Chapter 8

Artillery Tactical Logistics

8001. General

Artillery units must be capable of providing responsive, effective, and sustainable fires in a variety of operating environments. Logistics is the lifeline that arms, fuels, supplies, and maintains the artillery enabling it to fulfill its mission. In the ground combat element (GCE), artillery will be a demanding consumer of resources, particularly ammunition and fuel.

Commanders are responsible for their unit's logistics. At the regimental and battalion level, the S-4 assists the commander planning, supervising, and coordinating daily logistic functions. He coordinates with the S-3 to ensure support of operations. The S-4 exercises staff cognizance over special staff officers who manage specific commodity areas. In the firing batteries, the executive officer normally fulfills the responsibilities of the S-4.

8002. Artillery S-4 Duties

The S-4 coordinates unit logisitics. During operations, critical tasks performed by the S-4 include supervising the implementation of the ammunition plan, recording and disseminating critical information, coordinating transportation requirements, and maintaining the status of ammunition stocks and transportation availability.

a. Supervising the Ammunition Plan. The s-3 develops the ammunition plan to include allocations for specific training events and subordinate units. The S-4 ~~is~~ supervises the implementation of the ammunition plan. This includes remaining abreast of the ASR, road net, issuance of ammunition, proposed operations, transportation availability, location of supply points, and anticipated consumption. The S-4 recommends, to the next higher echelon (S-4 or G-4 as applicable), movement of supply points farther forward when timely re-supply to the unit becomes difficult.

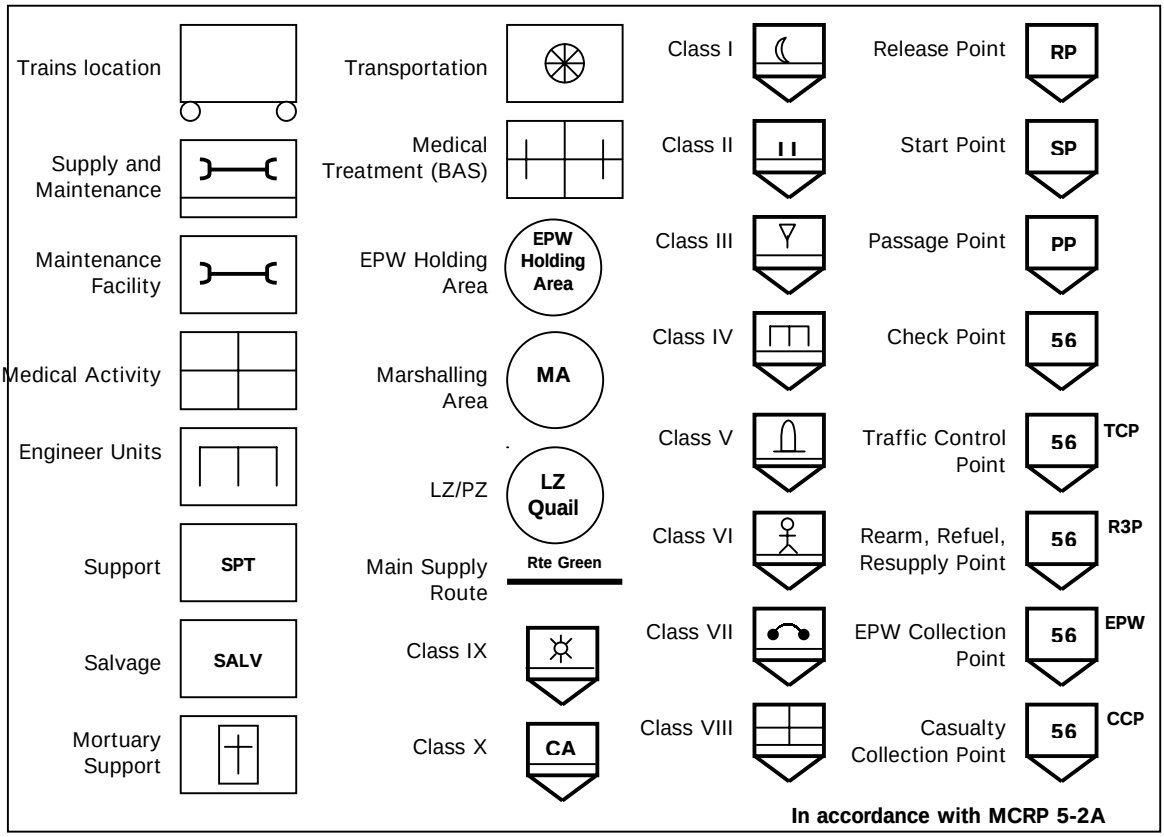
b. Maintaining Status of Ammunition. The S-4 maintains an accurate inventory of available ammunition. The S-4 coordinates with the S-3 to maintain the organization's ammunition status.

c. Recording and Disseminating Information. The S-4 disseminates logistics information to subordinate units and exchanges information with the supported

unit's S-4 and CSSE as required. The layout and array of data varies from unit to unit. Table 8-1 shows CSS map symbols of interest to the logistics officer. ~~,~~

d. Maintaining Status and Coordination of Transportation. The S-4 maintains ~~to~~ transportation data which reflects the orginizational transportation status. The S-4 maintains the status of traffic data and road networks through the use of engineer reports, etc. The S-4 coordinates the movement of supplies with the supported unit and CSSE. The S-4 coordinates traffic schedules, traffic routes, and road priorities with HHQ, adjacent units, and appropriate movement control centers. Road priority determines allocation of road space to subordinate artillery units. The S-4 provides traffic data and transportation availability to the S-3. The S-3 publishes march graphics which graphically show the location of units during displacement or when the main supply route (MSR) is congested. These graphs provide the means to establish priorities based on the rate of march, time length of the column, distance to be covered, and tactical advantages expected (in cases of displacement).

Table 8-1. CSS Map Symbols.



8003. Concept of Support and Logistics Capabilities

Tactical logistics includes the organic unit capabilities and the combat service support activities necessary to support military operations. It involves the coordination of functions required to sustain and move and supplies. Within the organization of the MAGTF, there is a combat service support element (CSSE). As a part of the GCE, Marine artillery also has organic logistics.

a. Organic

(1) Tactical Logistics Functions. Artillery units exercise each of the logistic functions (supply, maintenance, transportation, general engineering, health services, and services) to some degree. Additionally they are responsible for certain command functions; e.g., messing. Each battalion possesses limited, organic logistics capabilities and is capable of independent operations. Firing batteries normally rely on their parent battalions for logistics support. When detached, batteries must rely on its organic capability and the support provided by the supported GCE and CSSE. The battery is augmented with mechanics, communication-electronics and ammunition technicians, and corpsmen.

(2) Messing. Ensuring adequate messing support to using units is a command responsibility. The artillery regiment and battalions have organic messing capabilities. The food services officer, under the cognizance of the S-4, supervises the food service's section including the requisition, storage, and preparation of meals. The artillery regiment may choose to consolidate its food service specialists with those of the battalions to form a consolidated mess hall in garrison and/or a consolidated field mess when the entire regiment is employed in the field.

b. External Combat Service Support Organizations. Artillery units obtain external combat service support (CSS) from various Marine air-ground task force (MAGTF) CSS organizations. The artillery S-4 must be familiar with each of the CSS organizations in order to effectively utilize available resources. CSS units are either permanently organized or task-organized. Based on their organizational structure, they may be either single-function or multi-function units. The primary external source of CSS will be one of battalions of the FSSG or the various CSSEs from the FSSG which include: BSSG, CSSG, MSSG and CSSD.

8004. Logistics Planning

Each commander, from the firing battery to the regiment, must know and apply logistics concepts and principles in planning. Just as Artillery planning is conducted continuously and concurrently with maneuver planning at all levels, logistics staff officers must be full integrated to focus on supporting a “single battle” concept.

MCWP 5-1, *The Marine Corps Planning Process*, provides the sequence of planning. MCWP 4-11, *Tactical Level Logistics,* contains specific planning guidance.

a. General planning flow

(1) MAGTF Artillery Officer. At the beginning of an operations planning phase, the Marine Air-Ground Task Force (MAGTF) artillery officer estimates overall artillery requirements and determines the artillery's ability to provide effective, continuous support for each proposed course of action. Early, accurate identificaiton of logistics requirements is crucial to effective combat service support. The artillery officer prepares estimates of supportability and artillery requirements. An estimate of artillery requirements (appendix J) addresses the amount and type of artillery, ammunition, shipping, landing craft, aircraft, and special equipment. Special training requirements may also be identified. Combat planning data (MCO 8010.1_), METT-T factors, and experience are used in estimating requirements. Requirements submitted by artillery commanders are consolidated and analyzed, overall requirements refined, and final artillery requirements are presented to the MAGTF commander. Continual requirement modifications are made as planning progresses

(2) Artillery Commander and Staff. The artillery commander prepares estimates, issues guidance, establishes priorities, and allocates resources as required. Staff officers determine requirements and concerns from their functional area.. Requirements are consolidated at the senior artillery echelon and forwarded through the chain of command. At a minimum, artillery logistics plans must address:

- External support requirements.
- Basic load and corresponding unit load plans.
- Embarkation and debarkation requirements.
- Ammunition plan.
- Methods of re-supply.
- Organization of logistics resources (e.g., trains, MCTs)
- Logistics communication links.
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- Casualty treatment and evacuation plan.
- Anticipated problem areas.
- Security for trains and rear area facilities.

b. Logistics considerations and principles

(1) METT-T

(a) Mission. Requirements, priorities, allocations and mobility are affected by the mission. A movement to contact may place more emphasis on petroleum, oil, and lubrication (POL) and mobility, while a deliberate attack may increase ammunition consumption rates.

(b) Enemy. An analysis of enemy capabilities and composition serves to both identify logistics requirements and friendly logistics vulnerabilities

(c) Terrain. Terrain (including the impact of weather) has multiple effects on logistics. Table 8-2 identifies selected environmental impacts on CSS functions.

(d) Troops. The number of firing units and personnel/equipment available to sustain them must be considered in developing a logistics plan.

(e) Time. Rates of movement and frequency of displacements impact the ability to provide forward CSS. Time tables must be scrutinized to ensure the logistics plan provides the necessary support.

Table 8-2. Environmental Impacts on CSS.

Environmental Factors	Supply	Maintenance	Transportation	General Engineering	Health Services
Urbanized Terrain	Land lines of communications can be impeded	Maintenance areas available	Reduces movement	Existing utilities available	Existing facilities available
	Existing supplies available	Reduces Maintenance due to fewer displacements	Increases use of MHE due to dispersion of battery positions	Requires clearance of rubble	
	Increases expenditure of Class V (delay, VT fuzes)			Requires fortification of positions	
Cold Weather	Land lines of comm- unications are few and extended	Increases maintenance time	Restricts ground mobility	Increases use of hardened positions	Affects personnel
	Reduces ammunition carrying capacity	Requires frequent, regular warm-up of engines, radios, and batteries	Increases transportation needs due to battlefield size	Materiels handling difficult	Increases food intake
	Increases use of batteries	Maintenance areas critical and limited	Requires special cross country ability (snow-plow, snow- shoes)	Construction of barriers difficult in frozen ground	Sanitation difficult

	Reduces effects of ammunition in snow	Requires daily tire pressure checks to prevent flat tires and flat spots	Navigation difficult	Requires use of explosives to facilitate loosening ice and dirt	
	Increases effects of ammunition on ice	Requires periodic relocation of vehicles to avoid flat spots	Fuel handling dangerous		
	Sustainment of class I difficult		May require use of chains for wheeled vehicles		
	Requires supple-mentary rations				
	Limited potable water				
	Requires transport of ice blocks				
	Prepositioning and storage of materiel is key to sustainment				
Environmental Factors	**Supply**	**Maintenance**	**Transportation**	**General Engineering**	**Health Services**
Desert	Extended land lines of communications	Affects equipment	Wheeled vehicle movement difficult with heavy loads (class V, howitzers)	Increases use of hardened positions	Decreases personnel tolerance to heat and disease
	Increases use of class V (smoke, suppres- sion, countermech-inized fires)	Increases PM	Increased mechan-ized/motorized oper- ation requires freq- uent displacements	Requires obstacles clearing	Evacuation difficult
	Increases use of class III (POL, tires, cool- ant, cleaning materiels)	Increases on-site maintenance and re- pair to reduce evac- uation	Restricts movement to mission-essential loads only		Sanitation difficult
	Increases use of class IX (electrical, acces- sories for coolant system, wheel and sprocket nuts, wedge bolts)	Navigation difficult			
	Increases water and battery requirements	Poor roads			
	Increase class V consumption	Increases on-site repair to reduce evacuation	Potential for bottle-necks		Evacuation difficult
	Requires unit distribution		Increases use of heli- copter support		
	Restricts commun-ication				
Chemical/Nuclear	Hampers resupply due to unit dispersion and avoidance of contaminated areas	Decontamination of equipment difficult	Requires vehicles to transport NBC/de-contamination equipment	Increases use of fortifications	Hampers prevention and treatment of casualties

	Restricts supply to mission-essential items for short-notice displacements				Affects personnel
	Increases water requirement for decontamination				
	Reduces ammunition carrying capacity				
	Requires protective clothing, decontam- ination equipment, and special munitions				
Jungle	Lack of all-weather roads hampers re-supply	Increases require-ment for PM	Trafficability difficult	Increases need to establish and harden positions	Affects personnel
	Increase class V usage (reduces muni- tions effects)	Maintenance difficult	Increases reliance on helicopter support	Requires obstacle clearing support	Increases disease
Environmental Factors	**Supply**	**Maintenance**	**Transportation**	**General Engineering**	**Health Services**
	Increase deterior-ation of supplies	Requires on-site maintenance	Increases towing requirements		Evacuation difficult
	Restricts loads to mission-essential items only	Serviceability of winches essential			Requires preventive medicine and sanitation
	Requires frequent air resupply and in-creases vulnerability of positions				
	POL replenishment difficult				

Table 8-2. Environmental Impacts on CSS (Cont).

(2) Logistics Principles. The principles of logistics are neither numerous nor complex. Responsiveness, simplicity, flexibility, economy, attainability, sustainability, and survivability guide the planning, organization, and conduct of logistics. A principle's influence varies with each operation or phase of operation. The artillery commander must ensure these principles are applied in a manner which ensures the availability of responsive, effective and sustainable artillery support.

~~e.~~ **Evaluating Logistics Data.** The following items affect the unit's basic load and impact planning data in the development of estimates and the logisitics annex to the operation order. The information provided in the following subparagraphs is a guide and should be tailored to fit the needs of the specific tactical situation. By analyzing each logistics function, the artillery staff develops its requirements and concept of support. The evaluation of logistics data centers

around the unit's basic load. The basic load is the on-hand supplies required by a unit, the quantities of supplies that must be carried by the unit, and transportable by the unit organic lift. Operational requirements, cargo capacity of unit vehicles, and methods and means of resupply affect the composition of the basic load and therefore affect logistics functions. The artillery commander may forward a recommendation through appropriate command channels for consideration by higher headquarters for the establishment of the basic load. At the unit level, these terms are expressed in specific quantities. Unit vehicle load plans are then built around the established basic load. Basic loads may be transported as palletized or non-palletized loads.

(1) Supply. Pre-calculated blocks of supplies can be allocated from several sources. These sources include prepositioned war reserves (PWR), organic unit operating stocks, operational deployment blocks, landing forces operational reserve material (LFORM), and prepositioned material in maritime prepositioning ships (MPS) or remote storage activities. These resources, as allocated by the MAGTF commander, constitute the supplies available to operational units. Supply is divided into 10 classes, as depicted in table 8-3, for planning, management, and administrative purposes.

Table 8-3. Classes of Supply

Class	Description
I	Subsistence: MRE, A and B rations, and water
II	Clothing, individual equipment, tentage, organizational tool sets and kits, handtools, and administrative and housekeeping supplies and equipment
III	POL: petroleum fuels, lubricants, hydraulic and insulating oils, liquid and compressed gases, bulk chemical products, coolants, de-icing and anti-freeze compounds, and preservatives
IV	Construction material: installed equipment and fortification, barrier, and bridging material
V(W)	Ground ammunition: munitions containing explosives; chemical, nuclear, or radiological weapons; or any item that is propelled, placed, or dropped to inflict damage
VI	Personal demand items: nonmilitary sales items
VII	Major end items: end products ready for intended use.
IX	Repair parts: all repair parts, less class VII, required for maintenance of equipment.
X	Nonmilitary programs: military support programs not included in classes I through IX; e.g., agricultural, economic development.

(a) Class I

(1) Rations. Sufficient rations per individual must be carried in the artillery's basic load to provide subsistence through a ration cycle. One ration cycle, normally 24 hours, is designated as a DOS. The type of rations depends on the tactical situation, commander's guidance, and availability of messing facilities. Table 8-4 provides planning data for the transportation of rations.

Table 8-4. Planning Data for Rations

Ration Type	Content (portion/packaging)	Weight (lbs) per Unit	Vol (ft^3) per Unit
MRE	12 meals/case	20.6	0.88
RCW (Cold Weather)	6 rations/case	21.3	0.9
B	3 servings/ration	3.83	0.12
T (Tray pack)	18 meals/module		
	Breakfast	33	1.66
	Dinner	45	1.66

(2) Water. Water requirements depend upon the tactical situation, personnel consumption, vehicle maintenance, decontamination, bath/shower/laundry availability and frequency, and method of transport/resupply. Table 8-5 provides data for planning water requirements.

(b) Class II. The basic load of class II items depends on the tactical situation, commander's guidance, environment, and vehicle cargo space. Specific items, volume, weight, and replenishment factors are found in current tables of authorized material.

Table 8-5. Planning Data for Water

Personnel Consumption (Gallons per Individual per Day)

Planning factor of 47.5 lbs/1 ft^3 per expeditionary water can

	Climate		
Use	**Hot**	**Temperate**	**Cold**
Drinking[1]	3	1.5	2
Heat Treatment	0.2	0	0
Hygiene[2]	1.7	1.7	1.7
Food Prep	0.0-4.5	0.0-4.5	0.0-4.5
Waste (10%)	0.8-1.3	0.7-1.1	0.7-1.2

1. Increase to 3.5 (hot) and 3.0 (temperate) for MOPP levels 3 and 4.
2. Personal hygiene (shaving, brushing teeth, washing hands, sponge bath).

Vehicle Maintenance (Gallon per Vehicle per Day)

1. Estimate based on the radiator capacity (see table 2-7) and the number of vehicles.
2. Usage rates can be calculated using factors of 1.0 (hot and cold) and .5 (temperate).

Decontamination

Requirements depend on frequency, intensity, and location of attacks. Decontamination planning factors per individual/item are:

7 Gallons per individual
380 Gallons per major end item

(c) Class III. Class III consists of fuels and lubricants for vehicles and equipment. Class III items are carried in vehicle tanks, tankers, and mobile-loaded canned or drummed fuel containers. The S-4 must apply experience and the nature of the operation in calculating fuel requirements. Table 8-6 contains notional planning data for the transport of drummed or canned fuels.

Table 8-6. Transportation Planning Data for Drummed Fuel

	Diesel		Gasoline		Kerosene	
	ft^3	Lbs	ft^3	lbs	ft^3	lbs
55 gallon drum	9	432	9	384	9	421
5 gallon can	0.8	46	0.8	41	0.8	45

Table 8-7 provides notional planning data for daily fuel usage rates. To determine an estimate, select the statistical region approximating that of the area of operations. Table 8-8 Provides notional planning data for consumption rates and capacities for various items of equipment in the artillery inventory. Fuel requirement estimates are determined by the following formula:

(# of vehicles/equipment) x (daily fuel usage rate) x (consumption rate) = fuel requirement

For example, an organization with a truck density of 20, 5-ton vehicles operating in a Korea-type environment would have the following fuel requirement (figures were extracted from tables 8-7 and 8-8):

(20 vehicles) x (5 hrs/day) x (5.3 gal/hr) = 530 gal/day

Table 8-7. Estimates of Daily Fuel Usage Rates

	Statistical Region				
Equipment Type	Alaska *	Panama Canal *	CONUS *	Europe *	Korea *
Wheeled Vehicle	7	4	8	10	5
Generators	20	20	20	12	20
MHE	10	20	20	12	20
Stationary Equipment	10	10	10	12	10

* Hours of usage

Table 8-8. Consumption Rates and Capacities

	Fuel			Water
Vehicle / Equipment	Rate (gal/hour)	Tank (gal)	Type *	Radiator (gal)
M923	11.5	70	D	12
M998	1.7	25	D	7
M936	13	139	D	12
MC4000	4	35	D	6
3 kW GEN (MEP-16)	0.6	90	D	11
M12 DECON	3		G	500

* D – Diesel G – Gasoline

NOTE: Water usage rates are contained in table 2-4

(d) Class IV. Class IV includes materials for dunnage and preparation of gun positions and other battery areas. The required quantities depend on use and size of the position area. Table 8-9 provides transportation planning data for class IV material.

Table 8-9. Class IV Transportation Planning Data

Item	NSN	ft^3	Weight (lbs)
Bag, sand (bale) *	8105-00-285-4744	2.1	10
Barbed wire, 350 ft spool	5660-00-512-3197	1	28
Post, Fence, Metal			
2 ft	5660-00-270-1588	3	24
5 ft	5660-00-270-1587	11	99
Barbed wire, Concertina	5660-00-921-5516	4.4	62

* 200 bags per bale.

Class IV planning determines the usage requirement of sandbags and lumber. Approximately 500 sandbags are required to completely harden a 5-ton truck. The number of sandbags required to prepare a gun position depends upon the size and degree of position preparation. Lumber requirements are determined by converting the estimated lineal feet of lumber into board feet using the following formula:

thickness (inches) x width (inches) x length (inches)/12 = board feet

(e) Class V. The ammunition plan is developed as a result of determining class V requirements. The ammunition plan requires close and continuous coordination between unit commanders and operations and logistics officers at all levels. The commander provides guidance and establishes priorities for the ammunition plan. Operation and logistic officers work together in the planning and execution of the ammunition plan.

Based upon the commander's guidance, operation officers identify the type, quantity, location/unit, and required time/date of the ammunition resupply. Operation officers must forecast required supplies in order to allow sufficient time for logistic officers to respond. Operation officers establish task organization in support of the logistic effort (e.g., the composition of trains). Logistic officers determine how to fulfill identified requirements and arrange for their distribution. Specific instructions must be established (through SOP, operation order, or letter of instruction) for requisition, procedure for issuance, and methods of distribution. Ammunition distribution is probably the unit's most cumbersome logistics effort. The development of an ammunition plan must consider consumption requirements, replenishment requirements, method of resupply, and ammunition management measures.

(1) Consumption Requirements. Consumption requirements of conventional and special ammunition must be determined. The commander tailors the combat planning rates contained in MCO 8010.1_ based on his experience and the specific METT-T operational needs. Planning data, based on MCO 8010.1_ has been calculated for each type of unit/weapon and is provided in appendix J.

(2) Basic Allowance. Basic allowance (BA) refers to the initial distribution of a specified quantity of required ammunition for units entering combat. The size and composition of the BA must meet anticipated combat needs of the unit until resupply can be accomplished. Combat planning rates may be modified to meet special requirements.

(3) Basic Load. The quantity and type of ammunition carried by the artillery unit as the basic load must maximize artillery effectiveness and be tailored to support operational requirements. To position the greatest quantity of ammunition forward, the commander may develop a load consisting of the types of ammunition which will maximize effectiveness. This may result in a basic load consisting mostly of high usage ammunition. Ammunition usage rates may be impacted by the operation or phase of operation.

Table 8-10. Ammunition Carrying Capacities.

Vehicle	Caliber	Projectiles	Propellants
M813/923 Prime Mover[1]	155mm	48	48
M813/923 Ammunition Truck	155mm	96	336 (GB) 180 (WB) 120 (RB & M119)
M105A2 Ammunition Trailer	155mm	24	112 (GB) 60 (WB) 40 (RB & M119)

1. Combat loaded. May be reduced by safety restrictions (net explosive weight) and vehicle load plan.

NOTE Based on pure loads and single-type items (e.g., GB propellant) on skid.
Based on cross-country capacities. Data may be reduced by road conditions and vehicle hardening requirements.
Based on high explosive projectiles.
Packing dimensions for ammunition contained in appendix I.

Ammunition carrying capacities of artillery vehicles are depicted in table 2-9. The basic load of ammunition must be identified in the unit operation order. This provides data useful to the CSSE and liaison officers at the supported unit's FSCC. The basic load is expressed as:

Basic Load = BA + #~~1~~ DOA (sustaining rate)

(4) **Planning Ammunition Re-supply**. The following factors should be considered when planning ammunition re-supply:

- Rate and quantity of consumption.

- Road network and distance from battery positions to the source of supply.
- Tactical situation.
- Available vehicles, aircraft, personnel and material handling equipment (MHE).
- Availability of external support

(5) Ammunition Management Measures. Ammunition management requires careful planning and coordination by MAGTF, artillery, infantry, and CSSE commanders and their staffs.

. An artillery unit's accurate record keeping identifies shortages before they become critical. Ammunition status reporting aids in establishing re-supply priorities and forecasting subsequent consumption. Ammunition record keeping must be emphasized at each echelon. The procedures to be used must be identified in planning if not contained in unit SOP. The ammunition report (AMREP) is developed as a result of record keeping and assists in the maintenance of ammunition status. The AMREP should be submitted frequently enough to allow for operation and resupply decisions. The AMREP can be used as a trigger in an automatic or push supply system. The AMREP normally reports ammunition on hand, deficiencies or excesses for basic loads, and anticipated heavy expenditures.

(f) Class VI. Unit personnel deploy with personal demand items as prescribed by commanders at each echelon. Replenishment of these items is procured from the CSSE based on pre-established planning requirements.

(g) Class VII. Class VII's basic load consists of a unit's table of equipment (T/E) items. During the development of load plans, nonessential T/E items may be palletized.

(h) Class VIII. Medical supplies are drawn from the CSSE. Battalion and regimental aid stations are authorized the following medical allowance list blocks:

- AMAL 635 - aid station equipment
- AMAL 636 - aid station consumables

(i) Class IX. Depending on maintenance requirements, repair parts are demand supported. The S-4 coordinates with the CSSE to ensure adequate

stockage of artillery repair parts/kits for mission-essential items. Quick, on-site repairs can be accomplished through the use of pre-expended bins (PEBs); however, PEBs are limited to low-cost, high-usage items. The criteria for using PEBs is set forth in MCO P4400.150. Embarkation, landing, and surface movement must be planned in detail. Units are loaded in a manner which permits unloading according to the tactical plan. Accessibility to supplies and equipment aboard ship must be ensured. Mobile loads must allow for immediate operations upon landing. The tremendous amount of supplies requiring transportation by artillery units and the number of lengthy convoys during displacement creates a cumbersome logistic problem. Coordination of landing support, such as matting, facilitates rapid off-loading and prevents overcrowding of the beach area. The status of road nets, weight limits of bridges, minefield marking, traffic control, and route priorities must be coordinated with HHQ and appropriate transportation control centers when planning transportation requirements.

(a) Embarkation. The artillery unit embarkation officer provides embarkation requirements to the GCE as early in the planning phase as possible. The MAGTF II/LOGAIS family of systems facilitates planning and execution of embarkation. The artillery unit embarkation officer establishes the necessary liaison; provides the GCE MDSS II embarkation data; and coordinates staging, material handling, shoring and dunnage requirements, working party requirements, and security requirements based on higher headquarters' guidance (see Joint Pub 3-02.2 Joint Doctrine for Amphibious Embarkation).

(1) Organization for Embarkation. Artillery units may combine for embarkation or be embarked as attachments (in the case of a BLT or RLT) and divided into embarkation teams for each ship. The embarkation team consists of the troops, equipment, and supplies embarked on a single ship. Artillery weapons, prime movers, and their crews are embarked in the same ship to facilitate training and maintenance underway. The following artillery personnel are embarked with their supported units:

- Fire support coordination personnel with the supported unit.
- Liaison personnel with their assigned units
- Forward observer teams with their supported units.

(2) Load Plans. Artillery build-up ashore (advance parties, batteries, and battalion command echelons) must be considered. Load plans address the composition of the reconnaissance party and provide for the establishment of survey control, communications, selection of

battery positions, beach exits, route guides, and marking. The team embarkation officer prepares load plans in coordination with the ship's combat cargo officer. Ship loading and characteristic pamphlets (SLCP) identify detailed loading characteristics of assigned ships. An inspection is made of stowage areas, holds, and decks to verify the data contained in the SLCP. The ship's commanding officer approves the load plan before loading commences and approves required changes.

(b) Helicopter Movement. Helicopters provide a means of mobility for towed weapons and a means of re-supply for artillery units. Their use may be limited by availability, atmospheric conditions, and enemy threat. Successful movement of artillery by helicopter depends on the extent of coordination and reverse planning. The supported unit's air officer provides technical assistance in planning helicopter operations. In addition to the concept of operations, major considerations include:

- Command, control and face-to-face coordination. Organization of the unit in relation to the mission.
- Mobility of the unit once the helicopter lift if complete.
- Reconnaissance and selection of routes, loading areas, landing sites, and position areas.
- Preparation of helicopter employment assault landing tables.
- Re-supply, survey, and meteorological requirements.
- Enemy situation and use of division reconnaissance teams to determine ground threat in the position area.

Helicopter movement of artillery units is conducted in four phases: planning, loading, movement (including movement control), and occupation of position. The planning phase begins with the issuance of a warning order and continues through the commencement of the movement. The planning phase encompasses coordination with the supported and supporting units, reconnaissance and selection of position, fire planning, and rehearsals if time permits. The loading phase consists of ground movement to appropriate pick-up areas; preparation of the helicopter loading area; preparation of troops, equipment, and supplies; and loading of helicopters. The movement phase is the actual move from the loading area to the landing site. This phase begins with the take-off of the first helicopter and ends with the arrival of the last helicopter at the landing site. The occupation of position phase consists of the establishment of the helicopter landing site by an advanced artillery party, unloading of personnel and equipment, and occupation of the position.

Appendix F contains detailed information on the planning, organizing, and executing an artillery heliborne raid/movement.

(c) Fixed-Wing Air Transport. Artillery units can be transported by fixed-wing transport aircraft. Detailed and flexible plans are required due to the different models of available aircraft, weather, distance, staging, material handling, dunnage, and shoring requirements.

(d) Movement by Rail. Artillery units may be moved by rail. Planning factors that govern the rail movement include the distance to be traveled, availability of railroad facilities, and priorities established by the tactical situation. FM 101-10-1/2, *Staff Officers Field Manual: Organizational, Technical, Logistic Elements, Tables of Equipment*, contains details relative to the planning of rail movement.

(e) Motor Transport. Motor transport assets provide the artillery with the organic ability to move units to position areas, as well as a means for resupply. The motor transport assets contained in the artillery unit's T/E are provided in Appendices A through D. An artillery operation's demand for motor transport is increased by the vast tonnage of class V(W) requirements, which necessitates detailed planning and efficient loading for maximum vehicle utilization.

(3) Maintenance. To effectively plan maintenance support, the S-4 must know the availability of tools, test equipment, publications, and mechanics; determine maintenance concept; establish Maintenance Contact Teams (MCTs); and establish recovery and evacuation procedures.

(a) Supply Support Planning. A review of activity usage data, experience, and anticipated requirements based on the geographical area of the operation provides a guide as to the planned maintenance requirements. Liaison should be effected with the CSSE to ensure sufficient quantities of artillery peculiar items are stocked.

(b) Maintenance Contact Team (MCT). An MCT is a temporary organization of organic assets consisting of one or more mechanics/technicians formed to accommodate a specific task. An MCT provides on-site maintenance or technical assistance. The MCT focuses on diagnostics and repair part identification on-site. The MCT makes organizational level repairs when possible and identifies parts, tools, & technicians required to the CSSE to ensure the Maintenance Support Team (MST) arrives with the required capability. The decision to utilize MCTs depends on the following:

- Equipment size and complexity. Equipment installation. Equipment security classification. Distance from the maintenance area. Quantity of equipment involvedAvailability of qualified personnel and serviceable test equipment. Transportation and travel time.
- **(c) Recovery and Evacuation Procedures.** Artillery units have limited repair capabilities; therefore, recovery policies, maintenance repair time criteria, and an evacuation policy must be established. Maintenance repair time criteria serves as guidance on decisions of whether to attempt on-site repair or to evacuate damaged equipment

Collection point should be identified in planning to speed evacuation. Collection points are designated points on the battlefield, normally along routes of march, at which inoperable equipment can be moved for further evacuation/disposition. The artillery S-4 coordinates the location of collection points with the supported unit S-4 and CSSE.

(4) Health Services. Unit medical personnel are responsible for establishing lines of communication with the GCE's and CSSE's medical activities. Casualty evacuation plans must consider:

- Means of transportation
- Triage CASEVAC priorities
- Evacuation route(s)
- Mass casualty handling procedures

8005. Execution of Tactical Logistics

a. Battalion Logistics Organization. The battalion's organization for support may be decentralized, centralized, or a combination of both. This organization may change with the tactical situation.

(1) Decentralized Support. Within the battalion, batteries may be required to maintain logistics capability using their organic assets. Decentralized support affords the battery commander maximum control and responsiveness. Decentralized support has the following disadvantages:

- Vulnerability results from larger position areas and convoys.
- A signature effect may be produced by vehicles moving to and from the battery position.
- Battery displacements when logistics elements are replenishing may create difficulty in reconstituting the battery.

(2) Centralized Support. When centralized support is established, it must not degrade the battery's ability to displace. Personnel, vehicles, and

equipment may be centralized at the battalion level to provide logistics to firing batteries. Generally, a battery contains only the essential personnel, equipment, and supplies necessary to support operational requirements. Trains are established and utilized to provide logistic support to a firing battery. Centralization provides the battalion commander increased logisitcs flexibility.

b. Distribution. The artillery battalion will generally use both point and unit distribution methods over the course of an operation. The nature of the request, tactical situation, status of transportation assets, and volume of supplies requested will effect the type of distribution method used.

(1) Unit Distribution. The supporting agency delivers the support to the supported unit. The supported unit is responsible for its own internal distribution. This maintains the tactical positioning of the battery and reduces traffic flow. Vehicles stocked with POL and ammunition stop at each individual position to conduct re-supply services. The battalion or GCE S-4 must coordinate with the battery(s) being serviced to ensure tactical operations are not affected by movement into and out of the firing position.

(2) Point Distribution. The supported unit leaves its position to pick up requested support from the supporting unit area or other centralized location. This can involve vehicles leaving their tactical positions to enter an established Repair and Replenishment Points (RRP). An RRP is a pre-arranged or hastily position set up to support highly mobile units. An RRP request identifies the following:

- Unit requiring support.
- Class and quantity of the requirement.
- Type of support required (maintenance, engineer).
- Desired date and time of resupply.
- Route of march (start point and end point by grid.
- Coordinating instructions.

An RRP may be established to support a displacing battery at a coordinated point along the units established route of march. RRP's may be established to service multiple batteries in succession

c. Supply Systems. The supply system provides the materiel required for operating forces to function. Continuous evaluation must be made of supply levels to determine the need for possible changes. The S-4 must be aware of the unit's basic load and anticipate the extent and frequency of replenishment operations. Changes in supply requirements are affected by:

- Projected tactical changes.
- Changes in troop/equipment density.
- Consumption Rates
- Transportation availability.

Logistic summary reports, prepared by the S-4 provide the means to maintain supply status. The report's contents and frequency are established by unit SOPs. Re-supply can be accomplished by using a pull and push system.

(1) Pull System. In a pull system, the using unit determines need and forwards specific requests through logistic communication channels. The pull system will only provide those supplies ordered by the consumer and does not anticipate user needs.

(2) Push System. The push system functions as an automatic re-supply method. Data obtained from monitoring consumption rates are used to anticipate unit requirements. This system pushes supplies forward without a request, relieving the forward units of the logistics burden and/or potential shortage of supply. This allows the supporting unit to synchronize replenishment efforts. Care must be taken to avoid burdening the user with an excess of supplies.

d. Organization of Logistics Trains. The train concept is a means of internally task-organizing and employing ~~the~~ organic logistics assets. Trains serve as the link between the batteries and the supporting CSSE. This allows combat service support to be performed as far forward as the tactical situation permits. Trains may be fully mobile or movable depending on the situation. The desired capabilities of the trains will dictate the size and may require consolidation of some battery and/or battalion vehicles.

(1) Battalion Trains. The battalion's trains may be centralized into one entity or echeloned. Centralization of the trains places all the unit's logistics assets under the direct control of the commander under the cognizance of his logistics officer. It is most appropriate in the defense, slow moving, or static operations. Battalion trains can be echeloned into combat trains and field trains (Table 8-10). This concept improves responsiveness, flexibility and survivability against air attack.

Table 8-10. Notional Composition of Battalion Trains.

Element	Capability	Qty	Vehicle/Equipment
Combat Train	Supply		
	Class I	1	M923 w/M149
	Class V *	6-8	M923 w/M105
		1	MC-4000

	POL **	1	M923 w/Sixcon
	Maintenance ***	1	M936
	Medical	1	M1035
	Other ****		
Field Train	Supply		
	Class V *		As required
	General	1	M923
	Maintenance	1	M936
	Medical (BAS)		Aid Station
	Administrative		As required

* Ammunition section accompanies the combat train as required. Vehicles represent those provided by the firing batteries and the headquarters battery. The ammunition section's train may operate independently from the combat train.
** Augmentation of additional tankers from regiment ~~or CSSE~~ may be required.
*** May include MCTs or recovery equipment,
**** Engineer, landing support, NBC equipment, and personnel as required.

(a) Combat Trains. Combat trains provide critical organic logistics in forward areas. The key to combat trains is mobility. They are intentionally kept small so they can travel with supported forces. Combat trains usually include rations, fuel, ammunition, and maintenance contact teams with limited repair capability.

(b) Field Trains. Field trains consist of the remaining organic logistics elements located further to the rear. These trains may or may not be mobile-loaded. Field trains usually include the mess section; the supply section (-); some organic or attached motor transport; and a battalion aid station.

(2) Regimental Trains. The regimental trains consist of the logistics assets required to sustain the regimental headquarters and any organic or attached units under the direct control of the regiment. The regimental commander may choose to consolidate the battalion field trains in one location for security, control, and centralization of resources. Logistics support of immediate need to lower units should be allocated to the battalion trains, but that not of a time-critical nature can often be consolidated at the regimental level.

(3) Positioning Trains. The battalion S-4 selects train locations for logistics operations in coordination with the S-3. The main consideration in selecting a site for the positioning of trains should be responsiveness and survivability. Often the combat trains are located with the battalion command post. MCT's and task-organized elements of the combat train can be dispatched to provide the necessary support to the batteries. In general, trains should be located:

- On defensible terrain.

- In an area with enough space to permit dispersion.
- In an area that provides concealment.
- On firm ground to support heavy/continuous vehicle traffic.
- Near a suitable helicopter landing sites.
- Close to main supply routes (MSRs).
- In an area that allows good communication.

(4) Conducting Train Operations

(a) Route Selection. The battalion S-4 selects the supply route for train operations based on METT-T and the method of distribution. The route extends forward to the batteries or positions between their current location and future position area. Coordination with adjacent combat, combat support, and CSS units is necessary to ensure movement of support assets. Alternate routes should also be selected. The S-4 notifies the S-3 of route selection.

(b) Site Selection. The battalion S-4 determines a suitable location for the repair and replenishment point (RRP). The S-4 notifies the battery(s) of the location and time for resupply through the use of an RRP response. An RRP response identifies the following:

- Unit being supported.
- Site location.
- Date and time of support.
- Coordinating instructions (including quantities if different from request)

The site selected should be on or near the battery's route of march. The site should not block the MSR. The S-3 uses checkpoints to identify the intended route and coordinates with the battery. The site should have an identifiable entry and exit.

(c) Repair and Replenishment Point (RRP) Organization. The location of each activity must facilitate movement of vehicles in an orderly and sequential flow. Time consuming functions (e.g., refueling, ammunition transfer should be positioned to allow for simultaneous activity. Figure 3-1 illustrates a typical RRP layout.

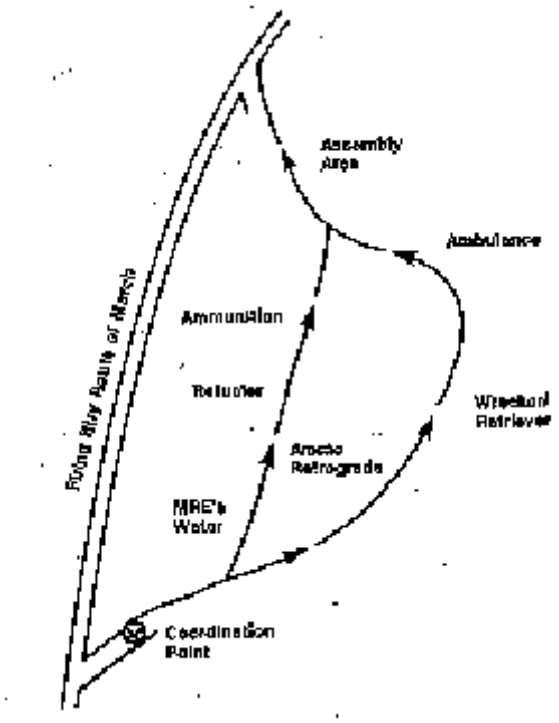

Figure 3-1. Replenishment and Repair Point Layout.

(d) RRP Operation. When the battery arrives:

- Designated personnel dismount at the coordination point to assist local security.
- Guides direct vehicles to their respective stations.
- Forklifts are moved forward to assist in ammunition loading.

The senior mechanic ~~S-4~~ determines vehicles requiring evacuation and they are retained by the train. The unit must cross deck equipment, supplies, and personnel on to another vehicle or shuttle.

(5) Security. Security threats come from the air, bypassed enemy units, infiltrators, guerrillas, indirect fire weapons, mines, and enemy combat formations that have broken through forward units.

Regardless of MOS, every Marine is an infantry man and is expected to participate in establishing and maintaining security. Depending on the extent of the threat, security personnel may be provided from the battalion itself and/or from the supported unit.

Reinforcement plans are established with adjacent or nearby units. Fire plans are prepared for the use of supporting arms. Listening and observation posts are established for early warning and dissemination of threat information through intelligence channels. Because of limited number of personnel, potential threats must be addressed quickly in order to determine strength and direction of attack.

(a) Train Security. Conducting replenishment operations under the cover of darkness, with special emphasis on light and noise discipline and radio silence, reduces the vulnerability of trains. Tactical convoy discipline must be practiced at all times. Well rehearsed, immediate action drills for blocked and unblocked ambushes and attacks are critical. Passengers have individual weapons ready and are assigned areas of observation, including air observation. Crew-served weapons are positioned to respond to attacks. Train personnel establish all around security during brief halts and in the rear area. During extended halts, improved security measures must be undertaken by all members.

(b) Rear Area Security. Security consists of passive defense measures and early warning. CSS elements may be collocated to facilitate security. Rear area security measures include dispersion, camouflage, noise and light discipline, cover and concealment, fortification, obstacles, and barriers.

e. Refueling Operations. A key to the refueling effort is for each unit/driver to refuel are every opportunity (e.g., during trips to the rear area). Special attention must be given to the refueling of ammunition hauling vehicles. Coordination is essential to refuel these vehicles as they routinely move to and from the ASP . Fuel should be recovered from disabled vehicles whenever possible. Packaged grease and lubricants are obtained through normal supply channels and distributed as required. Generally refueling operations are carried out as follows:

- Vehicles are alternated to a centrally located fuel site.
- Fuel is provided by battalion, regiment, and/or CSSE tankers.
- Vehicles are refueled during RRP operations.

Class IV. Requisitions for class IV items are submitted through normal supply channels. Distribution is the same as class II, except that fortification and barrier materials may be throughput by CSSE. Materials are issued on an as required basis.

f. Ammunition Operations. Ammunition resupply is one of the most vital logistics operation for an artillery unit. A properly functioning class V(w) support system provides the correct type and quantity of ammunition at the proper time and place. The system is tailored to fit the needs of the unit. The system incorporates the positioning of resources, maintenance of status, and concept of

support. The class V(w) support system adjusts to changes in the tactical situation, fire plan, and ammunition plan. Frequent and continuous coordination between the, supported unit and CSSE is essential.

(1) CSSE Responsibilities. The CSSE maintains ammunition stocks at various locations and delivers ammunition to the supported GCE. It is essential that the artillery commander makes frequent and accurate projections of ammunition requirements to the GCE commander in order to allow time for repositioning and prioritizing resupply efforts.

(a) Ammunition Company, Supply Battalion, FSSG. The ammunition company is assigned the mission of establishing ammunition dumps and operating supply points for class V supply. Ammunition company provides detachments to DS and GS CSSEs for ammunition operations.

The FSSG or detachments provide combat supply and maintenance support for chemical weapons. The supply battalion stocks special types of class V items and provides detachments specialized in assisting supported units. Chemical weapons require special consideration in combat operations, especially with respect to safety, security, transportation, and handling. The supply battalion performs all functions incident to the receipt, storage, issue, and fielding of chemical material.

(b) Ammunition Supply Point. An ASP is a supply activity established by the CSSE for receipt, storage, assembly, issue and/or distribution; limited salvage; and surveillance of Class V items for supported units. ASPs are normally assigned general support missions. A stockage level is maintained at the ASP with a specified quantity, but the level may vary with the requirements of the operation. Items are drawn form ASPs and are issued to the requesting unit as soon as possible. Ammunition operations transfer ammunition to artillery resupply vehicles to support the periodic or daily resupply needs of units. Successful ammunition operations require interface between the CSSE and the artillery unit in order to supervise the timing of deliveries and loading of vehicles with the proper type of ammunition. The artillery units should provide an individual knowledgeable in ammunition handling (e.g., projectile/fuse combinations) to function as an ammunition officer when interfacing with the CSSE. Frequent coordination between the artillery S-3 and S-4 and the ammunition officer allows for responsive resupply of ammunition in the required quantities and types.

(2) Artillery Responsibilities

(a) Artillery Battalion

(1) Ammunition Vehicle Load Plans. Vehicle load plans are developed around the basic load of ammunition, as this constitutes the greatest transportation demand. Load plans are developed for ease of access to supplies. The load plan facilitates replenishment of the gun sections and re-supply of the vehicle itself. A vehicle is designed to carry a single type and lot of ammunition if possible. The basic load of ammunition may require units to carry only mission essential equipment. Non-essential equipment can be palletized and staged for later use. In dynamic operations, the ammunition is serviced from mobile loaded vehicles to allow for frequent displacement. In static operations, there may be a requirement to download ammunition to free vehicles for replenishment.

(2) Ammunition Train Composition. After load plans have been developed, transportation assets are designated in support of the re-supply effort. Designated vehicles are used to form an ammunition train.

(3) Tailored Ammunition Packages. An ammunition package's content is based on experience, unit requirements, and flexibility. The artillery commander uses ammunition packages tailored to enhance artillery effectiveness to the supported unit. Tailored ammunition packages allow for greater quantities of high usage munitions to be carried on ammunition vehicles. Low usage ammunition (e.g., FASCAM) may be carried by a designated battery or section. This allows other units to adjust their basic load in order to carry greater quantities of high usage ammunition.

(4) Ammunition Resupply and Delivery. A basic principle for responsive ammunition support is the positioning of supplies as far forward as possible to reduce turnaround time. This is achieved by establishing unit priority for delivery and by selecting the method of resupply based on the tactical situation.

- Decentralized operations require battery ammunition sections to operate independently, drawing resupply directly from ASPs or CSSEs. Battalion assets are formed into small ammunition trains for selective augmentation of battery sections. The S-4 monitors the location and disposition of vehicles. This method is difficult to coordinate and maintain in dynamic operations.

- Centralized operations provide a high degree of control and flexibility. Centralized operations consolidate some of the battery's ammunition section assets into an ammunition train controlled by the battalion. Methods of operation range from daily resupply to continuous movement of ammunition train vehicles to and from ASPs to firing positions. Regardless of the degree of centralization, batteries must retain organic ammunition vehicles to carry basic loads and move ammunition within battery position areas.

Ammunition may be delivered directly to battery positions by the regiment, battalion, or CSSE. Distribution to batteries depends on the location, configuration of the position, and the ability to down load ammunition. Helicopters also provide transportation. In place deliveries to howitzer sections are desired.

Deliveries can also be made by exchanging loaded vehicles from the battalion ammunition train with empty vehicles of a battery's ammunition section. The exchange of loaded vehicles for empty ones reduces handling and turnaround time for the train. The use of pre-configured ammunition packages and vehicle load plans facilitates this exchange. This technique is particularly adaptable to high usage munitions.

(b) Pre-positioned Ammunition Stockages. Ammunition is down loaded at batteries or battalions as a means of pre-positioning ammunition in the forward area. Based on anticipated requirements, ammunition is moved forward during lulls. In defensive operations, stockpiles in battery areas support periods of increased expenditure such as counter-mechanized fires. In offensive operations, a series of stockpiles may be established in battery positions as well as future positions to support assault expenditures. If circumstances preclude the expenditure of pre-positioned quantities, ammunition is reported as excess and re-allocated.

(c) Unit ASPs. Unit ASPs may be formed by artillery units in forward areas. The reduced turnaround time for resupply offsets the required down load of ammunition. The ammunition is brought in by CSSE convoys, helicopters, and/or artillery trains. Unit ASPs can function from loaded vehicles and/or stockpiles on the ground. Advantages of unit ASPs include:

- Ammunition up load and unit displacement can occur concurrently.

- Ammunition distribution is conducted at a distance from forward positions.
- Unit vehicles are dedicated to the movement between the ASP and their respective positions.

Disadvantages of unit ASPs include the need for multiple handling, down loading, time, and assets. Unit_ASP site considerations include an area:

- Large enough to segregate ammunition.
- Adequate for night operations.
- Which provides adequate camouflage and concealment.
- To support movement of MHE and heavy vehicles.
- Not unduly affected by adverse weather.

Time can be saved by developing a plan for the loading of prime movers and trailers in separate areas to facilitate simultaneous loading. To control congestion, the commander establishes unit priority for entering the site and using MHE.

(d) Ammunition Management. Ammunition management is a continuous process performed by all units during a battle. Accurate record keeping is a critical part of ammunition management and must be practiced by all artillery units.

(1) Weighting the Main Effort. The battlefield requires the availability of sufficient supply levels and the time and means for distribution. The assignment of priorities occurs by designating an element to receive priority of fire, establishing a priority to a particular type of fire (e.g., counterfire), or identifying priorities for unit re-supply.

(2) Unit Interaction. Interaction between supporting and supported staffs must be emphasized. Unit commanders providing fire support must be informed of possible plans that require large quantities or special types of ammunition. Supporting commanders, stay abreast of possible courses of action so that support can be coordinated.

(3) Controlling Ammunition Issue. Maximum effort must be given to the issue of ammunition by lot segregation. Issuance and distribution of the minimum lots of projectiles, propellants, and fuses contribute to the gunnery solution and maximizes available carrying capacity. Recording the ammunition lot allows reports on condition, performance, and accidents in which ammunition is involved.

(4) Gunnery and Weaponeering Application. Prudent fire support planning, fire planning, and fire direction contribute to sustaining operations. Sound fire direction techniques reduce the need for survivability moves and increase ammunition effectiveness. Thus, the logistical burden of ammunition re-supply is reduced.

(5) Supply Economy Enforcement. Restricting and controlling firing practices conserves supplies and reduces the logistical burden of ammunition re-supply. Firing needs should be determined, fire plans established, and target priorities set to control the need for re-supply.

g. Maintenance Operations. A unit's ability to sustain combat operations rests on the ability to perform on-going maintenance. An effective maintenance program must incorporate the allocation of personnel and time, availability of repair parts and tools, and command emphasis at all levels. Commanders ensure that equipment is properly maintained by personnel under their control. Commanders monitor maintenance programs to ensure preventive maintenance (PM) which minimizes failures and ensures the smooth flow of repair parts and equipment for corrective maintenance (CM) when failures occur.

(1) Maintenance Support. Organizational maintenance is performed as far forward as the tactical situation allows and keeps the equipment in the hands of the user. As with other logistics functions, the commander establishes a maintenance program to maximize assets. Battalion or regiment MCTs or CSSE MSTs may be used to perform or assist in on site malfunction diagnoses, adjustments, alignments, repair, or replacement of end items or major assemblies. High usage parts should be held as far forward as possible.

(a) Preventive Maintenance (PM). The program includes systematic servicing and inspection, correcting failure before damage occurs, and proper use of equipment. Early and thorough PM prevents minor discrepancies from becoming major problems requiring extensive repair. The aim of PM is to prevent corrective maintenance.

(b) Corrective Maintenance (CM). When equipment becomes inoperable, it should be repaired on site at the lowest possible level. Battery level maintenance is limited to certain organizational maintenance services and minor repairs. The exact responsibility for repair of an item of equipment is determined largely by the type of equipment.

1. Vehicles. The S-4 will coordinate with the battalion motor transport officer to dispatch a MCT. Repairs will be made on site if

possible. If the repair requires intermediate level maintenance, the MCT will request a CSSE MST via the S-4 to repair the vehicle on site, if required. If a vehicle cannot be repaired, it is evacuated and repaired at the battalion. If evacuation is hampered by lack of time or capability, the vehicle may be moved to a maintenance collection point along the supply route where it is picked up by the CSSE.

2. Communications-Electronics Equipment. Organizational maintenance of communications-electronics equipment is performed by trained technicians within the artillery unit. On site repair is preferred. Equipment repair and responsibility are delegated as follows:

- Communications-electronics equipment requiring repair is evacuated to the battalion communications platoon. The headquarters battery of the artillery regiment performs intermediate maintenance on electronics systems within the command and weapons-loading radar equipment.

- General purpose test, measurement, and diagnostic equipment is calibrated and repaired by the electronics maintenance company, maintenance battalion, FSSG.

3. Engineer Equipment. Engineer equipment mechanics and electrical equipment repairmen are provided as required by the regiment. Second echelon maintenance is conducted by qualified maintenance personnel attached to the using unit or a MCT dispatched from the regimental engineer section. The regimental engineer section is responsible for the evacuation of malfunctioning engineer equipment.

4. Ordnance Equipment. Weapon repair is performed by the individual/crew, battery armorers, or artillery mechanics. If these individuals cannot repair the weapon, a CSSE MST is requested for on site weapon repair. If on site repair is not feasible, the weapon is evacuated.

(2) Maintenance Site Selection. Maintenance site selection is governed by the following fixed, physical characteristics: terrain, weather, tactical situation, size and mission of the unit, and the mission's maintenance requirements. Variables that impact maintenance site selection are addressed below.

(a) Adequate Space.

(b) Suitable Terrain Features. The terrain should offer ; favor defense against air or ground attack; facilitate local security; hard stand for vehicles and equipment; and accessibility to road, water, and air routes for evacuation and re-supply.

(b) Route Access.

(c) Proximity to Supported Units

(d) Proximity to Other CSS Elements.

(e) Maintenance Area Organization. The following should be considered when organizing the maintenance area:

- Organized in accordance with equipment density and anticipated maintenance workload.
- Structures to protect equipment from the climate.
- Drainage patterns.
- Generators positioned to provide adequate support throughout the area.
- Defensive positions must be accessible to the place of work.
- Storage areas for fuel and other flammables.
- Fire fighting equipment must be positioned.
- Points of access.
- Protection for personnel and equipment.

(3) Recovery and Salvage. Commanders are responsible for the recovery of their own disabled vehicles to facilitate repair efforts and prevent destruction or capture by the enemy. Recovered vehicles are inspected, repaired, and placed in operation at the lowest level possible. If a vehicle cannot be repaired, it is reported as disabled. The report includes the location, number and type of vehicles, and condition. Battery collected salvage materiel is evacuated to a battalion collection point by vehicles making supply trips to the rear. Battalions usually operate a collection point in the vicinity of their maintenance area. Salvaged, excess, and damaged items evacuated to the battalion are turned in for evacuation to CSSE. Vehicles which cannot be repaired are removed from the traffic pattern. The location and condition of these vehicles are reported to higher headquarters through logistics channels.

(4) Captured Materiel. Captured materiel is collected and evacuated under S-2 supervision. Captured materiel is always reported to the next higher headquarters where it provides a source of intelligence information.

(5) Equipment Destruction. The decision to destroy equipment is made only on approval delegated by higher authority. When ordered, destruction is accomplished quickly, efficiently, and uniformly. Plans for destruction should be prepared in advance and incorporated into unit SOPs.

h. Engineer Operations. Engineer operations in artillery units include preparation/hardening of unit positions; utility support; and nuclear, biological and chemical material handling and decontamination support. Artillery units may receive support from several sources, including the regimental engineer section, division engineers, and/or the CSSE.