

SURVIVABILITY OPERATIONS

美陸軍戰場生存力教範

翻譯--周寬渝中校

Chapter 4

第四章

Fighting Positions

Fighting positions provide cover and (often) camouflage and concealment for personnel and physical assets. At the same time, fighting positions must allow Soldiers/Marines and their weapon systems to engage and destroy enemy forces from the position. Fighting positions include individual and crew-served weapon fighting positions, bunkers and towers, vehicle fighting positions, and artillery positions. While individual and crew-served weapon fighting positions can be—and often are—constructed entirely without engineer support, the other categories (bunkers and towers, vehicle fighting positions, and artillery positions) usually require engineer support. This chapter provides planning, design, and construction considerations for fighting positions, focusing on those aspects that most commonly require engineer support.

PLANNING AND DESIGNING FIGHTING POSITIONS

4-1. Fighting positions should be selected, designed, and built to support a unit's direct and indirect fires while simultaneously enhancing the protection provided to the individuals or vehicles occupying those positions. When planning and designing fighting positions, several basic design requirements must be considered. These design requirements will help to ensure that the positions are effective. Requirement considerations include weapons employment, cover, simplicity and economy, ingenuity, and progressive development.

戰鬥陣地

戰鬥陣地可提供人員及實體物資隱、掩蔽及偽裝，同時戰鬥陣地必須能提供士兵、陸戰隊員及其武器系統從戰鬥陣地與敵接戰及摧毀敵軍。戰鬥陣地包含單兵、多人操作武器據點、掩體、警戒塔、車輛戰鬥陣地及砲兵陣地。

雖然單兵及多人操作武器戰鬥陣地通常可在無工兵支援的狀況下完成構築，但其他類型的戰鬥陣地(掩體、警戒塔、車輛戰鬥陣地及砲兵陣地)通常需要工兵支援，本章提供執行戰鬥陣地構築時之計畫、設計及構築相關考慮事項，置重點於多數普遍需要工兵支援的項目。

戰鬥陣地之計畫與設計

4-1 戰鬥陣地應經篩選、設計及構築，以支援單位的直射與非直射武器火力發揚，並同步提升佔領據點之單兵與載具之防護力。當執行戰鬥陣地規劃及設計時，必須考量各項基本設計要項，這些設計要項將協助確認所構築之據點具效能設計要項包含武器部署、掩護、簡單性、經濟性、創造力及漸進式發展等能力。

WEAPON EMPLOYMENT

4-2. Although it is desirable for a fighting position to provide maximum protection to personnel and equipment, the primary consideration is always given to effective weapons employment. In the offense, fighting positions for weapons systems are often sited where natural or existing positions are available or where terrain will provide the most protection—while maintaining the ability to engage the enemy in a selected EA. Because of the speed typically associated with offensive tasks, these positions are sited where minimal preparation and digging are required. In the defense, when more time may be available, positioning of weapons systems for the most effective employment becomes more critical. The best use of available terrain is always considered, but in the defense, terrain may be modified or changed to provide the most protection while still maximizing the capabilities of the weapons system. It is the responsibility of the unit, not the engineer, to locate the unit's positions where they are most effective.

COVER

4-3. Fighting positions are designed to allow the most effective use of weapons systems, while providing the maximum amount of protection to Soldiers/Marines and their equipment. The primary function of most fighting positions is to defeat the effects of conventional direct and indirect fire. When nuclear and chemical attacks or other threats (to include EHCs) are anticipated, the design of the fighting position must consider the potential effect of the enemy weapon or threat and increase the protection level accordingly. Designing and constructing fighting positions will be based on the type of cover that is needed to defeat the particular effects of enemy weapons systems. The following three different types of cover are used to make fighting positions more survivable :

武器部署

4-2 儘管構築戰鬥陣地最大之用意在提供人員及裝備最大的防護力，但優先考慮因素應為使所部署的武器能有效發揚火力。於攻勢作戰時，用於部署武器系統之戰鬥陣地通常選定於可獲得之天然及現有據點或可提供最大防護力之地形，以在選定之接戰地區中維持與敵接戰能力。

由於戰線推進之速度通常與攻擊行動相互連結，這些據點通常以最少量的時間設置並以挖掘最少量的土方構成。在防禦作戰中，當可獲得較多的時間時，如何部署武器系統使其能發揮最大效益則更加關鍵，必須永遠考量如何將可獲取的地形做最佳運用，但在防禦時，當武器系統仍可發揮最大能力時，可藉由修改或改變地形以提供最大之防護力。選定單位據點以發揮最大戰力為單位的責任，而非工兵部隊的責任。

掩蔽

4-3 戰鬥陣地仍設計為使武器系統發揮最大效能並提供士兵陸戰隊員及其裝備最大之防護力，戰鬥陣地的主要功能為抵擋傳統的直射與非直射武器影響，當預期將遭受核子、化學或其他威脅時(包含爆炸危害)，在設計戰鬥陣地時，必須依潛在之敵軍武器或威脅以及防護等級的增加，將所需抵擋敵武器系統的特定影響，根據掩體的種類實施設計及構築戰鬥陣地，以下 3 種不同類型的掩體，可使戰鬥陣地具備較高之戰場生存力：

●Frontal cover.

The primary purpose of frontal cover is to provide protection from direct-fire weapons, but it also provides some protection from the effects of indirect-fire weapons. Use of effective natural frontal cover such as rocks, thick trees, thick logs, and rubble is preferred because it is more difficult for the enemy to detect. In selecting a construction material, consider its capability to withstand enemy weapons effects, its potential to produce secondary shrapnel, and its ability to improve concealment. If these natural materials are not available or not adequate to provide the desired protection, it then becomes paramount to employ spoil (excavated from the fighting position and compacted) as frontal cover. Frontal cover requires that the fighting positions be built to correct dimensions to allow Soldiers/Marines adequate room to move and fight. It also requires adequate thickness necessary to stop small caliber direct fire and correct height to facilitate proper overhead protection. Constructing cover to protect from large caliber (greater than 12.7 millimeters) direct-fire weapons can be very difficult and resource-intensive. It is usually easier to achieve such protection by placing positions where the enemy cannot effectively engage them, and by concealing them, making pinpointing the exact location difficult.

●Overhead cover.

The primary purpose of overhead cover is to provide protection from indirect fire and fragmentation, but it also provides some protection from direct fires delivered from a higher position (for example, from a hill) or from enemy aircraft. When possible, overhead cover is always constructed to enhance protection against airburst indirect-fire rounds. Overhead cover dramatically increases survivability and protection for a

●前方掩體

前方掩體的主要功能為提供對直射武器之防護，但也可提供對非直射武器之防護，設置時偏向運用岩石、厚實的樹林、圓木及碎石等自然性物資作為前方掩體使用，因為運用自然性的物資可使敵方較難偵測，在選擇構築材料時，應考慮材料所能承受敵軍武器影響、潛在可能產生次級破片及提升隱蔽的能力，如果上述自然資材無法獲得或不具備所需之防護能力，構築材料改用的首選即為設置土堆(自戰鬥陣地所挖掘之土方並夯實)以作為前方掩體。前方掩體必須以正確的尺寸實施陣地構築，使人員具備運動及戰鬥之所需空間，亦須具備足夠之厚度，以抵擋小口徑直射武器及正確的高度，以提供覆頂式的防護能力。要構築足以抵擋大口徑武器的掩體(口徑大於 12.7 公厘)非常困難，且需密集資源，較為簡易可達成相同目的之方法，為使敵無法判定正確位置，通常採取調整戰陣地位置，使敵無法對其施以有效之攻擊；並施以隱掩蔽措施。

●覆頂式掩體

構築覆頂式掩體的主要目的為提供對非直射武器及破片之防護，但亦可提供部分對相對高處地區(如自山丘)或敵飛行器直射武器之防護。在可能的狀況下，應構築覆頂式掩體，以提供對敵空炸非直射火力之防護力，覆頂式掩體可大幅增

position. Most individual fighting positions will not be constructed to withstand a contact burst from an indirect-fire weapon.

CAUTION

Improper construction of overhead cover can lead to collapse and result in injury or death to Soldiers/Marines. One common construction error is the lack of support (beams) on which to stabilize the stringers. Another error is improper spacing of stringers. Eighteen inches of overhead cover provided by sandbags can weigh up to 4,000 pounds on a two-person fighting position.

● Flank and rear cover.

The primary purpose of flank and rear cover is to provide protection from the effects of indirect fire to the flanks and rear of the position, and the effects of friendly fire hazards such as the petals from discarding sabot ammunition. Flank and rear cover also provides some protection against direct fire delivered from the flank or rear of the position. In ideal conditions, natural cover and terrain provide this type of cover; however, in urban environments, it is often desirable to take advantage of existing manmade cover. If this is not possible, flank and rear cover are constructed as the situation permits

SIMPLICITY AND ECONOMY

4-4. Normal characteristics of fighting positions are simplicity and strength, providing the maximum amount of protection possible to the Soldier/Marine and equipment. Providing this protection through the use of readily available materials or existing structures is typically the most desirable as this requires the least amount of engineer equipment to construct the position. Occupying (and modifying, if necessary) existing positions can also save significant time and resources over constructing new positions.

INGENUITY

4-5. The most effective use of available materials and time requires a high degree of imagination. Various materials found on the battlefield, and prefabricated materials from built-up areas and industrial sites, make excellent fighting position components.

加陣地的防護力及戰場生存力，大多數個別的陣地並不會構築可承受非直射武器直接命中爆炸的能力。

注意事項

不當的覆頂式掩體構築可能會導致掩體塌陷而造成人員受傷或死亡。普遍的構築錯誤為缺乏穩定桁支撐(樑)，另一個錯誤為不正確之樑距，18 英吋沙包構築的雙人戰鬥陣地覆頂式掩體重量可達 4000 磅。

● 側、後方掩體

構築側、後方掩體的主要目的為提供對戰鬥陣地之側方及後方對非直射武器之防護，以及友軍火力危害影響。側、後方掩體亦可提供自側、後方來襲直射武器之防護，在理想的條件下，天然掩護及地形可提供此類掩體之功能，然而在城鎮的環境中，通常會利用現存之人為掩蔽物，如果前述條件無法滿足，就會在狀況允許時構築側、後方掩體。

簡單性及經濟性

4-4 戰鬥陣地普遍的特性為簡單性及堅固，提供士兵或裝備最大可能之防護力。通常部隊最希望使用整備完成的可用資材或既有結構物來提供防護力，因為可以使用最少工兵裝備實施陣地構築，相較於構築新陣地，佔領(在需要的狀況下實施修整)既有陣地，同樣也能節約大量的時間與資源。

創造性

4-5，為使可用之材料及時間發揮最大的效能，須具備高度的創造性，在戰場上所發現的各式材料及在建築或工業區之預製材料，均為構築戰鬥陣地之構件。

PROGRESSIVE DEVELOPMENT

4-6. Fighting positions should be progressively developed as time and situation permit. Hasty fighting positions provide immediate protection for Soldiers/Marines, but to a minimum degree. As time and resources are available, these positions should be improved into deliberate positions as quickly as possible. Given available time, fighting positions may be enhanced by the construction of tunnels and trenches connecting other fighting positions nearby. This provides the flexibility to move from position to position for engagements or resupply while remaining protected. Positions with grenade sumps and drainage increase the level of survivability.

4-7. In cases where design and development of fighting positions can be planned well ahead of their actual emplacement, deliberate positions can be located and bills of material can be identified for their construction. In addition, where advanced planning is possible, more effective and more efficient construction materials can be employed in fighting position construction, such as concrete barriers, soil-filled containers, or other materials. Such materials are especially advantageous for overhead cover. Using these materials can save time in both obtaining protective materials and in constructing fighting positions.

INDIVIDUAL FIGHTING POSITIONS

4-8. Individual fighting positions protect one or more dismounted Soldiers/Marines armed with individual weapons—intended to be operated by an individual rather than by a crew—while supporting their ability to engage the enemy from the position. Such positions typically consist of a hole in the ground, supplemented with frontal, overhead, and flank or rear cover as the time and situation permit. Individual fighting positions are generally constructed in the de-

漸進式發展

4-6 在時間及狀況允許時，戰鬥陣地應逐次改良，急迫之戰鬥陣地可立即提供對士兵之防護，但僅具最低程度之防護能力。在時間及資源許可之狀況下，應儘速改造為周密陣地；在能獲得充分構築時間的狀況下，應構築隧道及壕溝連接鄰近的戰鬥陣地。這些設施可提供陣地間運動的彈性，或在維持防護力的狀況下實施重新補給，陣地內具備手榴彈坑及排水溝可提升防護能力層級。

4-7 若戰鬥陣地在實際部署前有完善的設計及發展，即能實施周密陣地之建構，並可了解構築陣地所需使用之材料。此外，能夠事先完成構築計畫，就能更有效地構築效能更佳的戰鬥陣地，例如混凝土障礙、填土容器及其他材料或其他適於作為覆頂式掩體之材料，在獲取防護材料及構築戰鬥時，運用這些材料均可節省時間。

單兵戰鬥陣地

4-8 單兵戰鬥陣地可提供一個以上配備單兵操作武器之單兵之防護能力，主要為單兵使用而非供多人使用，本戰鬥陣地主要為支援單兵自戰鬥陣地與敵接戰之能力。這些陣地由地洞組成，在時間允許下會增加前方、覆頂式及側方或後方的掩體。單兵戰鬥陣地通常於鄉間地區實施陣地防禦時構築，其他單兵戰鬥陣地可能在城鎮構築或用於

fense in generally rural areas. Other individual fighting positions may be constructed in urban terrain (see chapter 8) or may be constructed in support of base camps. The positions should be planned and designed so that they are concealed, mutually supporting, and have interlocking fields of fire in all directions. Each weapons system must be assigned a primary sector of fire to support the defensive plan. Alternate positions that overwatch the primary sector should also be selected. Finally, each weapon should be assigned a supplementary position to engage attacks from other directions.

4-9. Design considerations include the mission variables and the following :

- Availability of materials. Certain materials such as logs and dressed lumber may be available locally. Other materials (such as U-shaped pickets, sandbags, plywood, and specialized materials) may be acquired through the supply system.
- Soil. Soil type is a design consideration when constructing individual fighting positions. Different soils can affect the integrity of the fighting position hole and its ability to remain structurally stable and drain off rainwater. In general, the looser the soil the more standoff from the edge of a fighting position will be required when placing supports for overhead cover.
- Drainage. Water can seriously degrade the structural stability of a fighting position and create unhealthy conditions for Soldiers/Marines occupying them. Proper drainage is often difficult to achieve when constructing fighting positions. In areas or seasons where rainfall is expected, drainage or some form of waterproofing should be implemented. The use of sumps, gravel, or wood decking at the bottom of positions will assist in water drainage and help protect Soldiers/Marines from the water. Additionally, waterproofing overhead cover using plastic garbage bags, ponchos, or other suitable material will help prevent water infiltration. Care should also be taken to ensure that the surrounding terrain drains water away from fighting positions.

支援基地防衛，戰鬥陣地應規劃及設計為具備隱蔽、相互支援且對各方向火力的交互鎖定功能。各武器系統應指定主要火力射向，以支援防禦計畫，另選定可對主要火力射向實施監視的替代陣地，最終每個武器系統應指定輔助陣地，以對應其他方向之攻擊。

4-9 戰鬥陣地設計所需考量任務變數。

- 可用資材：圓木及整飾過的木材等材料可就地取得，其他例如 U 型樁、沙包、聚合木材或其他特殊材料，可能須透過補給系統獲得。
- 土壤：單兵戰鬥據點設計時應考慮土壤型態，不同的土壤型態將影響各戰鬥陣地之構築、保持構築穩定性及對雨水之排水性。普遍而言在構築覆頂式掩體時，較鬆的土壤需要在戰鬥陣地邊緣使用更多的支撐。
- 排水：水會嚴重分解戰鬥陣地的結構穩定性並使駐留士兵處於不健康的環境，在構築戰鬥陣地時通常很難具備合適的排水能力，預期將降雨的區域或季節就應該運用排水溝及部分的防水措施，在陣地底部運用集水坑、碎石堆或木板執行對積水的防護，此外具防水功能的覆頂式掩體可運用垃圾袋、斗篷或其他適合的材料製作，以防止水份滲透，亦應留意戰鬥陣地周邊地域所排的水，不應向戰鬥陣地匯集。

- Safety. Care should be taken not to deviate from designs established in this and other Army and Marine Corps references. The collapse of fighting positions has lead to death and serious injury due to improper construction.

4-10. Individual fighting positions are categorized in two types : hasty and deliberate. The type of position constructed depends on time, equipment available, and the required level of protection. Characteristics and planning factors for individual fighting positions are found in table 4-1.

4-11. Soldiers/Marines are responsible for constructing their individual fighting positions. They use hand tools and the detailed descriptions and construction procedures found in FM 3-21.8, FM 3-21.75, FM 5-34/MCRP 3-17A, GTA 05-08-001, GTA 07-06-001, and MCWP 3-11.2. See ATTP 3-06.11 for information about individual fighting positions in urban terrain. While engineer support is desirable, supported commanders usually allocate such support to other tasks ahead of supporting the construction of individual fighting positions. When engineer support is available to support individual fighting positions, it should be used to assist with the most time-consuming and labor-intensive tasks—such as digging holes— or tasks requiring special equipment or expertise. Engineers typically use engineer equipment to support the digging effort, but rocky areas may require the use of explosives. Clearing the site of boulders, trees, roots, or other obstructions may require heavy engineer equipment, explosives, chain saws, or other engineer tools and equipment. Care should be taken, however, to minimize disruptions to the site that will make camouflage and concealment more difficult or less effective. Engineers can also assist with clearing selected obstructions from the fields of fire.

HASTY POSITIONS

- 安全：在進行陣地構築時應注意不可偏離陸軍或海軍陸戰隊所訂定之設計參考資料。不當之構築方式將導致戰鬥陣地坍塌，導致人員死亡或嚴重受傷。

4-10 單兵戰鬥陣地可分為急迫與周密等兩類，構築時依可用之時間、裝備及所需防護等級進行選擇，各單兵戰鬥陣地之特性及計畫參數如表 4-1

4-11 士兵負責單兵戰鬥陣地構築，針對所需運用之手工具及構築細節程序可於 FM 3-21.8, FM 3-21.75, FM 5-34/MCRP 3-17A, GTA 05-08-001, GTA 07-06-001, and MCWP 3-11.2.等準則查閱，針對於城鎮地區構築單兵戰鬥陣地的相關資訊，可參考 ATTP 3-06.11 準則，當需要工兵支援時，受支援部隊指揮官通常會先將工兵支援優先配置於其他任務而非運用於協助構築單兵戰鬥陣地，當可獲得工兵支援實施單兵陣地構築時，應該用於協助最耗時費力之任務，例如挖掘或者需其他特種工具與專長的任務。工兵通常會運用工兵裝備支援挖掘的勤務，但在岩石構成的區域可能就需要運用爆破清除巨石、樹木、樹根，或其他可能需要運用工兵重機械、爆破、鏈鋸或其他工兵器材及裝備的障礙。在實施構築時應謹慎執行，然而使現地對構築時的干擾降至最低將對更能以實施偽裝及隱蔽，並且使相關能力效能更差，工兵亦可針對射界中特定的障礙實施清除。

Table 4-1. Characteristics of individual fighting positions

Type	Position	Estimated Construction Time ¹ (Man-Hours)	Protection Provided				Remarks
			Direct Small Caliber Fire	Indirect-fire Blast and Fragmentation (Near-Miss) ²	Indirect-fire Blast and Fragmentation (Direct-Hit)	Nuclear Weapon ³	
Hasty	Prone Position	1.0	7.62mm	Better than in open-no overhead protection	None	Fair	Provides All-around cover
Deliberate	One-person position	3.0	12.7mm	Medium artillery no closer than 30 feet—no overhead protection	None	Fair	-
	One-person position with 1.5feet overhead cover	8.0	12.7mm	Medium artillery no closer than 30 feet	None	Good	Additional cover provides protection from direct hit small mortar blast.
	Two-person position	6.0	12.7mm	Medium artillery no closer than 30 feet—no overhead protection	None	Fair	-
	Two-person position with 1.5feet overhead cover	11.0	12.7mm	Medium artillery no closer than 30 feet	None	Good	Additional cover provides protection from direct hit small mortar blast.
	SLM position	3.0	12.7mm	Medium artillery no closer than 30feet—no overhead protection	None	Fair	-

Note.

Chemical protection is assumed because of individual protective masks and clothing.

A dash indicates no data.

¹ Estimated construction time assumes use of hand tools to prepare the position.

² Shell sizes are — Light Medium
 Mortar 82 mm 120 mm
 Artillery 105 mm 152 mm

³ Nuclear protection ratings are rated poor, fair, good, very good, and excellent.

Legend :

mm – millimeter

SLM – shoulder-launched munition

x – times

表 4-1. 各類單兵戰鬥陣地據點特性一覽表

類別	陣地 型式	估計 作業 人時 ¹ (人/小時)	防護能力				備註
			小口徑 直射 武器	幾乎命中狀態 之非直射武器 爆炸及破片 ² (Near-Miss)	直接命中狀 態之非直射 武器爆炸及 破片 (Direct-Hit)	核子 武器 ³	
急迫	俯臥 陣地	1.0	7.62 mm	無覆頂式掩體狀 態下(無上部防護 能力)·較開闊地 具較佳防護能力	無防護能力	一般	提供對四周 之防護
周密	單兵 陣地	3.0	12.7 mm	無覆頂式掩體狀 態下(無上部防護 能力)·對中型火 砲於 30 英尺以外 爆炸具防護能力	無防護能力	一般	-
	具 1.5 呎覆頂 式掩體 之單兵 陣地	8.0	12.7 mm	對中型火砲於 30 英尺以外爆炸具 防護能力	無防護能力	佳	外加的防護 措施可提供 對小口徑迫 擊砲直接命 中爆炸之防 護
	雙人陣 地	6.0	12.7 mm	無覆頂式掩體狀 態下(無上部防護 能力)·對中型火 砲於 30 英尺以外 爆炸具防護能力	無防護能力	一般	-
	具 1.5 呎覆頂 式掩體 之雙人 陣地	11.0	12.7 mm	對中型火砲於 30 英尺以外爆炸具 防護能力	無防護能力	佳	外加的防護 措施可提供 對小口徑迫 擊砲直接命 中爆炸之防 護
	肩射武 器陣地	3.0	12.7 mm	無覆頂式掩體狀 態下(無上部防護 能力)·對中型火 砲於 30 英尺以外 爆炸具防護能力	無防護能力	一般	-

備註

由於單兵具防護服及面具，故假設陣地具化學防護力。

橫線表示無相關資料。

¹ 預估構築時間是以運用手工具之構築時間。

² 砲彈種類分類

輕型火砲	中型火砲
迫擊砲 82 mm	120 mm
砲兵火砲 105 mm	152 mm

³ 核子防護能力區分為不良、一般、佳、極佳及優良。**圖例：**

mm – 公厘 SLM–肩射武器 x –時間

4-12. When time and materials are limited, troops in contact with the enemy use a hasty fighting position located behind whatever cover is available, maximizing the advantages provided by the existing terrain and natural or manmade cover. Hasty positions may only provide limited protection; however, positions should be selected to provide, as a minimum, frontal protection from direct fire while allowing Soldiers/Marines to fire to the front and oblique. Because of the situation and limited time typically associated with selecting a hasty position, extreme care must be taken to select a position that will reduce the risk of fratricide. For protection from indirect fire, a hasty fighting position can be located in a depression or hole that is at least 1 ½ feet deep. While there may be little or no natural cover, these positions can provide limited protection from fragmentation. If the unit remains in the area and/or as the situation permits, hasty positions should be continually improved to provide as much protection as possible. See FM 3-21.75 and MCWP 3-11.2 for additional information on hasty individual fighting positions.

DELIBERATE POSITIONS

4-13. Deliberate fighting positions are often modified hasty positions prepared as the situation and time permit. The unit leader should verify the sectors of observation/fire, interlocking fields of fire, adequate size for occupants, and safe backblast areas before improving each position. Continued improvements are made to strengthen the position during the period of occupation. In some cases, particularly in urban environments, it may be necessary to 'build up' or construct a position within an existing structure. Improvements include adding overhead cover, digging trenches or opening routes to adjacent positions, and maintaining camouflage.

CREW-SERVED WEAPONS FIGHTING POSITIONS

急迫陣地

4-12 當時間及材料受限時，與敵接觸部隊會在可獲得掩蔽的地方運用急迫陣地，以最大化地運用現有地形優點及天然或人為掩蔽物。急迫陣地可能僅能提供有限的防護，雖然陣地位置經過篩選後，可提供對前方直射武器最少量的防護能力，並使士兵能向前方及前方斜對角的目標進行射擊。但由於急迫陣地通常是在時間受限下進行選擇，必須慎選急迫陣地位置，以降低誤傷同袍的風險，為具備對直射武器的防護能力，可選擇深度大於 1.5 英尺的淺坑或坑洞作為急迫陣地的位置，由於這些位置可能只有少部分的天然掩蔽，或甚至沒有任何掩蔽，可提供對破片的防護，若單位需持續待在選定之陣地或在時間許可之狀況下，必須持續改善急迫陣地，以提升防護能力。

周密陣地

4-13 周密陣地通常是在時間即情況允許下，藉由修改預先完成之急迫陣地而成，單位領導者在針對各陣地實施強化前，應辨識區域中所需之觀測、火力、交叉火網、充足之陣地空間及對具筒後噴火武器所需之安全區域，佔領陣地後，應持續改善陣地，以強化陣地強度。在部分案例中，特別在城鎮環境中，可能必須在現有結構中建立或構築陣地，強化的手段包含增加覆頂式掩體，挖掘壕溝或開闢可連接鄰近據點的路徑，並維持偽裝效能。

4-14. Like individual positions, crew-served weapons positions are also classified as hasty and deliberate. The same principles apply to the crew-served weapon, although minor changes include dimensions of the position and characteristics to facilitate effective use of the weapon system. Frontal, overhead, flank, and rear protection provide increased survivability and protection as well. For crew-served weapons that create a backblast, overhead and rear protection must be considered for effective employment of the weapon while minimizing the risk of injury to the operator.

4-15. As with individual fighting positions, Soldiers/Marines are responsible for constructing their crew-served weapon fighting positions. These positions must be tailored to the operating characteristics and requirements of the weapon that will occupy the position. Weapon crews—and their leaders—must thoroughly understand and apply the descriptions and procedures for constructing fighting positions (found in the manuals listed in table 4-2) and camouflage and concealment of fighting positions (found in chapter 6). In addition, see ATTP 3-06.11 for information about crew-served weapon positions in urban terrain.

4-16. When engineer support for fighting positions is available, supported commanders often give higher priority to supporting construction of fighting positions for crew-served weapons than to individual fighting positions. As with individual fighting positions, available engineer support should be used to assist with the most time-consuming and labor-intensive tasks, or those requiring special equipment or expertise. Engineer support to crew-served weapon fighting positions typically involves the same types of tasks used to support individual fighting positions—digging, cutting, and clearing. Characteristics and planning factors for crew-served fighting positions are found in table 4-3.

多人武器戰鬥陣地

4-14 多人操作武器據點與單兵陣地同樣可分類為急迫及周密 2 類，同樣的原則也適用於多人操作武器陣地，藉由對陣地的空間及特性進行修改，以能更有效的發揮武器系統效能。前方、覆頂式、側方及後方的掩體同樣能增加生存力及防護力，對會產生噴射火焰的多人操作武器而言，在構築覆頂式及後方防護時，必須考慮能在將操作手受傷風險降至最低的狀況下進行武器部署。

4-15 如同單兵戰鬥陣地，士兵們必須負責自己的多人操作武器陣地構築，這些據點必須設計具備能符合部署於此陣地的武器操作特性。武器操作手及其領導者必須全然的了解及運用相關的說明及流程實施陣地構築(可參閱本手冊表 4-2 所提列之資訊)，另針對多人操作武器陣地之偽裝及隱蔽(參閱本手冊第六章)可另外參考 ATTP 3-06.1 中，有針對多人操作武器於城鎮地區的偽裝及隱蔽作為實施說明。

4-16 當可獲得工兵支援陣地構築時，受支援部隊指揮官通常會將工兵優先運用於支援多人操作武器構築而非單兵戰鬥陣地，可獲得的工兵兵力應用於最耗時費力地構築任務或其他需特殊裝備或技術之處，與支援單兵戰鬥陣地構築原則相同，工兵於支援多人操作武器構築時，通常所需支援任務型式與支援單兵戰鬥陣地相同包含挖掘、切除及清除等任務，構築多人操作武器戰鬥陣地相關特性及計畫因素如表 4-3。

Table 4-2. References for crew-served weapon fighting positions	
<i>Weapon</i>	<i>Reference</i>
Javelin	FM 3-22.37
Tube-launched, optically-tracked, wire-guided missile	FM 3-21.91 and FM 3-22.34/MCWP 3-15.4
Machine gun	FM 3-21.8, FM 3-21.75, FM 3-22.27, FM 3-22.65, FM 3-22.68, and MCWP 3-15.1
Mortar	ATTP 3-21.90/MCWP 3-15.2
Legend :	
ATTP–Army tactics, techniques, and procedures FM – field manual MCWP–Marine Corps warfighting publication	

表 4-2. 各類多人操作武器戰鬥陣地構築資訊參考表	
武器類型	參考資料
標槍	FM 3-22.37
線控導引光學追蹤式發射筒	FM 3-21.91 and FM 3-22.34/MCWP 3-15.4
機槍	FM 3-21.8, FM 3-22.27, FM 3-22.65, FM 3-22.68 and MCWP 3-15.1
迫砲	ATTP 3-21.90/ MCWP 3-15.2
圖例	
ATTP-陸軍戰術、技術及流程 FM-野戰手冊 MCWP-陸戰隊戰鬥手冊	

Table 4-3. Characteristics of crew-served weapons fighting positions

Type of Position	Estimated Construction Time ¹ (Man-Hours)	Protection Provided			
		Direct Small Caliber Fire	Indirect-fire Blast and Fragmentation (Near-Miss) ²	Indirect-fire Blast and Fragmentation (Direct-Hit)	Nuclear Weapon ³
Javelin position	4.0	12.7 mm	Medium artillery no closer than 30 feet—no overhead protection	None	Fair
Dismounted TOW missile position	11.0	12.7 mm	Medium artillery no closer than 30 feet—no overhead protection	None	Fair
Machine gun position	7.0	12.7 mm	Medium artillery no closer than 30 feet—no overhead protection	None	Fair
Machine gun position with 1 ½ feet overhead cover	12.0	12.7 mm	Medium artillery no closer than 30 feet	None	Good
Mortar position	14.0	12.7 mm	Medium artillery no closer than 30 feet—no overhead protection	None	Fair

Note.
Chemical protection is assumed because of individual protective masks and clothing.
A dash indicates no data.
¹ Estimated construction time assumes use of hand tools to prepare the position.
² Shell sizes are — Light Medium
Mortar 82 mm 120 mm
Artillery 105 mm 152 mm
³ Nuclear protection ratings are rated poor, fair, good, very good, and excellent.
Legend :
mm – millimeter SLM – shoulder-launched munition x – times

Table 4-3. 各類多人操作武器戰鬥陣地據點特性一覽表

陣地型式	估計作業人時 ¹ (人/小時)	防護能力			
		小口徑直射武器	幾乎命中狀態之非直射武器爆炸及破片 ²	直接命中狀態之非直射武器爆炸及破片	核子武器 ³
標槍飛彈陣地	4.0	12.7 mm	無覆頂式掩體狀態下(無上部防護能力)·對中型火炮於 30 英尺以外爆炸具防護能力	無防護能力	一般
非車載式拖式飛彈陣地	11.0	12.7 mm	無覆頂式掩體狀態下(無上部防護能力)·對中型火炮於 30 英尺以外爆炸具防護能力	無防護能力	一般
機槍陣地	7.0	12.7 mm	無覆頂式掩體狀態下(無上部防護能力)·對中型火炮於 30 英尺以外爆炸具防護能力	無防護能力	一般
具 1.5 英尺覆頂式掩體之機槍陣地	12.0	12.7 mm	無覆頂式掩體狀態下(無上部防護能力)·對中型火炮於 30 英尺以外爆炸具防護能力	無防護能力	Good
迫砲陣地	14.0	12.7 mm	無覆頂式掩體狀態下(無上部防護能力)·對中型火炮於 30 英尺以外爆炸具防護能力	無防護能力	一般

備註
由於單兵具防護服及面具，故假設陣地具化學防護力。
橫線表示無相關資料。
¹ 預估構築時間是以運用手工具之構築時間。
² 砲彈種類分類 輕型火炮 中型火炮
迫擊砲 82 mm 120 mm
砲兵火炮 105 mm 152 mm
³ 核子防護能力區分為不良、一般、佳、極佳及優良。
圖例：
mm – 公厘 SLM–肩射武器 x –時間

BUNKERS AND TOWERS

4-17. Base camps will generally require fighting positions in the form of bunkers and towers. These are generally constructed above ground using timber, sandbags, soil-filled containers, prefabricated concrete, or other specific items that are available through the supply system. These positions are employed to support perimeter security, security of key sites such as enemy prisoner of war compounds, and ECPs. A deliberate defense may also involve the construction of more elaborate bunkers that may hold up to a squad of Soldiers/Marines.

4-18. Bunkers are larger fighting positions constructed for squad-size (or potentially larger) units that are required to remain in defensive positions for a longer period of time. They are built either above- or below-ground and are usually made of reinforced concrete, but can be designed and constructed with a variety of materials. Because of the extensive engineer effort required to build bunkers, they are usually constructed when preparing strong points or protecting vital facilities such as base camps. If time permits, bunkers are connected to other fighting or supply positions by tunnels. Prefabrication of bunker assemblies affords rapid construction and placement flexibility. Bunkers offer excellent protection against direct fire and indirect-fire effects and, if properly constructed with appropriate collective protection equipment, can provide protection against chemical and biological agents.

4-19. The positions described below (in paragraphs 4-20 through 4-23) are designed for use by two or more individuals armed with rifles or machine guns. Although these are beyond the construction capabilities of nonengineer troops, certain construction phases can be accomplished with little or no engineer assistance. For example, while engineer assistance may be necessary to build steel frames and cut timbers for the roof of a structure; the excavation, assembly, and installation are all within the

地堡及警戒塔

4-17 在基地中一般會需要地堡及警戒塔等型式的戰鬥陣地，前述陣地通常為地上式，運用木材、沙包、填滿土方的容器、預籌混凝土或其他可透過補給系統獲得知特殊材料構築。這些陣地被部署運用於支援基地週邊警戒、戰俘營重要地點警戒及進出管制點，周密的防禦可能也需要運用更多如可容納整班士兵的精良地堡建物。

4-18 地堡為一種較大之戰鬥陣地，構築的尺寸需可容納一個班(或可能更大)，能長期作為防禦陣地使用，可設計構築於地上或地下，且通常由鋼筋混凝土所構成，但亦可運用其他各種材料設計、構築，由於構築地堡需要密集之工兵兵力，通常用以協助兼顧陣地整備及基地等重要設施防護，在時間許可時，地堡應藉隧道與其他陣地或補給點連接，預鑄式的地堡組件，具備可快速構築及彈性部署之特性。地堡對直射及非直射武器均有良好防護效能，如搭配適當的團體防護裝備，則具對抗生化戰劑之防護能力。

4-19、4-20 至 4-23 節次為針對配置兩個以上之步、機槍陣地之相關說明，雖然構築這些陣地已超過非工兵部隊的能力，但於特定的構築階段中，可在少量或無工兵協助的狀況下完成，舉例而言，當建築鋼構及切割木材作為結構之屋頂時需要工兵之協助，但挖角、組裝及安裝則是大部分單位能力所及之作業。具備充足的支援能力對構築覆頂式掩體是相當重要的，支撐系統

capabilities of most units. Adequate support for overhead cover is extremely important. The support system should be strong enough to safely support the roof and soil material and survive the effects of weapon detonations. FM 5-34/MCRP 3-17A, GTA 90-01-011, and the Theater Construction Management System (TCMS) provide additional designs, information, construction techniques, and bills of material.

SOIL-FILLED CONTAINER FIGHTING POSITIONS

4-20. Soil-filled container positions can be quickly constructed and provide a high degree of survivability. They are most commonly used above ground, but the soil-filled container will provide increased ability when partially buried. Soil-filled containers are available through normal supply channels and, when employed correctly, provide a high degree of protection against blast and fragmentation. When using soil-filled containers, Soldiers/Marines must ensure that proper overhead cover frames are used in the construction to prevent cave-ins from occurring. Some preparation may be required for the base of the position if the foundation soil is unsuitable or if longer term emplacement is anticipated. GTA 90-01-011 shows several designs (including bills of materials; estimates of equipment, personnel, and time requirements; and construction steps) using soil-filled containers for construction of fighting positions, observation posts, and bunkers.

WOOD OR STEEL-FRAME FIGHTING POSITION

4-21. The wood-frame or steel-frame fighting position consists of prefabricated timber or steel-frame support elements that support a timber or concrete roof. The position is useful as a two-person fighting or observation position in areas where it can be dug into the ground.

應足夠強度，以安全地支撐所構築之屋頂及土壤材料，使其能在武器爆炸所產生的影響下存活。

填土容器式戰鬥陣地

4-20 填土容器式戰鬥陣地可被快速構築用以提供高度生存力，此類陣地通常採地上式構築，但部分埋設於土壤的填土容器砂包式陣地可提供更加的防護能力，填土容器砂包所構築之戰鬥陣地可由一般補給管道獲得。填土容器砂包式戰鬥陣地正確部署時，可提供對爆炸或破片之防護，當運用填土容器砂包式陣地時，士兵們必須確保運用適當的覆頂式掩蔽框架，以防止坍塌發生。部分基地若有基礎土壤不宜構築或預期需長期部署之狀況，需要具備之相關準備事項詳見 GTA 90-01-011，內容中展示數種運用填土容器構築戰鬥陣地、觀測陣地及地堡之設計方式(包含材料清單、預估所需裝備、人員及時間及構築步驟)。

木架或鋼架戰鬥陣地

4-21 木架或鋼架戰鬥陣地乃由預製之木架或鋼架支撐其木造或混凝土之屋頂元件，此類已地下式構築之陣地適於作為雙人戰鬥陣地或觀測陣地。

CORRUGATED METAL WALL BUNKERS

4-22. A bunker made from corrugated metal walls is very useful in areas where digging is not possible or practical. With 4-foot, earth-filled walls and 2-foot overhead cover, this position defeats direct fire and blasts or fragments from near miss mortar and artillery ammunition. The upper portion of the bunker is left open for maximum visibility in all directions.

PLYWOOD PERIMETER BUNKER

4-23. A plywood perimeter bunker is used as an aboveground protected observation post. The bunker has a post foundation or can be constructed on the ground. Another option is to build the wood bunker on top of one or two stacked CONEX boxes. Walls of this bunker will need to be earth filled or otherwise hardened to resist the applicable threat.

VEHICLE FIGHTING POSITIONS

4-24. Vehicle fighting positions include fighting and protective positions for major weapons systems vehicles and their support equipment. Initially, vehicles use the natural cover and concealment in hide positions to increase survivability. As time, assets, and situation permit, positions are prepared using engineer support. Priority is given to those vehicles containing essential critical equipment or supplies. Drivers and crews should also use these fighting positions for individual protection.

4-25. Berms and revetments positioned at the front of or around major weapons systems will provide improved protection from direct fire and from blast and fragments of indirect-fire artillery, mortar, and rocket shells. At its base, a berm has a thickness of at least 8 feet. Further, the berm or revetment functions as a standoff barrier for impact-detonating, direct-fire HEAT and antitank guided missile (ATGM)

金屬浪板牆地堡

4-22 在無法實施挖掘的區域中，金屬浪板牆地堡為非常適用於構築地堡的材料，運用厚度 4 呎的填土及浪板牆及 2 呎厚的覆頂式掩體，即可抵抗直射武器及迫砲或砲兵火砲近距離的爆炸與破片，地堡上方應保留對各方向最大之觀測能力。

膠合木製地堡

4-23 膠合木製地堡一般用於對地上式觀測陣地之防護。地堡具有基礎陣地或可構築於地面；另一種構築方式的選擇是在木質地堡上方疊上一至兩層的儲物箱，地堡的牆面需填土或其他堅硬材料，以具備適宜之抵抗能力。

載具戰鬥陣地

4-24 載具戰鬥陣地對大多數主要武器系統之載具及所屬支援裝備而言包含戰鬥及防護陣地，於作戰初期載具運用天然的地形實施隱、掩蔽，在時間、資材及狀況許可時，可運用工兵支援執行陣地整備，優先支援項目為必要之關鍵裝備或補給品，駕駛及乘員亦應運用這些陣地作為個人的防護。

4-25 主要武器系統周圍前方所構築之護堤及護牆將提供對直射武器及砲兵火砲、迫擊砲與火箭彈之爆炸與破片防護，在基地構築時，至少需 8 呎厚的護堤。此外，護堤或護牆可作為對爆破衝擊、直射武器熱源及反戰車導引飛彈投射之阻柵，可使相關彈藥引信啟動，因此可增加備防護車輛之生存

projectiles. It should cause the fuzes to activate, thereby increasing survivability for the protected vehicles. If the expected enemy uses kinetic energy direct-fire armor piercing or hypervelocity projectiles, it is impossible to construct berms thick enough for protection. To protect against these projectiles, prepare deep-cut, hull defilade, or turret defilade positions. Construct fighting and protective positions that are no larger than operationally necessary.

4-26. Success on the battlefield requires maneuver between hide and fighting positions between main gun firings. Maximum use of wadis or draws, reversed slope hills, and natural concealment is required to conceal fighting vehicles maneuvering among fighting positions. When a major weapon system fires its main gun, the vehicle and gun may make a concealed maneuver to another position before firing again. If the major weapon system immediately reappears in the old position, the enemy will know where to fire the next round. Table 4-4 provides a summary of the dimensions of the hasty and deliberate vehicle positions discussed above. (See the vehicles' respective operator's manuals for more detailed vehicle dimensions.) Construction planning factors for vehicle fighting positions are shown there as well. Chapter 6 provides information about camouflage and concealment of fighting positions.

HASTY POSITIONS

4-27. Hasty fighting positions for combat vehicles take advantage of natural terrain features or are prepared with a minimum of construction effort. A frontal berm, as high as practical without interfering with the vehicle's weapon systems, shields from frontal attack and provides limited concealment if properly camouflaged. Protection is improved if the position is made deeper and the berm extended around the vehicle's

力。若預其敵將使用動能穿甲彈及超音速武器之投射，則構築再厚的護堤亦無法具備對前述武器之防護，為具備對是類武器之防護能力，需具備向下挖掘全遮蔽或半遮蔽掩體，構築戰鬥及防護陣地時，構築尺寸不應超出作戰所需。

4-26 要能成功地在戰場於隱蔽地點、戰鬥陣地及主要武器的射擊位置間機動，需要最大量的運用乾河床或孔洞、反斜坡及天然隱蔽物，提供戰鬥載具在戰鬥陣地間機動時所需之隱蔽，當主要武器系統運用其主要武器實施射擊後，當戰鬥載具及武器要於再次執行射擊時，即運用可能之隱蔽作為機動至另一個陣地，如果主要武器系統迅速於既有陣地重現時，敵軍就會知道我軍下次要射擊之位置，表 4-4 顯示上述急迫與周密載具陣地之構築尺寸。

急迫陣地

4-27 戰鬥載具所需之急迫陣地，可利用天然地形優點或運用最少量構築作業針對已完成準備之陣地實施構築而成。前方陣地之護堤應在不干擾載具武器系統的狀況下，盡可能地滿足實際所需高度，以抵抗前方之攻擊，如能藉由適當的偽裝，則可提供有限之隱

Table 4-4. Dimensions of vehicle positions

Vehicle Types		Position Dimension (feet) ²			Equipment Hours ⁴ D7 Dozer/M9 ACE/MCT	Minimum Berm Thick- ness at Base (feet) ⁵
		Length	Width	Depth ³		
Hasty ¹	Stryker vehicle (all variants) with slat armor	32	19	9	1.6	8
	M113 series carrier	22	14	6	0.6	8
	M577 command post vehicle	22	14	9	0.8	8
	M106 and M125 mortar carrier	22	16	7	0.7	8
	AAV with armor kit	33	19	11	2.0	8
	LAV with armor kit	27	25	9	1.7	8
Deliberate	Hull Defilade					
	M113 series carrier	22	14	6	0.6	NA
	M577 command post vehicle	22	14	9	0.8	NA
	M106 and M125 mortar carrier	22	16	7	0.7	NA
	M2 and M3 fighting vehicle	26	16	7	0.8	NA
	M1 main battle tank	32	18	5.5	0.9	NA
	AAV with armor kit	33	19	11	2.0	NA
	LAV with armor kit	27	25	9	1.7	NA
	Access Route	Each access route between positions or hide locations must have the same width as the hull defilade. Clearing times are planned using FM 5-34/MCRP 3-17A. Production time is determined by calculating the volume of soil needed to be moved (in cubic yards) and dividing by 100 bank cubic yards per 0.75 hour.				
	Hide Location	Hide locations are made using natural terrain and concealment. Ground clearing times are planned with the use of FM 5-34/MCRP 3-17A. The minimum width of the hide location is the same as the deliberate hull defilade. The hide position depth requirement is calculated by increasing the depth given in the deliberate turret defilade position by 15 percent.				
	Turret Defilade					
	Stryker vehicle (all variants) with slat armor	32	19	9	1.6	NA
	M113 series carrier	22	14	7.5	0.7	NA
	M2 and M3 fighting vehicle	26	16	10	1.2	NA
	M1 main battle tank	32	18	9	1.5	NA
	AAV with armor kit	33	19	13	2.3	NA
	LAV with armor kit	27	25	12	2.3	NA

¹ Hasty positions for tanks and infantry fighting vehicles not recommended.

² Position dimensions provide an approximate 3-foot clearance around vehicle for movement and maintenance and do not include access ramp(s).

³ Total depth includes any berm height. All depths are approximate and will need adjustment for surrounding terrain and fields of fire.

⁴ This column provides rules of thumb which are useful (in the absence of actual production rate data) as a starting point to estimate time required to prepare fighting positions. These equipment hours are based on a production rate of 100 bank cubic yards per 0.75 hour. Divide construction time by 0.85 for rocky or hard soil, night conditions, or closed hatch operations (M9). Use of natural terrain features will reduce construction time. See FM 5-434 for more information about estimating production rates.

⁵ Berms are not recommended for hull and turret defilade positions.

Legend :

AAV – assault amphibious vehicle

LAV – light armored vehicle

NA – not applicable

ACE – armored combat earthmover

MCRP – Marine Corps reference publication

FM – field manual

MCT – medium crawler tractor

表 4-4. 載具陣地尺寸一覽表

表 4-4. 載具陣地尺寸一覽表						
陣地類型	載具型式	陣地尺寸			裝備構築工時 D7/M9/MCT 推土機(小時)	基地護堤 所需最低 厚度(呎)
		長	寬	深		
急迫	外掛裝甲之史崔克裝甲車	32	19	9	1.6	8
	M113 系列載具	22	14	6	0.6	8
	M577 指揮車	22	14	9	0.8	8
	M106 及 M125 迫砲載具	22	16	7	0.7	8
	具裝甲防護組之 AAV 系列甲車	33	19	11	2.0	8
	具裝甲防護組之 LAV 系列甲車	27	25	9	1.7	8
可掩蔽車體周密陣地	可掩蔽車體陣地					
	M113 系列載具	22	14	6	0.6	NA
	M577 指揮車	22	14	9	0.8	NA
	M106 及 M125 迫砲載具	22	16	7	0.7	NA
	M2 及 M3 戰鬥車	26	16	7	0.8	NA
	M1 主戰車	32	18	5.5	0.9	NA
	具裝甲防護組之 AAV 系列甲車	33	19	11	2.0	NA
	具裝甲防護組之 LAV 系列甲車	27	25	9	1.7	NA
	進入路徑	各進入路徑必須具載具可通行寬度，構築時間可具體依據移除土方量除以 100 立方碼後乘以 0.75 計算				
	掩蔽位置	掩蔽位置通常運用天然掩蔽，所需寬度與可掩蔽載具車體之週密載具陣地相同，深度則需與可掩蔽砲塔之週密陣地尺寸相同。				
	可掩蔽砲塔陣地					
	外掛裝甲之史崔克裝甲車	32	19	9	1.6	NA
	M113 系列載具	22	14	7.5	0.7	NA
	M2 及 M3 戰鬥車	26	16	10	1.2	NA
	M1 主戰車	32	18	9	1.5	NA
	具裝甲防護組之 AAV 系列甲車	33	19	13	2.3	NA
	具裝甲防護組之 LAV 系列甲車	27	25	12	2.3	NA

¹ 步兵戰鬥車及戰車不建議使用急迫陣地。

² 陣地尺寸應提供 3 呎的淨空，用以裝備運動及保修，進入路徑則不需增加。

³ 陣地總高度包含護堤高度，另深度應依據周圍地形及火力配置進行調整。

⁴ 本表提供陣地整備所需時間，來自實用之經驗法則。

⁵ 針對可掩蔽車體及砲塔陣地，不建議運用護堤。

備註

AAV-兩棲突擊載具	LAV-輕型裝甲車	NA 不適用
ACE-戰鬥推土機	MCRP-陸戰隊出版參考資料	
FM -野戰手冊	MCT-中型履帶式推土機	

sides. Because of the false sense of security provided by berms against kinetic energy and hypervelocity projectiles, hasty vehicle fighting positions with berms are not recommended for tanks, infantry fighting vehicles, or Stryker mobile gun systems. Hasty fighting positions do offer protection from HEAT projectiles and provide limited concealment if properly camouflaged. As the tactical situation permits, hasty positions for combat vehicles are improved to deliberate positions.

DELIBERATE POSITIONS

4-28. Deliberate fighting positions are required to protect a vehicle from kinetic energy and hypervelocity projectiles. Deliberate vehicle fighting positions are holes in the ground which provide cover and concealment, reducing the target signature. The position is constructed in four parts: hull defilade, turret defilade, concealed access ramp or route, and hide location. Positions formed by natural terrain are best because of easy modification; however, if preparation is necessary, extensive engineer support is required. Each position is camouflaged with either natural vegetation or a camouflage net, and the spoil is flattened out or hauled away. All fighting positions for fighting vehicles (tanks, infantry fighting vehicles, and Stryker mobile gun systems) are planned as deliberate positions. Since lack of time usually limits the full construction of a deliberate position, only some parts of the position's construction are prepared. For example, the complete fighting position for a tank requires the construction of a hull defilade, a turret defilade, a concealed access ramp or route, and a hide location—all within the same fighting position. The maneuver team commander uses engineer earthmoving assets and usually constructs fighting position parts in the following order:

蔽。如果陣地構築深度越深且將護堤字前方延伸至載具的兩側，則可進一步提升陣地的防護能力。由於護堤能對動能穿甲彈及高速砲彈提供防護為錯誤之認知，故不建議戰車、步兵戰鬥車及史崔克機動武器系統之掩體採地上式具護堤方式執行陣地構築。急迫戰鬥陣地可提供對穿甲彈之防護，並在適當偽裝後，具備有限之隱蔽能力，在戰術狀況允許時，應將載具所用之急迫陣地強化為周密陣地。

周密陣地

4-28 周密陣地能使載具具備對動能穿甲彈及高速砲彈之防護力。周密陣地乃由各個地下坑洞所構成，以提供所需之隱、掩蔽，降低目標特徵。周密陣地由 4 個部份構成，車體掩蔽部、砲塔掩蔽部、具隱蔽性之進入坡道或路徑及躲避地點。運用天然地形所構成之陣地為最佳之選擇，因為最易於修改。然而若需實施相關之準備作業時，就需要大量的工兵支援，各陣地可運用天然植被或偽裝網執行偽裝作業，並把作業產生的棄土移除。各戰鬥載具所用之戰鬥陣地(戰車、步兵戰鬥車及史崔克機動砲塔系統)均需以周密陣地之型式進行規劃。由於常因時間不足而無法構築完整的周密陣地，僅能於準備階段時，完成周密陣地的其中幾個部份構築，例如完成戰車所需陣地與其他相同的陣地一樣需包含車體掩蔽部、砲塔掩蔽部、進入坡道或路徑及掩蔽位置。任務指揮官運用工兵土方作業機具時通常會依下列順序構築：

- Hull defilade. This position leaves the vehicle's turret above ground, allowing it to observe and engage targets.
- Turret defilade. The entire vehicle is belowground level. A hull defilade position is required in front of the vehicle to allow it to move up to engage targets.
- Hide location. The hide location allows the vehicle to be concealed away from the fighting position, and includes overhead concealment when possible.
- Concealed access ramp or route. A concealed route, either natural or constructed, allows the vehicle to move from its hide position to its fighting positions.

4-29. When developing deliberate positions, construction of hide locations and a concealed route between positions is only done when time and engineer assets are available. When limited time is available, engineer assets should be prioritized to concentrate on hull and turret defilade positions. Once the commander's priorities are complete, hide positions and concealed routes can begin. The ramps and concealed routes should require only partial clearing and leveling with engineer equipment because natural concealed routes and hide positions are used. In terrain where natural concealed routes and hide positions are not available, commanders must consider employing organic obscuration equipment when vehicles are occupying primary fighting positions or repositioning. Artillery or mortar-delivered smoke and smoke generators may provide this obscuration. The use of smoke may be a two-edged sword since it alerts the enemy to activity that may be occurring. Figures 4-1 and 4-2 depict what a fully developed deliberate vehicle fighting position may look like.

- 車體掩蔽部：載具之砲塔在此類型陣地中會顯露於地上，使其能執行觀測並與目標接戰。
- 砲塔掩蔽部：全部載具均在地平面以下，於此類掩蔽部前方需要一個車體掩蔽部，使載具能移動至車體掩蔽部與目標接戰。
- 掩蔽位置：躲避位置可使載具在陣地獲得隱蔽，在可能的狀況下，應包含覆頂式的掩蔽功能。
- 隱蔽之進入坡道或路徑：由天然或構築而成之隱蔽路徑，可使載具自隱蔽位置機動至其戰鬥陣地。

4-29 當編組周密陣地時，只有在時間及工兵資材可獲得之狀況下，才能構築陣地所需之隱蔽位置陣地掩蔽路線，在時間受限的狀況下，工兵資材應優先集中用於構築車體及砲塔掩體，當滿足指揮官的優先構築需求後，即可開始構築隱蔽位置及進入陣地，由於路徑及隱蔽位置運用天然的隱蔽，故僅需運用工兵裝備進行局部清除及整平。當路徑及隱蔽位置所在之地形不具天然隱蔽效果時，指揮官必須考慮部署建制之遮蔽器材、砲兵、迫擊砲或煙霧產生器提供此類遮蔽功能，煙霧運用為雙面刃，因為它可能會引起敵人對此作業產生警覺，圖 4-1 及 4-2 為周密陣地示意圖。



Figure 4-1. M1 tank (hull defilade)

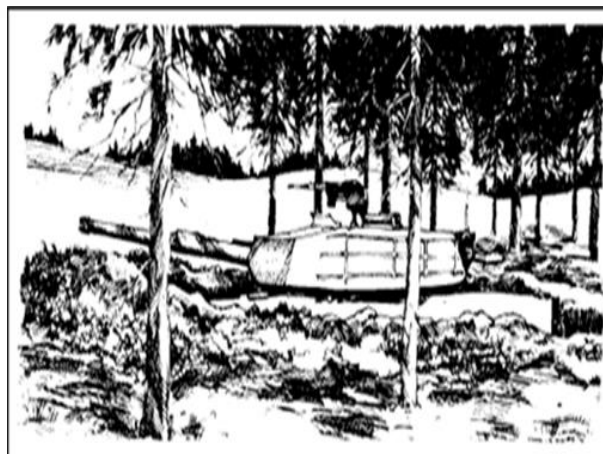


圖 4-1 M1 坦克車(全遮蔽掩體)

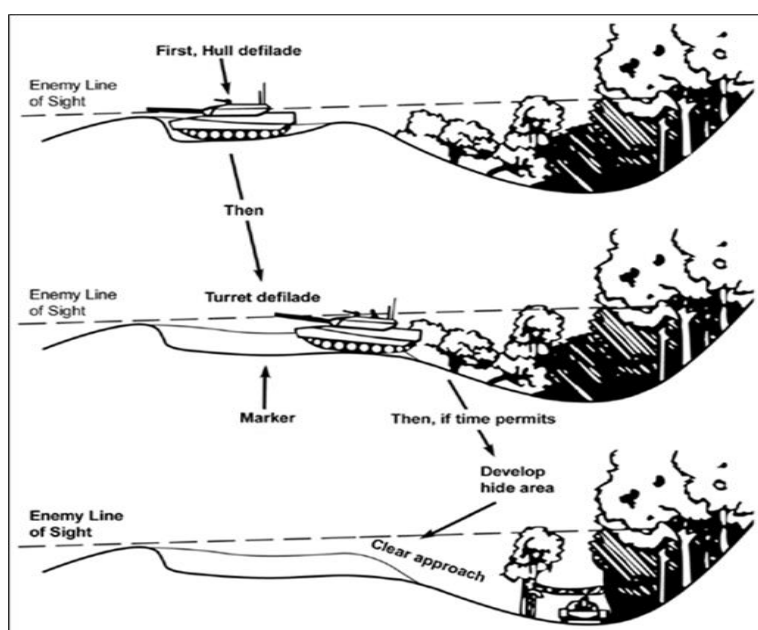


Figure 4-2. Fully developed deliberate fighting position

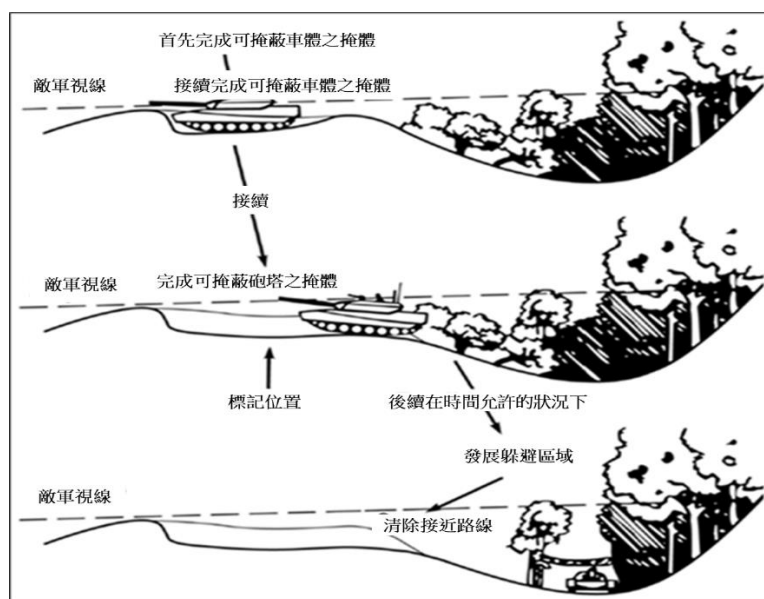


圖 4-2 完備之周密戰鬥陣地

4-30. The terrain, the type of soil, and the water table will all influence the construction of vehicle fighting positions. In many cases, the depth of soil to bedrock or to the water table will prevent or hinder the construction of positions. This concern may impact a specific vehicle position or an entire unit BP. Commanders must sometimes consider the competing requirements of vehicle positions against the ability to excavate the desired fighting positions. For units remaining in place for extended periods of time, measures must be taken to prevent or mitigate erosion and drainage problems.

MARKING

4-31. When fighting positions are planned, it is extremely important to mark the positions (for recognition during day and night) and understand when and how the positions will be occupied. This maximizes the time available for construction and ensures that the fighting positions meet the intent of the maneuver commander. Maneuver commanders and vehicle commanders will mark the position and then be available when engineer assets begin digging. It is the vehicle commander's responsibility to check the position for proper depth and line of sight (LOS) before releasing engineer assets to move to the next position. The vehicle commander or his representative must remain present during the construction of the fighting position. Once the leader is satisfied that the position meets standards and can properly engage his sector, the engineer assets will be released for their next prioritized mission. It is the maneuver unit commander's responsibility to ensure that fighting positions are correctly sited, and it is the engineer commander's responsibility to enforce construction standards.

4-30 地形、土壤種類及地下水位將影響載具戰鬥陣地構築，在許多案例中，土壤之岩床或地下水位將阻礙或造成陣地無法構築，這些相關事項可能會對特殊之載具陣地或對整個單位的戰鬥陣地造成衝擊，指揮官有時必須在所需構築的陣地及構築能力間權衡，單位如需於既有地點延長停留時間，則必須採取方法以防止或減輕陣地的損壞及排水問題。

標記

4-31 當完成戰鬥陣地規劃後，標記陣地即為極度重要的事項(日夜間均能辨識)，並且了解陣地將於何時及何種方式佔領，將可最大化構築可用時間並確認戰鬥陣地可符合任務指揮官之企圖，任務指揮官及載具之車長將會標記陣地位置，並使用工兵器材進行挖掘後即可運用相關陣地。車長在工兵器材轉移至次一陣地實施作業前，須負責檢核陣地之深度及視線是否合適，故在陣地構築期間，車長或其代表必須在場，當車長滿意陣地之構築狀況且符合標準並能適當的在其所負責區域接戰時，工兵器材將轉移執行次一優先任務，任務指揮官須負責確保各戰鬥陣地之正確配置；另工兵指揮官須負責各構築陣地符合標準。

COMPANY AND BATTALION BATTLE POSITIONS

4-32. The creation of company- and battalion-sized BPs involves the construction of numerous fighting and protective positions to meet the commander's intent for those particular sites. That intent will be linked to the defensive plan (see FM 90-7). Although engineers are responsible for prioritizing the engineer effort within the commander's guidance and constructing fighting positions to standard, the maneuver unit is responsible for siting each position and developing the BP. The maneuver unit should designate a representative (typically the unit's senior NCO (Army)/senior staff NCO (Marine Corps) or executive officer) as the on-site point of contact to guide the execution of the required engineer support. There are five kinds of BPs: primary, alternate, supplementary, subsequent, and strong point. All BPs require survivability and countermobility support, but the creation of a strong point requires significant time, resources, and engineer effort to create. See FM 3-90 for more information.

EXCAVATION CAPABILITY PLANNING FACTORS

4-33. The basic excavation capabilities of the most likely survivability equipment supporting a BCT/RCT are shown in table 4-5. These planning factors may be further influenced by the condition of the soil, terrain, weather and weather-related effects; maintenance of the vehicles; personnel availability; and other potential significant influences on their performance.

4-34. These capability estimates can be used to estimate the time required to excavate for various fighting and protective positions, in the event that other tables do not include the information necessary for a specific vehicle or situation. In that event, it is necessary to estimate the size of the position required, the amount of material to be

營、連級戰鬥陣地

4-32 營、連級戰鬥陣地之構築為在特定地點匯集數個符合指揮官企圖之戰鬥及防護陣地而成。指揮官企圖將與防禦計畫相互聯結，雖然工兵負責在指揮官指導下，排定工兵兵力運用優序並構築符合標準的戰鬥陣地，然各陣地位置之選定及發展則為執行任務單位之責任，執行任務單位應指派代表(通常是資深士官或副連長)作為現場的聯絡對口，以引導所需工兵支援兵力執行構築作業，戰鬥陣地計有主要、預備、補充、後續及堅固陣地等 5 類，所有類型的陣地均須戰場生存力及反機動力支援，但構築堅固陣地須具備大量時間、資源及工兵兵力之投入。

計畫所需掘土作業能力參數

4-33 大多數可能用於支援旅級或群級戰鬥隊用於提升戰場生存力之裝備的基本掘土作業能力參數如表 4-5，這些計畫參數可能會因土壤狀況、地形、天氣及天氣相關因素而產生更多的影響，載具的維保、人員獲得性及其他潛在的重要因素都會影響作業能力。

4-34 掘土能力評估數值可用於估計挖掘各式戰鬥及防護陣地所需時間，在構築特種載具或狀況下所需必要之參考資料並未列在其他相關參考表內，對於相關構築作業，必須針對所需構築之陣地尺寸、所

Table 4-5. Excavation capabilities of selected survivability equipment

Equipment	Excavator Capability (cubic yards per hour)	
	Banked Material	Loose Material
Armored combat earthmover, M9	163	204
Scoop loader	125	156
Tractor, full tracked, D3	50	60
Tractor, full tracked, D5 (Army)/ MC1150 (Marine Corps)	150	170
Tractor, full tracked, D7 (Army)/ Medium crawler tractor (Marine Corps)	165	211
Tractor, rubber-tired, articulated-steering, multipurpose (TRAM), 624K	125	156
Deployable universal combat earthmover	160	170
High mobility engineer excavator	66	66
Backhoe loader	66	66
Small emplacement excavator	30	40
Utility tractor	30	40
Note. Rates are based on work performed in clayey sand soil with an operator efficiency of 0.83, a 50-minute work hour, and excavated soil being spread or dumped in the immediate vicinity of the excavation site.		

表 4-5. 各類提升戰場生存力構築機具掘土能力一覽表

裝備型式	掘土能力	
	實方	鬆方
M9 戰鬥推土機	163	204
鏟裝機	125	156
D5/M1150 全履帶牽引機	150	170
D3 全履帶牽引機	50	60
D7 全履帶牽引機(陸戰隊中型履帶牽引機)	165	211
624K 輪型多用途關節式 轉向型牽引機	125	156
通用戰鬥推土機	160	170
高機動性工兵挖土機	66	66
挖掘裝載機	66	66
通用牽引機	30	40
多功能工兵車	30	40
備註 作業效率計算乃基於操作手熟練度達 0.83 時，在黏質砂土每小時作業 50 分鐘，且挖掘產出之土方可立即鋪散或傾倒之狀況。		

moved, and the type of equipment used. FM 5-412/MCRP 3-17.7F provides additional information on estimated earthwork. FM 5-434 (which provides estimated production rates, characteristics, operation techniques, and soil considerations for earthmoving equipment) should be used as a guide to selecting the most economical and effective equipment based on the situation.

ARTILLERY POSITIONS

4-35. The same principles that apply to hasty individual and crew-served weapons positions also apply to artillery positions when time, materials, and engineer equipment are limited. As time, materials, and engineer equipment permit, artillery positions are improved with firing platforms and berm or revetment positions.

ARTILLERY FIRING PLATFORM

4-36. Artillery firing platforms for towed or self-propelled artillery weapons are necessary on soft ground to preclude weapon relaying after each round is fired. The pad distributes the loads over a larger area with no significant settlement and is flexible, level, and strong enough to withstand the turning and movement of self-propelled weapons. The pad allows firing in all directions. Trail logs are anchored outside the pad for towed weapons. For self-propelled weapons, the recoil spades are set in compacted solid material or in a layer of crushed rock around the pad. These positions provide limited protection with the use of a berm or revetment.

BERM OR REVETMENT POSITIONS

4-37. A berm or revetment position for field artillery provides improved protection from near-miss, indirect-fire weapons effects and small caliber direct fire. The berm is constructed with material removed from the excavation and is built low enough to allow direct howitzer fire. It is usually neces-

需移除材料量及運用之土方作業機具進行評估。FM 5 412/MCRP 3-17.F 提供額外土方作業所需評估資訊(在 FM 5-434 中提供作業效率、機具特性、作業技巧及對土方作業機具之土壤考量因素)可應用於依狀況選擇最經濟、有效構築裝備之指引。

砲兵陣地

4-35 砲兵陣地構築時若在時間、資材及工兵裝備有限的狀況下，也可運用與單人及多人操作武器陣地之原則進行構築，待狀況許可時，砲兵陣地應改良具護堤或護牆之射擊平台。

砲兵射擊平台

4-36 在鬆軟的土地上牽引砲或自走砲需要砲兵射擊平台，以排除武器在每發砲彈射擊後須重新瞄準之狀況，射擊平台可將載重分布於較大區域，且無顯著沉陷狀況，並具彈性、平整及足夠支撐自走砲轉向及運動之強度。平台允許向各個方向射擊，牽引武器的腳架固定於發射平台外，針對自走砲、反後座力鏟應設立於夯實之土壤或在平台周邊的碎石堆層，運用護堤或護牆時，可提供此類陣地有限之防護力。

護堤或護牆陣地

4-37 具護堤或護牆之陣地可提供野戰砲兵對非直射武器在近彈狀況或小口徑直射武器進階之防護能力，護堤是由陣地構築時挖掘產出之材料構成，期高度必須低於榴彈砲直射時之所需高度，護堤通常需壓實確保穩定，以防止砲口爆震使期損毀，震地可由天然植被或偽

sary to stabilize the berm to prevent deterioration caused by muzzle blast. The position is camouflaged with natural vegetation or camouflage netting. Table 4-6 gives dimensions of positions for field artillery vehicles. Shelter construction is necessary to provide adequate protection for the firing crew, fire direction center, and CP. Separate shelters are necessary to contain an artillery section's basic load of projectiles, fuzes, and propelling charges. If time allows, firing positions, CPs, and fire direction centers are connected by trenches. See chapter 6 for information about camouflage and concealment of survivability positions.

4-38. Emplacements for towed artillery systems are routinely constructed to increase the weapons systems survivability. These weapons systems are not as mobile as self-propelled systems and require increased survivability measures. Emplacements for towed systems must provide maximum flexibility in the delivery of fire and protect the weapon and crew against the effects of enemy fire. Those positions designed to allow the towed systems to be used in a defensive direct-fire role will have adjusted berm heights that allow firing at 0 mils elevation.

4-39. Trail logs may be necessary to overcome the weapons recoil, while still providing the ability to traverse the artillery piece. Trail logs are commonly constructed in a complete circle to allow the howitzer to pivot 360 degrees. In semipermanent installations, wooden decking may be placed on the floor of the emplacement to assist in drainage and when traversing the howitzer. Protective positions with overhead cover are provided for the personnel ready position and ammunition shelters. (See figure 4-3 and figure 4-4, page 4-16.).

4-40. Modern self-propelled howitzers are designed to shoot during short halts. The ability to shoot and then reposition quickly provides increased survivability for

裝網偽裝，表 4-6 顯示野戰砲兵載具之陣地尺寸、相關隱、掩蔽設施必須能提供射擊人員、射擊指揮所及射擊陣地充足之防護，分儲砲兵組所需之砲彈、引信及推進藥需具有分散之防護場所，在時間允許的狀況下，可構築壕溝將射擊震地、指揮所及射擊指揮所完成構聯。

4-38 牽引砲系統通常會構築火砲掩體以提升武器系統之生存力。這些牽引砲系統機動能力不如自走砲系統，需要增加提升生存力之方法。牽引砲系統所使用之火砲掩體必須提供射擊之最大彈性及武器與操作人員對敵火之防護，這些陣地被設計為當牽引砲系統作為防衛性直射武器時，將調整護堤高度，使火炮能在 0 密位的仰角射擊。

4-39 砲架固定枕木為克服武器後座力所需物品，同時可提供火砲橫向支撐力，砲架枕木通常構築成完整的圓形，使榴彈砲可轉項 360 度，在半永久式設施中，可能會在火砲掩體的地面設置木質平台，以協助排水，同時可橫向移動榴彈砲，於人員待命陣地及彈藥交付所應提供具覆頂式掩體之防護陣地(如圖 4-3 及圖 4-4、頁 4-16)。

4-40 現代化的自走榴砲設計為具備可短暫停止後持續射擊，於射擊後可快速重新部署的能力，增

Table 4-6. Dimensions of field artillery vehicle positions

Vehicle Type	Dimension (feet) ¹			Other Information		
	Length	Dimension Width	Depth/ Berm Height ^{2,4}	Equip-ment Hours ³ (D7 Dozer/ M9 ACE/ MCT)	Minimum Berm Thickness at Base (feet)	Re-marks
105-mm towed howitzer (M102)	21 feet 10-1/2 inches (6.7 meters)	6 feet 4 inches (1.9 meters)	24 inches (0.61 meters)/ 18 inches (0.46 meters)	1 hour	8	—
105-mm towed howitzer (M119A2)	Folded position: 16 feet (4.87 meters) With tube in firing position: 20 feet 9 inches (6.32 meters) With tube locked in tube clamp: 20 feet 2 inches (6.15 meters)	5 feet 10 inches (1.78 meters)	24 inches (0.61 meters)/ 18 inches (0.46 meters)	1 hour	8	—
155-mm towed howitzer (M198)	Firing position (without spades): 36 feet 2 inches (11.02 meters) Stowed position: 24 feet 5 inches (7.44 meters) Towed position: 40 feet 6 inches (12.34 meters) Tread (center-to-center): 7 feet 9 inches (2.36 meters)	Towed position: 9 feet 2 inches (2.79 meters)	—	1.5 hours	8	—
155-mm towed howitzer (M777)	33 feet 6 inches (10.21 meters)	12 feet 3 inches (3.72 meters)	—	—	8	—
155-mm howitzer self-propelled (M109A6)	Overall length (with baskets to rear): 423 inches (10.7 meters) Overall length (with baskets forward): 392 inches (9.9 meters)	Overall width (with baskets forward): 154 inches (3.9 meters) Overall width (with baskets to rear): 128 inches (3.3 meters)	—	—	—	—

Note.

A dash indicates no data.

¹ Position dimensions provide an approximate 3-foot clearance around vehicle for movement and maintenance and do not include ramp(s).² Total depth includes any berm height.³ Production rate of 100 bank cubic yards per 0.75 hour. Divide construction time by 0.85 for rocky or hard soil, night

conditions, or closed hatch operations (M9). Use of natural terrain features will reduce construction time.

⁴ All depths are approximate and will need adjustment for surrounding terrain and fields of fire.**Legend :**

ACE – armored combat earthmover

MCT – medium crawler tractor

mm – millimeter

表 4-6. 野戰砲兵載具陣地尺寸一覽表

載具形式	尺寸(英尺) ¹			其他資訊		
	長	寬	深度/ 護堤高度 ^{2、4}	作業工時 ³ (D7 或 M9 推土機)	護堤最低 厚度(英尺)	備註
M102 105 公厘牽引砲	6.7 公尺	1.9 公尺	0.61 公尺/ 0.46 公尺	1 小時	8	-
M119A2 105 公厘牽引榴砲	1.收合陣地 4.87 公尺 2.可容納砲管陣地 6.32 公尺 3.可容納砲管於鎖制於固定位置陣地 6.15 公尺	牽引陣地 2.79 公尺	-	1 小時	8	-
M198 155 公厘牽引榴砲	1.不包含腳架 11.02 公尺 2.收合陣地 7.44 公尺 3.牽引陣地 12.34 公尺 4.輪距(兩輪中心線距離)2.36 公尺	牽引陣地 2.79 公尺	-	1.5 小時	8	-
M777 155 公厘牽引榴砲	10.21 公尺	3.72 公尺	-	-	8	-
M109A6 155 公厘自走榴砲	1.全長(置物箱在後側)10.7 公尺 2.全長(置物箱在前側)9.9 公尺	1.全寬(置物箱在後側)3.3 公尺 2.全寬(置物箱在前側)3.9 公尺	-	-	-	-

備註

破折號表示不具相關資料

¹ 陣地尺寸需能於載具周邊提供大約 3 英尺的淨空，以提供載具運動及保養空間，坡道不需預留淨空空間。² 總深度需包含任一護堤高度。³ 構築時間為每 0.75 小時可處理 100 立方碼之土堆，若在岩質、硬質土壤、夜間作業、或以 M9 推土機於近接作戰之隱密構築作業時，應將作業效率乘以 0.85。⁴ 本表所列深度為估計值，需配合周邊地形及射界調整。**圖例：**

ACE：裝甲戰鬥推土機

MCT：中型履帶式牽引機

mm：公厘

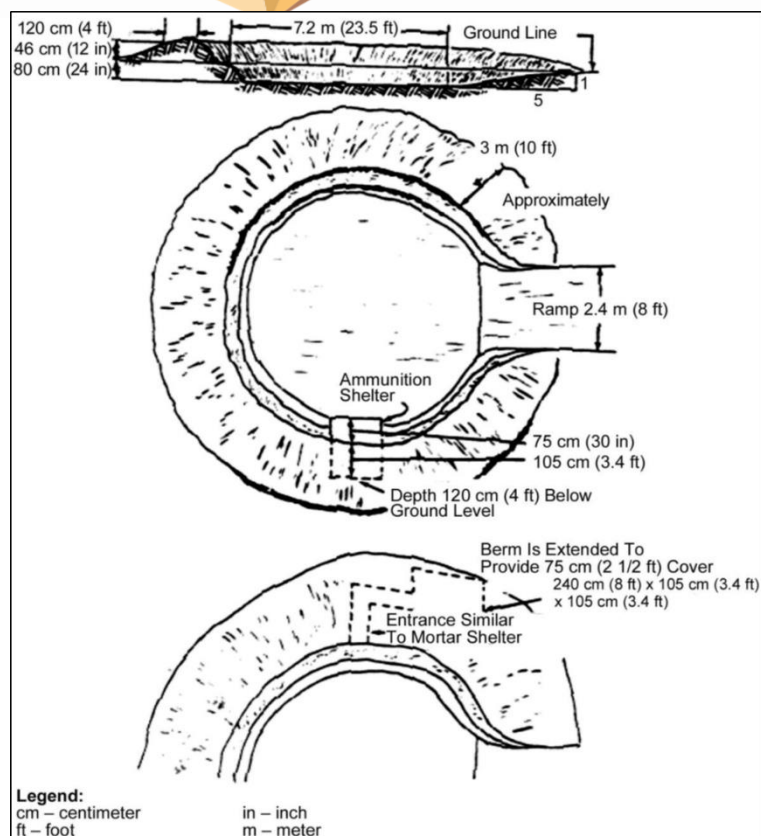


Figure 4-3. Towed howitzer emplacement (105-millimeter and 155-millimeter howitzer) layout

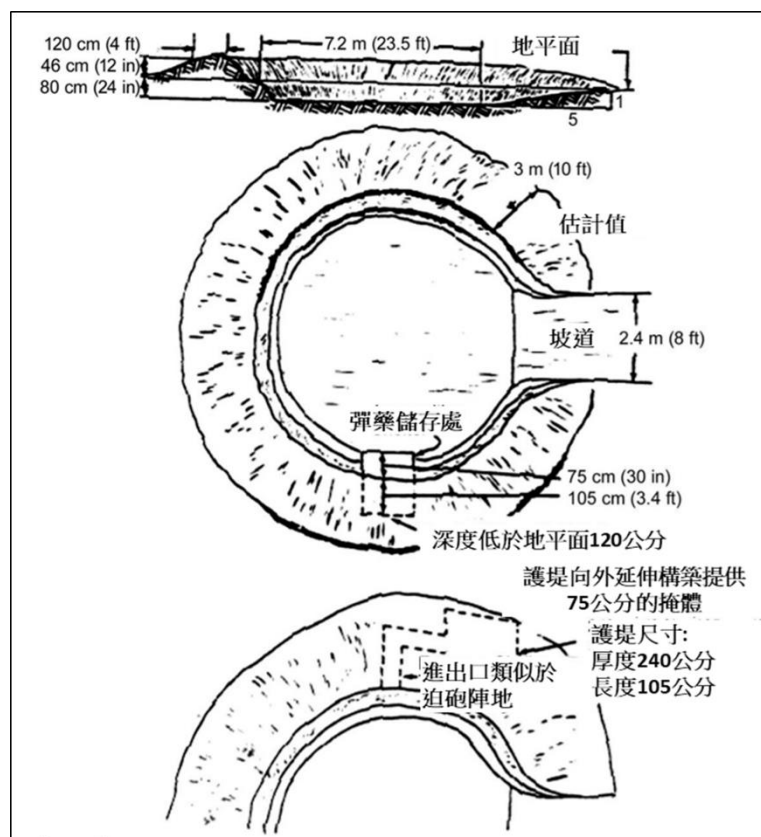
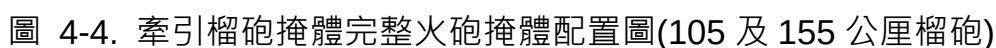
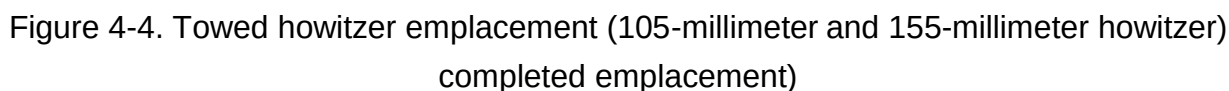


圖 4-3. 牽引榴砲掩體配置圖(105 及 155 公厘榴砲)



the weapons systems. Self-propelled howitzers may be positioned on base camps to provide fire support to the local commander's AO. Figure 4-5 portrays a protected firing emplacement for self-propelled howitzers used in this role.

4-41. When positions for self-propelled artillery systems are prepared, a sloped ramp is built to facilitate the vehicles' entry into and exit from the emplacement. Although the hull of the howitzer is protected, leaders must ensure that berms and revetments are not constructed to a height which prohibits the howitzer from depressing to the minimum elevation. This would prevent the weapons system from being used in the direct-fire role. Barrel stops may be used, if necessary, to prevent fire into adjacent units. In temperate or tropical environments, provisions must be made for drainage inside the emplacement.

加了武器系統的生存力，自走榴砲可能被部署於基地內，以提供作戰地區內指揮官現地之支援火力，圖 4-5 為描述自走榴砲當最為防護性射擊用途時射擊陣地。

4-41 當完成自走砲系統陣地準備後，應構築坡道使自走榴砲可進出陣地，雖然自走榴砲的車體已具備防護，現場指揮官必須確保護堤及護坡的構築高度不可高於火炮最低水平之高度，高於火炮最低水平高度將會妨礙火炮作為直射武器之運用。需要時可能需使用砲管固定器，以避免向鄰近單位進行射擊，驗溫帶或熱帶環境，臨時陣地必須於火炮陣地內設置排水溝。

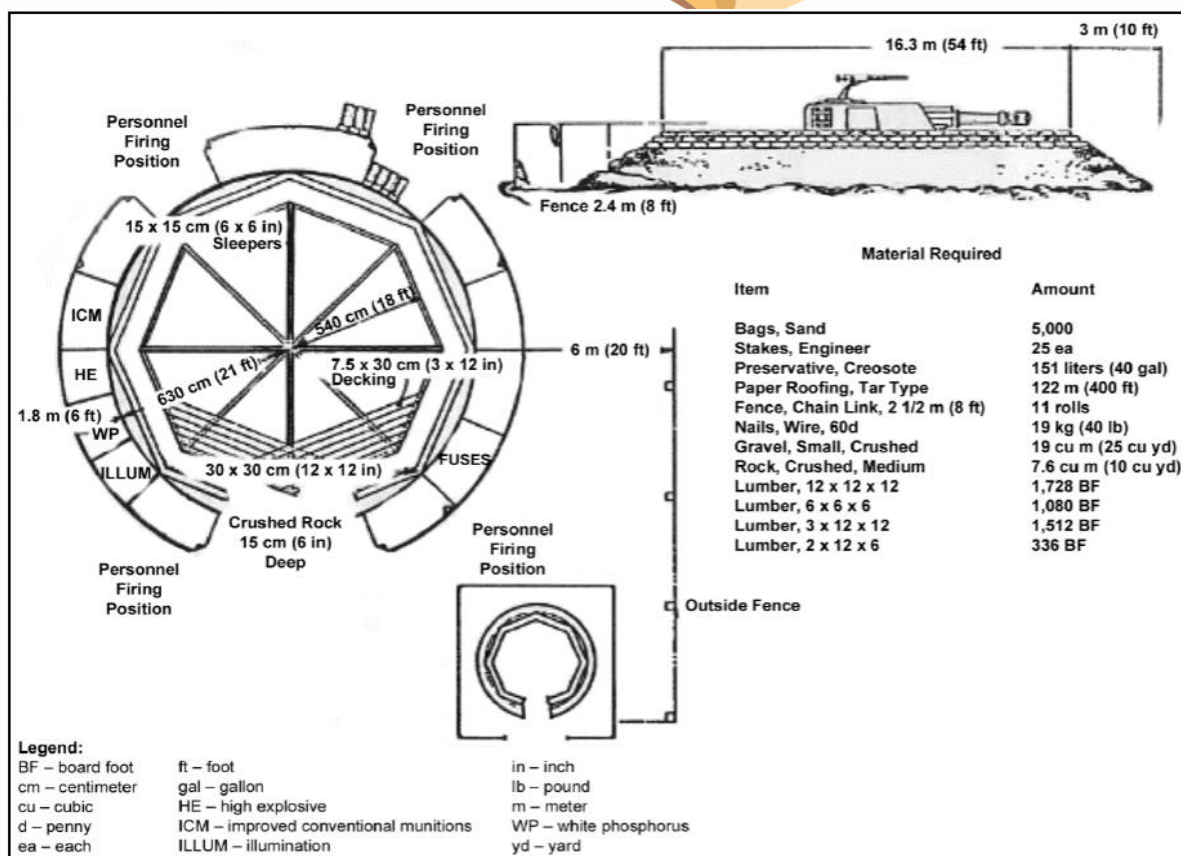


Figure 4-4. Towed howitzer emplacement (105-millimeter and 155-millimeter howitzer) completed emplacement)

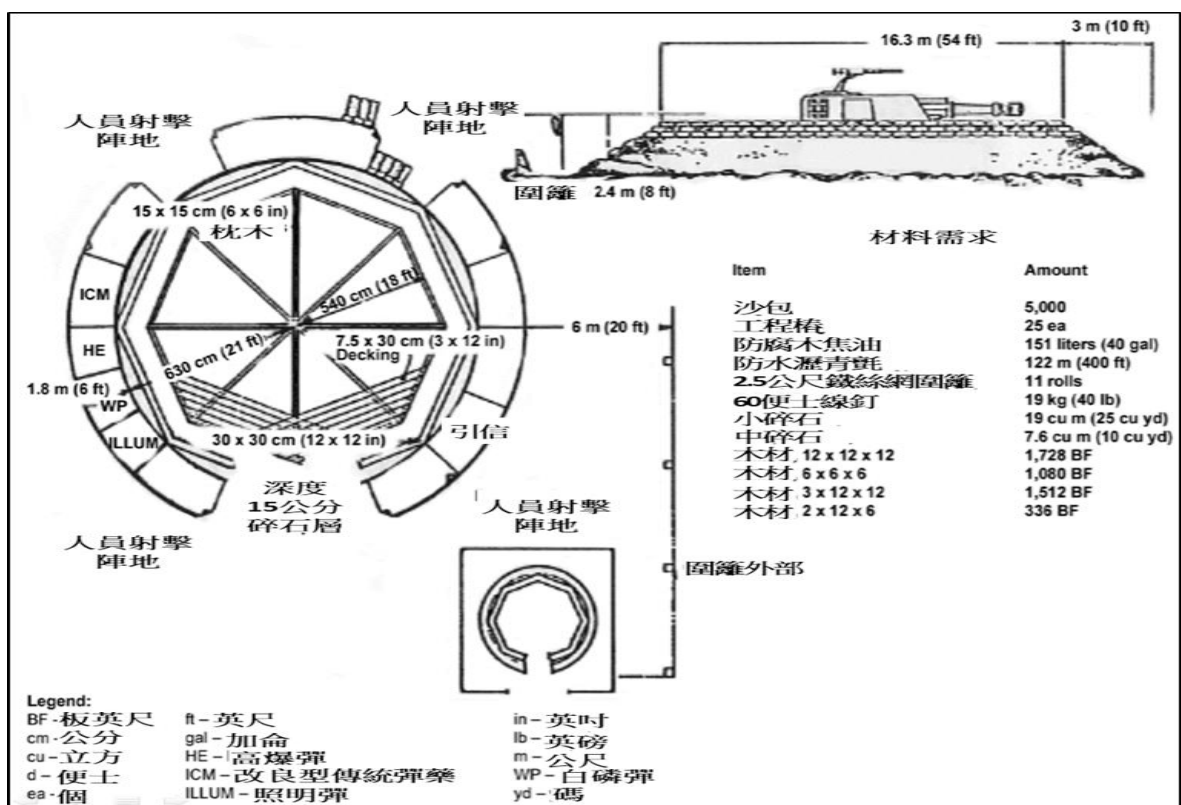


圖 4-5. 155 公厘自走榴砲火砲掩體配置圖(109 系列)(半永久設施)