of sapper attacks would be greatest during periods of reduced visibility and inclement weather. Additionally, a greater frequency of attack is expected at Class III and V storage areas. The tenacity of the indigenous populace and remaining Aggressor forces will ultimately determine this frequency.

  - A potential distribution of sapper teams to logistic areas, shown below, indicates that the irregular threat to these areas is sizable. It is estimated that a minimum of 50% of these teams would undertake a mission every day, with each team being capable of executing a maximum of three missions per day. With these parameters in mind, the MAF should be prepared for 38 to 225 irregular attacks per day centered on combat service support activities.

BSA RED	- 5 teams
BSA BLUE	- 5 teams
CSSA 1	- 15 teams
CSSA 2	- 10 teams
AF 1	- 5 teams
AF 2	- 5 teams
ASP(A)	- 15 teams
ASP(A)	- 15 teams
Other	- 25 teams

NOTE: All teams will not be operational initially; CSS areas may not warrant sapper attacks until development is underway.

BDM analysts recognized that not all attacks will be successful and penetrate all three critical points to reach the final objective of the attack. The probability of success at each point is given below.

- 25% of the attacks will be repelled at point 1. Class V expenditures will be 2 M18A1 mines, 400 rds 7.62mm (M60), and 80 rds 5.56mm (M16A1).
- 25% of the attacks will penetrate point 1 and be repelled at point 2. Class V expenditures will be the sum of expenditures at points 1 and 2, or 2 M18A1, 400 rds 7.62mm (M60), and 180 rds 5.56mm (M16A1).
- 25% of the attacks will penetrate points 1 and 2 and be repelled at point 3. Ammuntion will be expended at all three points totalling 2 M18A1, 800 rds 7.62mm (M60), 580 rds 5.56mm (M16A1), 200 rds .50 cal (M2), and 12 rds 40mm HE (M203).
- 25% of the attacks will penetrate all three critical points and attack the objective. Expended ammunition will be the same as in the previous case.

Given four sapper team attacks and the probabilities of success noted above, averaged Class V expenditures per attack are shown in the table below.

TABLE B-13. AVERAGE CLASS V EXPENDED PER SAPPER ATTACK - DI SCENARIO

CLASS V ITEM	1 ATK REPELLED AT PT 1	1 ATK PENETRATE 1 REPELLED AT 2	1 ATK PENETRATE 1,2 REPELLED AT 3	1 ATK PENETRATE ALL ATK OBJ	AVG PER ATTACK
M18A1 MINE	2	2	2	2	2
7.62mm (M60)	400	400	800	800	600
5.56mm (M16A1)	80	180	580	580	355
.50 CAL (M2)	-	-	200	200	100
40mm HE (M203)	-	-	12	12	6

Defensive Irregular Scenario (Continued)

Summary. During the play of this scenario, analysts noted several points concerning logistic area development and weapons utilization during irregular attacks.

- It is imperative that ALL indigenous personnel be cleared from areas designated to serve as combat service support areas. Extra care must be taken during the evacuation process to thoroughly search all areas and structures. Enemy not found during the search and evacuation will utilize tactics common to the Suburban Irregular scenario.

- The defense of logistic activities located in open or wooded areas is conducted in a manner similar to a nonurban environment.

- Special care must be taken during engagements in CSS areas to ensure that stray rounds do not hazard friendly troops or sensitive supply stocks. Supporting fires from mortars, artillery, and close air, while available to the area commander to augment his organic weaponry in a defensive situation, must be considered carefully with respect to collateral damage, particularly against a numerically small enemy.

- Logistic areas within an urban or suburban area should be sited so that perimeter zones fall into open or cleared areas whenever possible. Engineer assistance may be required to level and clear small structures to increase the cleared zone.

- The vulnerability of ammunition and bulk fuel stocks militates in favor of augmenting local security forces from CSS units with additional combat troops, situation permitting. Sea-basing the bulk of these items may be required in the presence of an aggressive and hostile indigenous populace.

- Weaponry organic to CSS units (rifles, MGs) should be adequate to defend logistic areas if ready reaction forces were drawn from divisional units and supporting fires were available. No requirement was identified for the development of new weaponry or munitions to defend an urban logistic activity.

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