Appendix M
MARINE CORPS TRAINING ON GUAM TECHNICAL APPENDIX

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Final

Environmental Impact Statement

GUAM AND CNMI MILITARY RELOCATION

Relocating Marines from Okinawa, Visiting Aircraft Carrier Berthing, and Army Air and Missile Defense Task Force

MARINE CORPS TRAINING ON GUAM TECHNICAL APPENDIX

July 2010

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1.0 Non-Firing General Military Skills Training Facilities

The general classes of non-firing general military skills training relevant to all Marines for survival on the battlefield include the following:

- Physical Fitness
- Individual Combat Skills
- Crew, Unit, and MOS Combat Skills
- Driving and Equipment Operations

Proposed Facilities and Operations

Table 1.0-1 provides summary facility and operational characteristics for proposed non-firing training facilities that would be constructed under the proposed action. Brief project descriptions for each type of proposed facility and training activity are provided below. (For more detailed information on all the training elements needed and proposed for Guam, see the "Training Concept Plan of 2008" completed by Marine Forces Pacific).

Table1.0-1. Summary of Proposed Non-Fire Training Facilities and Operations

Facility	*Facility Footprint ac/ha*	*Typical Use*	*Munitions Use*	*Annual Requal. Req.(No. of Personnel)*[1]	*Location*
Two Obstacle Courses and a Confidence Course	2/.8	Weekly basis, 25-60 personnel at any given time	None	8,000	Main Cantonment
Hand-to-Hand Combat Pit	< 1/.4	Weekly basis, 25-60 personnel at any given time	None	8,000	Main Cantonment
Rappelling Tower	< 1/.4	Weekly basis, 25-60 personnel at any given time	None	8,000	Main Cantonment
Gas Chamber	< 1/.4	Weekly basis, 2-3 hour training per session	Chlorobenzai-malononitrile (CS) gas	8,000	Main Cantonment
Combat Training Tank	< 1/.4	Weekly basis, 25-60 personnel at any given time	None	8,000	Main Cantonment
General Purpose Auditorium	2/.8	Capacity to brief 6,000	None	Not applicable	Main Cantonment
Maneuver Training Area: Andersen South	2,000/809	250-300 personnel/week, 5 days/week , 45 weeks/year	Pyrotechnics, blanks	11,250-13,500	Andersen South northwest of Route 15
Maneuver Training Area: NMS	3,350/1,356	120 personnel, 5-7 consecutive days, 12 times per year	Pyrotechnics, blanks	1,440	Southern end of NMS
MOUT Complex: Core Urban/Embassy	15/6	Daily basis, 40-750 personnel; 15% night	Pyrotechnics, blanks, small demolitions <1/4 lb.	8,000	Andersen South northwest of Route 15
MOUT Complex: Modular MOUT	5/2	Daily basis, 40-750 personnel; 15% night	Pyrotechnics, blanks	8,000	Andersen South northwest of Route 15

Table1.0-1. Summary of Proposed Non-Fire Training Facilities and Operations

Facility	*Facility Footprint ac/ha*	*Typical Use*	*Munitions Use*	*Annual Requal. Req.(No. of Personnel)*[1]	*Location*
Advanced Motor Vehicle Operators Course (AMVOC)	15/6	Weekly basis, 25-60 personnel, 20 drivers/week	None	1,000	Eastern side of Andersen South
Engineer Equipment and Decontamination Training	5-10/2-4	Daily basis, up to 20 personnel at any given time	None	800	Main Cantonment

Note: [1] Based on U.S. Marine Corps AIP loading.

Obstacle and Confidence Courses

Two proposed obstacle courses and one confidence course would be constructed in the same location. Components of these courses are standard throughout the Marine Corps. Each obstacle course would include a two-lane outdoor complex of wooden obstacles for Marines to hop, climb, crawl, and pull over. The confidence course would include additional obstacles and challenges added within the same footprint as the obstacle courses. The three courses would be located together on a 2-ac (.8-ha) site. The courses would be used daily and accommodate approximately 25 to 60 personnel at a given time.

Hand-to-Hand Combat Pit

A hand-to-hand combat pit is needed for training in hand-to-hand combat techniques. Under the proposed action, a sand-filled area with padded retaining wall would be constructed to provide a safe area for training Marines in hand-to-hand combat techniques.

Rappelling Tower

Under the proposed action, a 60-ft (18-m) tower of four floors, approximately 26 ft (8 m) on a side with a rappelling wall, overhang, and climbing wall would be constructed.

Gas Chamber

Under the proposed action, a 4,000 ft^2 (372 m^2) single building would be constructed, consisting of a 600-ft^2 (56-m^2) gas chamber, 1,500 ft^2 (139 m^2) of classroom and associated office space, a mechanical room for ventilation/filtration, and storage of training devices.

During training events in this type of facility, participants are exposed to a non-lethal "tear gas" that is typically used as a riot control agent. The training is designed to teach individual confidence in the application of a field protective mask in the presence of gas.

Combat Training Tank

Under the proposed action, one 13,000- ft^2 (1,208-m^2) swimming pool would be constructed to meet the training requirement for water survival and amphibious vehicle egress.

General Purpose Auditorium

Under the proposed action, an approximately 72,000-ft^2 (6,690-m^2) auditorium would be constructed to provide capacity to simultaneously brief 6,000 military personnel.

Maneuver Training Areas and MOUT

Maneuver training areas are used for training Marines in the variety of skills specified in the Infantry Training and Requirements Manual (NAVMC DIR 3500.87), as defined in the Required Capabilities

Document. In general, for company-level (200 Marines) training, a 12 square mi (3,108 ha) maneuver space is optimal. This type of space is not available on Guam, but maneuver training can be conducted in smaller areas. The size requirement depends on the size of the Marine units and the size and complexity of a training event. Proximity is an important characteristic for efficient-to-use training areas, as cost and difficulty of transportation directly diminish the amount of training that can be accomplished within a given budget.

Based on the loading of Marines per the requirements of the AIP, an estimated 8,600 Marines transferred from Okinawa to Guam would require company-level maneuver training on Guam biannually. There is a shortage of open space for company-level maneuver training on Guam, and a hierarchy of maneuver training spaces in multiple areas would be needed to meet the unit training objective for Guam. Small areas within Main Cantonment would provide maneuver area training to include crew, fire team, and squad training such as gun drills, formations, and camouflage. It would primarily consist of foot maneuvers and would not include live-fire training, but would include firing of blanks in weapons and use of smoke (i.e., pyrotechnics) for marking. The use of smoke and flares would be limited seasonally. Air-ground operations would include Helicopter Support Team training for ground units. Personnel train in rappelling from the helicopter on ropes (sometimes called fast roping) and procedures that would be used in inserting and extracting troops via helicopter at combat locations. The maneuver area aviation training operations would be a component of training to meet the aviation training requirements.

Proposed development at the two maneuver sites would be minimal. In addition to the required open space, there is also a requirement for a division-sized LZ and roads to support maneuver training.

In these two maneuver training areas, operations would be as follows:

- NMS: Company-level patrolling, jungle training, land navigation, and air-ground operations to occur on 5-7 consecutive days, 12 weeks per year, day and night. Access to the NMS site would potentially occur via helicopter transport operations. Although improvements to existing access to the NMS would be needed (and is further discussed below), no roads would be established within this training site. When the existing Explosive Ordnance Disposal (EOD) demolition range at NMS is operational, an Explosive Safety Quantity Distance (ESQD) arc is generated at the proposed site for maneuver training.
- Andersen South: Convoy operations, Military Operations in Urban Terrain (MOUT)-related maneuver training, and general maneuver and air-ground operations to vary from small unit to company-level exercises to occur 5 days a week, 45 weeks per year, day and night. This area of Andersen South is currently used by the Air Force for expeditionary airfield training that has similarities to the proposed maneuver area training. The area would be scheduled to continue to support this Air Force training, while also accommodating the Marine Corps training requirements.

An approximately 2,000-ac (809 ha) area at Anderson South near the proposed MOUT complex has been identified for maneuver training to include the convoy course.

LZ AS1 would support maneuver training operations at Andersen South. The convoy training course would use existing roadways and abandoned rights of way in the northwestern portion of Andersen South within areas identified for maneuver training use.

MOUT training would be conducted in a complex of structures that would simulate urban rural and embassy environments The MOUT at Anderson South would be suitable for units/organizations up to 800 Marines at a time, and would be used on a daily basis by 40 to 750 personnel. The MOUT may operate during daylight hours and at night. Night operations would comprise an estimated 15% of all operations.

The MOUT would be used by III MEF units and organizations based on Guam, transients, and visiting regional allied forces. Units using the various MOUTs may bivouac in the vicinity, or arrive and depart daily. Forklifts or cranes would be used to reconfigure the modules of the MOUT to add variety and diversity to training (e.g., simulate a rural village or more complex setting). The MOUT facilities requires surrounding maneuver space to provide room for tactical engagement.

A fire management plan, currently being prepared by NAVFAC Pacific, would address the fire conditions under which use of pyrotechnics at Andersen South and NMS would be authorized and best management practices for use of those pyrotechnics. This plan would also address broad fire management and fire response at the Andersen South and NMS proposed maneuver areas.

The facilities and locational information are presented together for the MOUT complex at Anderson South, as facilities requirements have been developed concurrently. Two site plans have been developed for the MOUT and supporting facilities, reflecting slight differences in configuration that would occur with the Range Complex Option A and Range Complex Option B. The overall site plans for Andersen South also include the AMVOC, maneuver area, and convoy course.

If Route 15 is realigned under Option A for the Firing Range Complex access roads and gates would be needed for the portion of Andersen South north of the route realignment. The plan assumes two bridges would be constructed across Route 15. If only one bridge is constructed, then a parallel road would be needed for the road segment north of the Route 15 realignment, between the proposed secondary gate and the intersection with the proposed north-south road that would lead to the proposed main gate, in order to provide adequate traffic circulation. The proposed secondary gate is an existing gate that would be upgraded. If Route 15 is not realigned as would be the case under Option B for the Firing Range Complex, the existing gate would be upgraded and the bridge would not be constructed at that location. Under both options a perimeter security fence and gravel parking area would be constructed to serve the complex.

Advanced Motor Vehicle Operators Course (AMVOC)

Tactical motor vehicle operator training is a continuous requirement for MEF units. The proposed AMVOC would consist of a route along where a series of obstacles would be placed for driver trainees to negotiate.

The AMVOC course would be constructed on the western side of Andersen South.

The capacity of the AMVOC facility would range from 25 to 60 personnel and would be used for individual, section, squad, or platoon training. An estimated 20 drivers per week would train at the AMVOC, primarily with HMMWVs.

Engineer Equipment and Decontamination Training

The engineer equipment training site or "engineering pit" would be similar to a permanent construction site and would be located at the Main Cantonment. The engineer equipment site would be designed to support all three engineer units (approximately 750 Marines) to be stationed on Guam. Types of vehicles that would operate at the "engineering pit include bulldozers, graders, material handling equipment, and Armored Combat Engineer Vehicles. Decontamination training involves using wash-down equipment to simulate decontamination of equipment exposed to a chemical or biological agent. The decontamination site would be used on a weekly basis with equipment and personnel throughput to vary based on the training scenario.

2.0 Firing General Military Skills Training

Overview

General military skills training involving the firing of munitions includes the following categories:

- *Individual Weapons Training.* Individual weapons are those assigned by Table of Organization that requires either annual requalification or periodic familiarization firing. These weapons include the 5.56-mm rifle (M-16 rifle or M-4 carbine) and 9-mm service pistol (M-9). All Marines are armed with one or another of these weapons, and most require annual requalification. Individual weapons training occurs at KD range that are those where there is an established distance between firing points and targets, and UD ranges that are those where this distance varies.
- *Individual Combat Skills*. Hand grenade training is a standard combat and combat-support individual MOS skill. Marines must conduct this training every 6 months.
- *Crew, Unit, and MOS Combat Skills.* These are collective operational capabilities that include weapons crew proficiency. This training would occur at the UD Range, Multi-purpose Range, and Machine Gun Range.

Ranges that use live-fire munitions are categorized as qualification and operational ranges. All military personnel require individual or small crew weapons training (i.e., qualification) to maintain their certification levels on specific weapons, and to advance to higher or different skill levels. Operational training allows for groups to develop and maintain combat proficiency and typically requires larger operational training in order to accommodate more people and approximate real world conditions.

It is anticipated that the four proposed qualification firing ranges would be used by military personnel (all services) as much as 7 days per week. Weapons ranges would fulfill requirements for individual qualification (Tables 1, 2, 3 and 4 of the Marksmanship Manual Marine Corps Order 3574.2K), and sustainment proficiency training for crew-served weapons common to the majority of organizations in the prescribed loading (M2 .50-caliber machine gun, MK19 40-mm machine gun, M-240 7.62-mm machine gun, M249 5.56-mm SAW). Requalification occurs annually for essentially all Marines, sustainment training occurs semi-annually for assigned crews to maintain Command and Control training readiness.

Each range would be defined by a range footprint that is the area of the range encompassing firing positions and targets that has been cleared of vegetation and contains back-stops, service roads, limits of fire delineators and related facilities. Small arms ranges are designed to contain the projectiles within the range footprint itself. Firing ranges typically have fan-shaped SDZs that contain:

- Firing positions: location of fire
- Target areas: the area that contains the targets/backstops and that is demarked by limits of fire delineators
- Dispersion area that includes the ground and associated airspace within the training complex used to contain projectiles between point of fire and the farthest target, with allowance for over shots and horizontal aiming variation
- Buffer zones: or secondary danger areas that contain the ricochets and fragments that by statistical analysis may extend beyond the dispersion area

SDZs must be devoid of unrelated facilities, and access to the SDZ is restricted to those involved in the conducted training. SDZs over water and affecting navigable airspace are published on charts with restrictions to access denoted as appropriate. Depending on the type of restriction, these spaces are monitored by range control during firing for safety.

For planning purposes in this EIS/OEIS, notional SDZs have been developed based on the conceptual placement of ranges. As the planning process progresses, and range designs mature, the SDZs would be certified in accordance with Marine Corps Order 3550.9, Marine Corps Ground Range Certification and Recertification Program. Limitations to use of land, water and airspace affected by SDZs are subject to regulation by the DoD, U.S. Coast Guard (USCG), U.S. Army Corps of Engineers (USACE), and the FAA, as appropriate.

Other fire ranges that do not use targets also have restricted zones around them. The demolition range would have a noise setback and a fragmentation hazard setback. Munitions expended at the proposed small arms ranges would be entrapped in soil impact berms that would be constructed in accordance with the specifications in Military Handbook 1027/3B, Range Facilities and Miscellaneous Training Facilities Other than Buildings Handbook. This handbook addresses the required dimensions of the range and earthen berms for safe operation of the ranges. In order to properly maintain the range berms, the Marine Corps would periodically shut down the range, sift the expended rounds from the soil on site, and place the soil immediately back on the berm face, and contain and transport expended rounds to a local recycling contractor or smelter in accordance with all applicable regulations. Soils would be regularly evaluated and maintained at a neutral pH level (6 to 8). Grassy vegetation would be maintained on berms and engineering controls employed to manage BMPs relating to stormwater and control erosion. A monitoring program would be implemented to identify any early indications of lead movement and establish protocols for environmental protection if such indications are identified.

Table 2.0-1 summarizes the areas encompassed by the range footprint and SDZs associated with the firing ranges. Table 2.0-2 presents the daily and annual proposed use of the five proposed outdoor small arms qualification ranges. Table 2.0-3 presents summary data on the daily and annual use estimates for the demolition and explosive ranges (and small arms fire associated with the shooting house) under the proposed action. All live-fire training and support facilities that are part of the proposed action are described in the text that follows.

Table 2.0-1. Size of Proposed Firing Ranges and Associated Notional SDZs

Weapons Range	*Range Footprint (ac/ha)*	*Notional SDZ (ac/ha)*
Rifle KD	13/5	992/401
Pistol	0.2/.08	190/77
Square-Bay	1.3/0.5	722/292
UD Range	31/13	728/295
Machine Gun	56/23	7,434/3,008

Table 2.0-2 Daily and Annual Use of Proposed Small Arms Outdoor Qualification Ranges

Range	*Weapon*	*Ammunition Type*	*Typical Use Estimate*			*Ammunition Expenditure Estimates*		
			Crews or Personnel	*Hours*	*Days Per Yr*[(a)]	*Busy Day*[(b)] *Day*	*Busy Day*[(b)] *Night*[(c)]	*Annual*[(d)]
KD	Rifle	5.56mm	250	0800-1200 1900-2200	200	10,000	2,250	2,450,000
Pistol	Pistol (M9)	9mm	100	0800-1200 1900-2200	225	7,000	3,000	2,250,000
Square Bay	Rifle	5.56mm	125	0800-1600 1900-2200	225	4,523	2,227	1,518,750
	Pistol	9mm	25	0800-1600 1900-2200	225	4,500	750	1,181,250
UD	Rifle	5.56mm	64	0800-1600 1900-2200	225	5,440	750	1,392,750
Machine Gun	MMG	7.62mm	32	0800-1600	225	4,000	2,400	920,000
	HMG	.50 cal	32	0800-1600	225	4,000	2,400	340,000
	HMG	40mm TP	32	0800-1600	225	1,120	480	82,000
							Total	**10,134,750**

Legend: cal = caliber, mm = millimeters, HMG = heavy machine gun, MMG = medium machine gun.

Notes:

(a) The figures for number of days of use are determined from estimated down time for maintenance and weather. Typical use is estimated at 5 days/week, 45 weeks/year for most ranges and 5 days/week, with the exception of the KD range that is adjusted to account for weather (i.e., if 1 or 2 days of training at the KD range is lost due to weather, the whole week is rescheduled; scheduling of the other ranges is more flexible). Range use would occur periodically throughout the year, with no predictably busy or non-use periods.

(b) The estimates for the KD, Pistol, Square Bay, and UD ranges are based on the maximum number of shooters per day who could make use of each proposed range (calculated by multiplying the number of firing points or lanes by the number of firing relays), firing the number of rounds prescribed for a standard string of fire. This estimate is consistent with the munitions allocation for the relocated AIP units. For the machine gun range, the AIP munitions allocation is considerably less than the range capacity.

(c) Night refers to non-daylight hours that are generally 1900-0600 on Guam. Range use is not expected to extend beyond 2200 (2200-0700 is considered nighttime for community noise analysis)

(d) The annual numbers of rounds expended are consistent with the AIP munitions allocation.

Table 2.0-3. Daily and Annual Use of Proposed Demolition and Explosive Ranges

Range	*Explosive/ Munitions*	*Typical Use Estimate*			*Expenditure Estimates*		
		Crews or Personnel	*Hours*	*Days Per Yr* [(a)]	*Busy Day*[(b)] *Day*	*Night*[(c)]	*Annual* [(d)]
Demolition	TNT (<20 lb)	80	0800-1600	48	10 lb	0	500 lb
	C-4	20	0800-1600	48	20 lb	0	682 lb
	Other (20 lb TNT equiv.)	20	0800-1600	48	40 lb	0	1,920 lb
Breacher and Shooting House[(e)]	TNT (¼ lb blocks)	40	0800-1200 1900-2200	36	5	1	300
Hand Grenade	M67 Fragmentation Grenade	54	0800-1600	70	54	0	3,780
Hand Grenade House	M67 Fragmentation Grenade	26	0800-1600	70	26	0	1,820

Legend: lb = pound, TNT = trinitrotoluene.

Notes:

(a) Typical use of ranges: demolition range 4 non-consecutive days per month; breacher and shooting house 3 consecutive days per month; hand grenade range and hand grenade house 1-2 times per week up to 70 days per year. Range use would occur periodically throughout the year, with no predictably busy or non-use periods.

(b) Estimates are based on the number of personnel that would train at each range times the number of explosives / grenades that would be used in a high-use training day. This estimate is consistent with the munitions allocation for the relocated AIP units.

(c) Night refers to non-daylight hours that are generally 1900-0600 on Guam. With the exception of the breacher and shooting house, training at the demolition or explosive ranges would occur during daylight hours only. See note (e) for additional estimates for firing of the 5.56mm rifle at the shooting house.

(d) The annual estimate is consistent with the AIP munitions allocation.

(e) In addition to the use of breacher charges, the 5.56mm rifle would be used by the 40 personnel conducting training at this location. An estimated 2,400 5.56mm rounds would be expended by these personnel at the breacher and shooting house in a busy training day, with 1,200 of those expended during nighttime, but not past 2200 (2200-0700 is considered nighttime for community noise analysis).

Live-Fire Training Range Complex

The training range complex would operate 45 weeks per year, with the highest daily use generally being between 6:00 a.m. and 10:00 p.m. An estimated 15% of the operations at the pistol, nonstandard small arms range, Modified Record of Fire Range, and machine gun ranges would occur at night. The proposed action would result in an estimated utilization of qualification ranges (KD, pistol, nonstandard small arms, and modified record of fire) for up to 8 hours a day, 5 days per week, for 45 weeks per year. The number of personnel training on the range complex could vary between 70 and 250. It is anticipated that the qualification firing ranges would ultimately be used by military personnel (all services up to 24 hours a day, 7 days per week, for 45 weeks per year). Range management, including maintenance, accounts for up to 4 weeks per year that the range complex may not be available for use. The proposed Training Range Complex would include the following individual ranges:

Range Control and Range Maintenance Buildings

The range and training area management and maintenance facilities would house several related functions necessary for managing and maintaining the ranges, including scheduling, safety, air/sea-space clearance, maintenance, environmental monitoring, security, and training. These functions are specified in detail in Marine Corps Order P3550.10, "Policies and Procedures for Range and Training Area Management." Numerous smaller structures associated with each range are covered with the range itself.

The range control function would be operating whenever there are training activities. During the day, 100-120 personnel could be working at the facility. If there are evening training operations, 2 to 8 persons would be at the facility. Traffic to the site would include personal vehicles, buses, delivery trucks, and

range vehicles. Approximately 40 personal vehicles, two delivery trucks, and two buses would arrive to and depart from the site daily. Hazardous materials would be limited to fuel for on-site lawn mowers and range machinery. No munitions would be handled at the office.

Three separate structures would be constructed:

- Administration building - a 7,000 ft^2 (650 m^2) building providing office space for range management, safety, scheduling, and coordination, and training. It would include a three-bay Indoor Simulated Marksmanship Trainer.
- Maintenance and storage building - the 22,000 ft^2 (2,044 m^2) range maintenance and storage building would include offices for maintenance, supply, and environmental personnel; a maintenance bay for range vehicles; delivery point and storage for materials; carpenter shop for target construction/ repair; storage for targets and shooter's jackets; storage and repair for range maintenance equipment such as tractors and mowers; and separate flammable storage is required for gasoline and other volatile consumables used in target repair.
- Automated target storage and maintenance building - the 18,300 ft^2 (1,700 m^2) dehumidified automated target storage and maintenance building would be used to store and maintain the automated target systems, including automated target systems for the MOUT. The number of targets to be stored is approximately 728 stationary infantry targets and lifters or equivalent, 48 moving infantry targets, 28 stationary armored targets and 12 armored movers; which would require a warehouse of approximately 17,820 ft^2 (1,656 m^2), plus administrative and electronics maintenance space (for target lifter/sensor repair) for 4 personnel, estimated at 480 ft^2 (45 m^2).

Known Distance Range

The proposed KD range would provide for 50 firing points, but the range area would be sized for future expansion up to 80 firing points. The range would be 160-yards wide and 500 yards from the farthest firing line to the target line. Other features would include:

- Target line flush with ground
- Level ground from 200 yard line to butts
- Trench for future automated target scoring system
- Moveable tower, vehicle lane between firing lines
- Lateral berm for two independently operated ranges
- Target storage and maintenance shed
- Restrooms
- Ready issue magazine
- 250-person covered bleachers

The 13-ac (5-ha) range footprint would be entirely cleared of vegetation and the range designed so that expended rounds would be contained within the range footprint. Following construction, some grassy vegetation may be introduced for erosion and stormwater control in some areas of the range footprint in keeping with BMPs.

Daily munitions use at this range is summarized in Table 2.0-2. Typical daily operations at the KD Range would involve the firing of 5.56-mm munitions at 50 firing points. There would be approximately five relays (i.e., one group fires at the 50 firing points, followed by each additional group until five groups have completed shooting a standard string of fire) in order to train approximately 250 personnel. Each person would typically fire approximately 40 rounds, with a maximum of 60 rounds. Approximately 15% of the KD range use would occur at night. Typically, the KD range would be used 5 days per week, but use may be as frequent as 7 days per week at times. Annual use is estimated at 40 weeks per year, as

compared to 45 weeks per year at the other ranges. This is due to the fact that weather events are more likely to require rescheduling of weekly training events at the KD range than the other types of ranges.

Pistol Range

The proposed pistol range would provide for the required 25 firing points and would be expandable to 30 firing points, 50 yard or 150 ft (46 m) square-bay range for multi-purpose use and conversion to use for M4. The range would be:

- Bermed for parallel placement with KD range. Deviation would be required to deconflict KD range operations
- Variable height target placement for standing or prone firing, turning targets for pistol
- Bullet trap/granulated rubber back stop

The 0.2 ac range footprint would be entirely cleared of vegetation and the range designed so that expended rounds would be contained within the range footprint. Following construction, some grassy vegetation may be introduced for erosion and stormwater control in some areas of the range footprint.

Daily munitions use at this range is summarized in Table 2.0-2.Typical daily operations at the pistol range would involve the firing of 9-mm munitions with the M9 pistol at 25 firing points. An estimated 100 personnel would be trained per day in 4 relays firing a standard string of fire. On average, an estimated 100 rounds would be fired per person, with 30 of those fired during nighttime (but before 10 p.m.). The pistol range would typically be used 5 days per week (weekdays), 45 weeks per year, but use may be as frequent as 7 days per week at times.

Due to the proposed bullet entrapment system, the expended rounds would likely be collected from the bullet entrapment system on a more frequent basis as compared to the other small arms ranges with earthen berms. However, the same procedures would apply as described for the earthen berms.

Square-Bay Range

The proposed Square Bay Range would include the following features:

- 328 ft (100 m) in length, 25 firing points, expandable in future to 50 firing points; 9-mm, 5.56-mm munitions
- Targets at variable heights for prone, kneeling and standing. Moving targets. Automatically scored target system
- Covered bleachers for 200 persons
- Ready issue magazine (ball munitions), fenced storage shed for brass collection and shredding
- Range control tower, climate controlled

The 2-ac (0.8 ha) range footprint would be entirely cleared of vegetation and the range designed so that expended rounds would be contained within the range footprint. Following construction, some grassy vegetation may be introduced for erosion and stormwater control in some areas of the range footprint.

Daily munitions use at this range is summarized in Table 2.0-2 Typical daily operations at the Square-Bay Range would involve the firing of 5.56-mm rifle by 125 shooters and M9 9-mm pistol by 25 shooters. Firing would occur in an estimated 25 lanes and six relays. Ammunition expenditures would average 30 rounds per day per shooter during daylight hours and 15 rounds per shooter per day during nighttime hours (but not after 10 p.m). Daily use is estimated at 5 days per week (weekdays), 45 weeks per year, but there could be times when the range is in use 7 days per week. Periodic range maintenance would be conducted as described for similar ranges above.

Unknown Distance Range

The proposed UD Range would have the following features:

- 16 lanes, expandable to 24 lanes in future; 5.56-mm munitions
- Covered bleachers for 200 persons
- Restrooms
- Ready issue magazine
- Fenced storage shed for brass and boxes
- Range control tower
- Automatically scored target system that uses compressed gas to operate targets

The 31-ac (13-ha) range footprint would be entirely cleared of vegetation and the range designed so that expended rounds would be contained within the range footprint. Following construction, some grassy vegetation may be introduced for erosion and stormwater control in some areas of the range footprint.

Daily munitions use at this range is summarized in Table 2.0-2. Typical daily operations at the UD Range would involve the firing of 5.56-mm munitions with a rifle from 16 lanes for 4 relays. Approximately 85 rounds would be fired per shooter during daylight hours and 15 rounds per shooter during nighttime hours (but not past 10 p.m.). Daily use would be 5 days per week (weekdays), 45 weeks per year, although there would potentially be times when the range is used up to 7 days per week.

Nonstandard Small Arms Range

The proposed Nonstandard Small Arms Range would include the following features:

- 328 ft (100 m) in length, 25 firing points, expandable in future to 50 firing points; 9-mm, 5.56-mm munitions
- Targets at variable heights for prone, kneeling and standing. Moving targets. Automatically scored target system
- Covered bleachers for 200 persons
- Ready issue magazine (ball munitions), fenced storage shed for brass collection and shredding
- Range control tower, climate controlled

The 1.3-ac (0.8 ha) range footprint would be entirely cleared of vegetation and the range designed so that expended rounds would be contained within the range footprint. Following construction, some grassy vegetation may be introduced for erosion and stormwater control in some areas of the range footprint.

Typical daily operations at the Nonstandard Small Arms Range would involve the firing of 5.56-mm rifle by 125 shooters and M9 9-mm pistol by 25 shooters. Firing would occur in an estimated 25 lanes and six relays. Ammunition expenditures would average 30 rounds per day per shooter during daylight hours and 15 rounds per shooter per day during nighttime hours (but not after 10 p.m). Daily use is estimated at 5 days per week (weekdays), 45 weeks per year, but there could be times when the range is in use 7 days per week. Periodic range maintenance would be conducted as described for similar ranges above.

Modified Record of Fire Range

The proposed Modified Record of Fire Range would have the following features:

- 16 lanes, expandable to 24 lanes in future; 5.56-mm munitions
- Covered bleachers for 200 persons
- Restrooms
- Ready issue magazine
- Fenced storage shed for brass and boxes
- 30 ft (9 m) range control tower
- Automatically scored target system that uses compressed gas to operate targets

The 31-ac (13-ha) range footprint would be entirely cleared of vegetation and the range designed so that expended rounds would be contained within the range footprint. Following construction, some grassy vegetation may be introduced for erosion and stormwater control in some areas of the range footprint.

Typical daily operations at the Modified Record of Fire Range would involve the firing of 5.56-mm munitions with a rifle from 16 lanes for 4 relays. Approximately 85 rounds would be fired per shooter during daylight hours and 15 rounds per shooter during nighttime hours (but not past 10 p.m.). Daily use would be 5 days per week (weekdays), 45 weeks per year, although there would potentially be times when the range is used up to 7 days per week.

Machine Gun Range

Facilities for the proposed machine gun range would include:

- Firing: eight stationary firing lanes, expandable to 12 and two moving target lanes. Lanes approximately 3,820 ft (1 km) long. The firing line is 492-ft (150-m) wide; the target line at its farthest extent is 984-ft (300-m) wide. The firing line is raised to include a vehicle firing platform extending 130-ft (40-m) deep.
- Covered bleachers for 150 people
- Restrooms
- Ready issue magazine
- Fenced storage shed for brass and boxes
- 30 ft (9 m) range control tower
- Automatically scored target system that uses compressed gas to operate targets
- Paved vehicle firing box
- Paved range road

Construction of the target systems would include the target emplacements and the control conduit. The range would have a public address system and water distribution for fire suppression and potable water. A perimeter road and security fence would be required. The range footprint would encompass an estimated 56 ac (23 ha).

This project would provide a MK19/.50-caliber machine gun range. The machine gun range is required to provide sustainment training of 0331 MOS personnel and familiarization training for secondary machine gun personnel. Navy/Marine Corps Directive 3500.87, Infantry Training and Readiness Manual, provides specifications for progressive training. The Marine Corps loading is expected to be 24 0331 MOS machine gun personnel requiring semi-annual sustainment training, and would potentially expand to up to 48 0331 MOS machine gun personnel. In addition, there would be approximately 770 Marine Corps secondary duty personnel (and potential expansion to up to 1,100 personnel), the Army has requirements

to train 443 personnel, and the Air Force Commando Warrior trainees would add annual training requirements for 600 additional personnel.

Daily munitions use at this range is summarized in Table 2.0-2.Typical operations at the machine gun range would involve the firing of .50-caliber, 7.62-mm, and MK19 40-mm TP munitions at eight lanes, with four personnel per lane. The range would be used 5 days per week (weekdays), 45 weeks per year. Daily munitions expenditures are estimated as follows:

- Rounds per person per day (.50 caliber): 4,000 daytime, 2,400 nighttime (but before 10 p.m.)
- Rounds per person per day (7.62-mm): 4,000 daytime, 2,400 nighttime (but before 10 p.m.)
- Rounds per person per day (MK19 40-mm TP): 1,120 daytime, 480 nighttime (but before 10 p.m.)

Machine guns fire multiple bullets with each burst. These rounds do not travel along identical flight paths, and the paths of the bullets of any burst that travel in a cluster are called cones of fire. Guns would be mounted on vehicles, tripods, and bipods. These positions would be emplaced and personnel would fire at targets placed at various distances as specified in the Infantry Training and Requirements Manual. Range safety supervisors would monitor firing personnel. The area primarily impacted by bullets is referred to as the beaten zone.

A Range Management Plan, Wildfire Management Program, and Environmental Management Plan would be developed and would address specific plans and protocols for safe and environmentally responsible operation of the machine gun range in accordance with BMPs. The Range Management Plan would primarily address safety, range maintenance, scheduling, and logistics. The Wildfire Management Program, currently under development, would include protocols for monitoring fire conditions and adjusting training as needed (e.g., firing of tracers may be disallowed under certain fire conditions); location and management of fire breaks, fire fighting roads, and a fire fighting water system; protocols for using units to be briefed by range control on requirements suitable to the conditions of the day; and protocols should a fire occur (e.g., specifying how the range would shut down and fire suppression action would be taken). The Environmental Management Plan would address best management practices for erosion control and stormwater management, hazardous materials and waste, recycling of munitions brass and containers, any special procedures for threatened or endangered species or cultural resources.

Personnel would arrive in buses, with some personal vehicles. Up to company size units would use the range at one time (approximately 150 people, requiring four buses, and ten cars). Classes and demonstrations would be conducted in the bleachers, with material of technical, tactical and safety nature. Generally, the machine gun range would be used daily between 6:00 a.m. and 10:00 p.m.; however, 24-hour operations may be required on a limited basis. Medical Corpsmen would be on site during operation of the range. Range lighting would be provided at the bleachers and range towers.

Demolition Range

The demolition range would consist of a demolition pit of dirt or sand, approximately 100 ft (30 m) in diameter, upon where explosives would be rigged, primed, and detonated. Table 1.1-1 provides an estimate of daily and annual demolition charges that would be expended at the range. A limit of 20 pounds of TNT or equivalent would be placed on the range. Training personnel would be sheltered in a bunker or defilade position approximately 985 ft (300 m) from the point of detonation. A fragmentation hazard setback would be established at a distance of approximately 2,645 ft (806 m) and a noise safety setback (unprotected safe hearing distance) would be established at approximately 2,050 ft (625 m). Generally, the demolition range would primarily be used during daylight hours, but operational

commitments and training requirements may require use of the facility after daylight hours. With the proposed action, an estimated total of 862 personnel would require demolition range requalification training biannually. Training would occur at the range approximately 4 non-consecutive days per month.

Hand Grenade Range

An approximately 1- to 2-ac (0.4- to .08- ha) area would be cleared and developed as a hand grenade training range complex for the M67 fragmentation hand grenade. It would consist of a demonstration area with bleachers, an open practice throwing field with various targets and throwing positions located outside of the hazard zone, and a parking area. A 1-ac (0.4 ha) training and demonstration field would also be developed. Within the hazard zone, there would be a holding shelter for the subsequent throwing relay of 4 persons, 4 throwing positions with grenade sumps, located approximately 17 ft (5 m) apart, a range tower with ballistic glass, and a grenade dudded impact area (explosive impact area with the potential to contain unexploded charges) approximately 66 ft (20 m) from the throwing positions.

The range would be used on a daily basis, generally during daylight hours only; however, operational commitments and training requirements may require use of this facility after daylight hours. Daily munitions use at this range is summarized in Table 2.0-3. Typical operations at the Hand Grenade Range would involve the use of M67 fragmentation hand grenade at four throwing positions. On a typical day, 30 hand grenades would be expended and on a busy day, approximately 48 hand grenades would be expended. The hand grenade range would be used an estimated 2-3 times per week, 45 weeks per year. The SDZ for a hand grenade is defined at a distance of 492 ft (150 m) from the range.

Hand Grenade House

A Grenade House training facility is required as part of the proposed action. An approximately 100 ft by 100 ft (30 m by 30 m) area would be cleared and a structure made of ballistic concrete or other bullet absorbing material would be constructed to serve as a Grenade House. Communications would include telephone connectivity to Range Control. The SDZ for the hand grenade house would be defined at a distance of 492 ft (150 m). The Grenade House would be collocated with the grenade throwing pits utilizing same associated features and range control.

Training for this individual combat skill is conducted at individual stations and is enhanced when co-located with MOUT and maneuver training areas. The proposed grenade house would provide four-stations to accommodate training for up to four personnel at any given time. Fragmentation grenades would be authorized for use at the grenade house. Daily and annual estimates of hand grenade use are provided in Table 2.0-3. Munitions would be temporarily stored in a permanent concrete structure (magazine) with dimensions of approximately 10 ft by 10 ft (0.3 m by 0.3 m). There would be an earthen berm on three sides of the magazine and it would be located nearby for convenient access during the training exercise. Operations at the proposed grenade house would be suitable for squad and platoon training.

Figure 2.0-1 depicts a typical hand grenade house. The grenade house would typically be used 2-3 times per week, 45 weeks per year, by approximately 24 personnel at a time (but up to 40 personnel at a time).

Figure 2.0-1. Typical Grenade House

Breacher and Shooting House Training

The breacher and shooting house operations would be integrated into the MOUT. The shooting house would be a standard two-story enclosed structure with 100-ft (30-m) clearance on all sides. Power, but no other utilities would be required.

The Marine Corps has requirements for various types of training in forced entry, including in the use of small explosive charges (less than ¼ pound TNT). The breacher house facility would be used daily and could support squad and platoon training. Table 2.0-3 presents estimates of daily and annual breacher charge use at this proposed facility; typically five breacher charges would be used during daylight hours and one during nighttime hours (but before 10 p.m.)

Shooting house operations are conducted in an enclosed structure and provide training in close-quarter skills like room clearing and hallway navigation. Explosive charges up to ¼ lb may be used, as well as diversionary devices (e.g., flash-banks), mechanical breaching methods, blanks, and special effects small arms marking in shooting house training. In addition, live-fire training operations with the 5.56-mm rifle would be authorized at the facility. The shooting house would be used monthly during a 2-3 day consecutive day period by a total of approximately 40 personnel. Dry runs would be conducted prior to live-fire operations. Each shooter would fire one magazine of 30 rounds in the daytime and another one at nighttime (but before 10 p.m.) for a total of 1,200 rounds during the day and 1,200 rounds at nighttime (but before 10 p.m.).

Indoor Small Arms Range.

The proposed indoor small arms range would include:

- 25 firing points with target distance up to 85 ft (26 m)
- two independently operated bays: one with 12 lanes at 4-ft (1.2-m) wide each for static firing points and one of 12 lanes 5 ft (1.5m) wide each for movement while engaging targets

The structure itself would be approximately 14,690 ft^2 (1,365 m^2): 130-ft (140-m) long to provide space for bullet traps behind the target line and front offices and waiting space before the firing line and a building width of approximately 113 ft (34 m).

The proposed indoor small arms range would be for 5.56-mm and 9-mm firing training. The facility would have no external SDZ and is treated for planning as a normal structure. This range would be operated to serve those who re-qualify with the pistol only or familiarization fire with the M4 at distances of 25 m or less, but do not fire the rifle. The range would also be suitable for scenario and combat shooting training, and for use by military police.