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Civil Engineer Camouflage, Concealment, & Deception (CCD) Measures

DEPARTMENT OF THE AIR FORCE

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Operations

CIVIL ENGINEER CAMOUFLAGE, CONCEALMENT, AND DECEPTION MEASURES

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This handbook supports Air Force Instruction (AFI) 10-210, *Prime Base Engineer Emergency Force (BEEF) Program* and AFI 10-211, *Civil Engineer Contingency Response Planning* by describing civil engineers camouflage, concealment, and deception (CCD) responsibilities in contingency operations. This handbook includes responsibilities found in other references, but otherwise is not directive or mandatory. Instead, it presents ideas and concepts to consider throughout the planning and execution phases of the civil engineer CCD plan. This handbook applies to deployed Air Force civil engineer personnel, including Air National Guard (ANG) units and Air Force Reserve Command (AFRC), civilian and contractor personnel who may be tasked to execute a civil engineer CCD plan. Refer recommended changes and questions about this publication to the office of primary responsibility (OPR) using AF IMT 847, *Recommendation for Change of Publication*; route AF IMT 847s from the field through Major Command (MAJCOM) publications/forms managers. Ensure that all records created as a result of processes prescribed in this publication are maintained in accordance with Air Force Manual (AFMAN) 33-363, *Management of Records*, and disposed of in accordance with the Air Force Records Disposition Schedule

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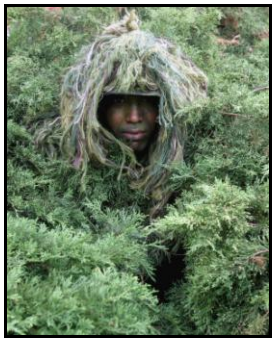
Chapter 1

INTRODUCTION

1.1. Overview. Camouflage, concealment and deception (CCD) is the use of materials and techniques to hide, blend, disguise, decoy, or disrupt the appearance of military targets and/or their backgrounds. CCD helps prevent an enemy from detecting or identifying friendly troops, equipment, activities, or installations. Properly designed CCD techniques take advantage of the immediate environment and natural and artificial materials (**Figure 1.1.**).

Figure 1.1. Use of Artificial CCD Materials to Blend with Environment.



1.1.1. While deception is a part of CCD, it does not fall within civil engineer primary responsibilities. However, there is a chance engineers will be tasked to assist in deception plans and/or operations. The overall responsibility for the Air Force Military Deception Program falls within the Information Operations Division (AF/A3Z-CI) of the Headquarters Air Force Cyber and Space Operations Directorate. Deception operations must be coordinated and approved IAW AFI 10-704 and/or CJCSI 3211.01 series. An USAF deception operation is defined as a commander approved plan and/or event(s) that clearly outline real or notional effects and/or objectives targeting adversary decision makers. Tactical level training and exercises employing CCD are not considered deception operations for above coordination and approval purposes. CCD can be used in support of operational plans through operational taking channels.

1.1.2. Civil Engineer (CE) units and personnel have CCD responsibilities that should be performed in specific situations. For example, in high threat areas where the enemy may launch mortar or rocket attacks at the installation, passive protection measures should be taken to protect high valued targets, referenced as Deception in support of operations security (DISO). Some of these measures include dispersing mission essential assets, including personnel, and then camouflaging or concealing them from enemy reconnaissance and surveillance to prevent them from becoming targets. Although, much of this handbook is written to support mobile ground units, the principles, tactics, techniques, and procedures are relevant to fixed installations and their assets. Listed below are just a few examples of CE resources that may require CCD measures and/or dispersal under specific threat conditions.

1.1.2.1. **Airfield Damage Repair** (**ADR) Assets.** Disperse equipment (**Figure 1.2.**), materials, and personnel that are designated to repair the airfield after an enemy attack. Distribute like items and personnel with specific ADR skills to different dispersal locations to prevent total loss of a capability with a single hit on one dispersal location. It is also a good idea to camouflage these assets at the dispersal site.

Figure 1.2. ADR Equipment Must Survive Enemy Attack.

1.1.2.2. **CE Unit Control Center** (**UCC).** The UCC contains the command and control (C2) structure for CE and in high threat areas should be camouf-

laged to help ensure survivability of its personnel. In addition, the alternate UCC should be dispersed far enough from the primary UCC to prevent bomb damage from an explosion at the primary UCC if it is hit during an attack.

1.1.2.3. **Power Plants.** Plan to disperse power plants in a high-threat environment and interconnect them to ensure some degree of electrical generation capability is retained after an attack. Use CCD measures on power plant assets and stand-by generators to protect against targeting by the enemy.

1.1.2.4. **Personnel with Special Skills.** As mentioned in **paragraph 1.1.1.1.**, disperse personnel with special skill-sets to separate locations to prevent loss of their capabilities with a single hit on one dispersal location. Also, disperse personnel with the same Air Force specialty to different locations.

1.1.2.5. **Firefighting Vehicles.** Fires are a major result from enemy attack. Therefore, disperse and camouflage firefighting vehicles to increase their chances of survivability.

1.1.2.6. **Fighting Positions.** Camouflage fighting positions to prevent the enemy from targeting them and enhance the survivability of occupants (**Figure 1.3.**). Occupants should also perform individual camouflage techniques (**Chapter 7**).

Figure 1.3. Airmen Placing Camouflage Netting over Fighting Position.

1.1.2.7. **Dispersal Positions.** Assets are dispersed to help ensure their survivability; however, if assets are dispersed but can still be seen by the enemy,

they can become a target. Therefore, CCD measures are a necessity to help ensure the assets survive the attack.

1.1.3. To help ensure the installation's mission continues after an enemy attack, all units must apply CCD principles to protect friendly forces and high value assets from enemy weapons and actions. Ignoring a threat's ability to detect and target high valued targets is shortsighted and dangerous. Friendly units enhance their survivability capabilities if they are well versed in CCD principles and techniques.

1.1.4. Increased survivability and mission continuation is the goal of a CCD plan. A unit commander must encourage each Airman to think of survivability and CCD as synonymous terms. Training Airman to recognize this correlation instills a greater appreciation of CCD values.

1.1.5. CCD encompasses individual and unit efforts such as movement, light, and noise discipline; litter control; dispersal; and deception operations. Each Airman's actions must contribute to the unit's overall CCD posture to maximize effectiveness.

1.1.6. This handbook is designed to take the reader through the sequential stages of CCD in hopes of understanding and correctly implementing the CCD plan. This understanding begins with knowing the threat you are faced with. Threat familiarization determines the necessity of CCD, and if so, what CCD measures will be effective. The fundamentals of CCD are discussed to give the reader the foundation necessary to effectively execute the CCD plan. Next, the handbook explains how CCD fits in the overall installation's defensive operations plan to blind the enemy. Then, suggestions are given to help determine which assets are high valued targets and how to protect those targets using CCD. Finally, details are given on how the environment may affect CCD implementation measures.

1.2. Responsibilities.

1.2.1. **Installation Commander.** Where applicable, establishes a single, comprehensive, installation-wide CCD program that supports all units. Typically, this will be managed by the installation commander's appointed Military Deception Officer and/or NCO (MDO/MDNCO) per AFI 10-704.

1.2.1.1. Insert CCD guidance into applicable operations orders, plans, directives, and similar documents.

1.2.1.2. Assesses intelligence indicators and operational situations to decide which force protection defense measures to implement and when to implement them.

1.2.1.3. Ensures all installation units, including tenants, augmenting forces and geographically separated units (GSUs), participate in the installation CCD program.

1.2.1.4. Ensure CCD considerations are incorporated into deployment location plans and home station facilities and landscaping, if appropriate.

1.2.2. **Unit Commanders.** Where applicable, unit commanders are responsible for CCD of their units using established standard operating procedures (SOPs) and battle drills to guide their efforts. They also identify requirements, budget for, obtain, store and maintain unit passive defense operational and training equipment. Unit commanders will ensure CCD efforts are coordinated with the installation MDO/MDNCO and IAW AFI 10-704, *Military Deception Program*.

1.2.3. **Intelligence/Area Air Defense Commander (AADC).** Assesses capabilities of potential enemies and provides timely warning of attack, which initiates some passive defense measures.

1.2.4. **CE Commander.** The CE Commander participates in installation threat and vulnerability assessments with AFOSI, SF, and the Threat Working Group (TWG) IAW AFI10-245, *Antiterrorism (AT)*. They identify resource dispersal sites and provide dispersal information in the CE Contingency Response Plan or the Comprehensive Emergency Management Plan (CEMP) 10-2. CE Commanders will also direct appropriate CE subject matter experts to assist the installation MDO/MDNCO planning and/or execution efforts when requested.

1.2.5. **CE Readiness and Emergency Management Flight.** Ensures Emergency Management program direction and guidance are included in operations orders, plans, directive, support agreements, and other installation planning documents.

1.2.5.1. They also manage the passive defense for the CE Commander and Installation Commander.

1.2.5.2. Assists in passive defense plans and checklists development.

1.2.5.3. Develops, publishes, and maintains the installation CEMP 10-2.

1.2.5.4. Provide procedures and planned actions for conventional attack protective requirements in the In-garrison Expeditionary Site Plan (IGESP)/ Expeditionary Site Plan (ESP), including CCD operations that identify procedures on how and where to have camouflage netting, expedient tonedown, and decoys, including available quantities both in-place and deployable to the base (**AFI10-404, *Base Support and Expeditionary Site Planning***).

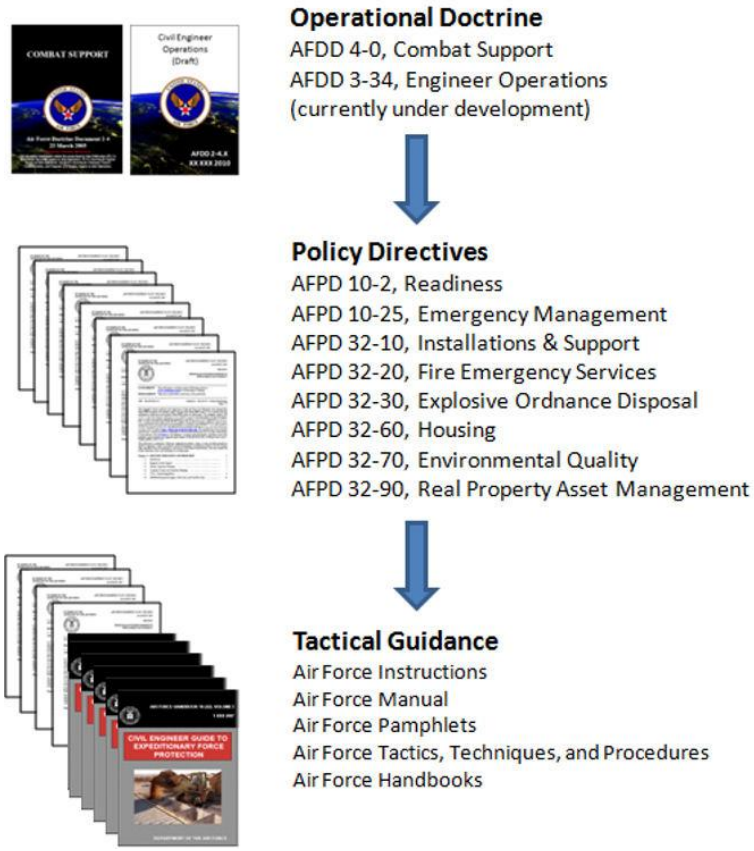
1.2.6. **Each Airman.** Every Airman is responsible for personal camouflage, equipment camouflage, and dispersal.

1.3. Doctrinal Considerations. This handbook supports implementation of Air Force Policy Directive (AFPD) 10-2, *Readiness*, and contains tactics, techniques, and procedures (TTPs) for use by civil engineers in supporting precepts outlined in Air Force Doctrine Document (AFDD) 2-4, *Agile Combat Support* and AFDD 3-34, *Civil Engineer Operations*. This relationship is illustrated in the Air Force CE hierarchy of publications (**Figure 1.4.**).

1.3.1. One of the imperatives of military doctrine is to conserve friendly strength for decisive action. Such conservation is aided through sound operations security (OPSEC) and protection from attack. Protection includes all actions that make Airmen, equipment, and units difficult to locate.

1.3.2. CCD degrades the effectiveness of enemy reconnaissance, surveillance, and target acquisition (RSTA) capabilities. Skilled observers and sophisticated sensors can be defeated by obscuring telltale signs (signatures) of units on the battlefield. Preventing detection impairs enemy efforts to assess friendly operational patterns, functions, and capabilities. This describes the goals and objectives of a DISO effort.

Figure 1.4. Air Force Civil Engineer Publications Hierarchy.



1.3.3. CCD enhances friendly survivability by reducing an enemy's ability to detect, identify, and engage friendly elements. Survivability encompasses all actions taken to conserve personnel, facilities, and supplies from the effects of enemy weapons and actions. Survivability techniques include using physical measures such as fighting and protective positions; chemical, biological, radiological, and nuclear (CBRN) equipment; and armor. These actions in-

clude interrelated tactical countermeasures such as dispersion, movement techniques, OPSEC, communications security (COMSEC), CCD, and smoke operations (a form of CCD). Improved survivability from CCD is not restricted to combat operations. Benefits are also derived by denying an enemy the collection of information about friendly forces during peacetime.

1.3.4. Deception helps mask the real intent of primary combat operations and aids in achieving surprise. Deception countermeasures can delay effective enemy reaction by disguising information about friendly intentions, capabilities, objectives, and locations of vulnerable units and facilities. Conversely, intentionally poor CCD can project misleading information about friendly operations. Successful tactical deception depends on stringent OPSEC. As mentioned previously, deception does not fall within CE responsibilities; however, regarding CCD planning and employment, it should be expected that engineers will be tasked to assist in deception operations.

1.3.5. Smoke and obscurants are effective CCD tools and greatly enhance the effectiveness of other traditionally passive CCD techniques (**Figure 1.5.**). Smoke and obscurants can change battlefield dynamics by blocking or degrading the spectral bands used by an enemy's target-acquisition and weapons systems. More recently developed obscurants are now able to degrade non-visual detection systems such as thermal infrared (IR) imaging systems, selected radar systems, and laser systems. (See FM 3-50, *Smoke Operations*, for more information on planning smoke operations.)

Figure 1.5. Smoke Degrades Enemy Detection Systems.

1.4. Priorities.

1.4.1. Every Airman and unit has an inherent mission of self-protection and they should use all CCD means available unless directed otherwise. However, CCD countermeasures have become more complicated due to advancing technology. Commanders must recognize that advanced technologies have:

1.4.1.1. Enhanced the performance of enemy recon and surveillance equipment.

1.4.1.2. Increased an enemy's ability to use electromagnetic (EM) signature analysis for detecting friendly units.

1.4.1.3. Reduced the time available to apply CCD because units must perform nearly all aspects of battlefield operations at an increased speed.

1.4.2. Commanders must prioritize CCD operations when time, camouflage materials, or other resources are insufficient to provide adequate support. Considerations for establishing these priorities involve analyzing the mission, enemy, terrain, weather, troops, time available, and civilian considerations (METT-TC). The following sets forth a METT-TC methodology to help determine CCD priorities:

1.4.2.1. **Mission.** The mission is always the first and most important consideration. CCD efforts must enhance the mission but not be so elaborate that they hinder a unit's ability to accomplish the mission, unless directed otherwise in support of operational level deception goals and objectives.

1.4.2.2. **Enemy.** An enemy's RSTA capabilities often influence the camouflage materials and CCD techniques needed to support a unit's mission. Before beginning a mission, obtain an intelligence analysis from the supporting intelligence office to identify the enemy's RSTA capabilities.

1.4.2.3. **Terrain and Weather.** The battlefield terrain generally dictates what CCD techniques and materials are necessary. Different terrain types or background environments (urban, mountain, forest, plains, desert, arctic, etc.) require specific CCD techniques.

1.4.2.4. **Airmen.** All Airmen must be well trained in CCD techniques that apply to their mission, unit, and equipment. A change in the environment or

the mission often requires additional training on effective techniques. Leaders must also consider the alertness of Airmen. Careless CCD efforts are ineffective and may disclose a unit's location, degrade its survivability, and hamper its mission accomplishment. Intelligence analysis should address the relative detectability of friendly equipment and the target signatures that unit elements normally project.

1.4.2.5. **Time.** Time is often a critical consideration. Elaborate CCD may not be practical in all tactical situations. The type and amount of CCD needed are impacted by the time a unit occupies a given area, the time available to employ CCD countermeasures, and the time necessary to remove and reemploy camouflage during unit relocation if necessary. Units should continue to improve and perfect CCD measures as time allows.

1.4.2.6. **Civilian Considerations.** From conflict to war and from tactical to strategic, civilians in the area of operation (AO) may be active or passive collectors of information. Commanders and their staffs should manage this collection capability to benefit the command and the mission.

1.5. Training. CCD training must be included in every field exercise (**Figure 1.6.**). Airmen must be aware that an enemy can detect, identify, and acquire targets by using resources outside the visual portion of the EM spectrum.

Figure 1.6. Airmen Conducting CCD Training.

Caution
Ensure local environmental considerations are addressed before cutting live vegetation or foliage in training areas.

1.5.1. **Individual.** Each member of the unit must acquire and maintain critical CCD skills. These include the ability to analyze and use terrain effectively; to select an individual site properly; and to hide, blend, disguise, disrupt, and decoy key signatures using natural and artificial materials. *See **Chapter 7** for individual CCD techniques*.

1.5.2. **Unit.** Unit CCD training refines individual and leader skills, introduces the element of team coordination, and contributes to tactical realism. If CCD is to conserve friendly strength, it must be practiced with the highest degree of discipline. The deployment and teardown of camouflage; light, noise, and communications discipline; and signal security must be practiced and evaluated in an integrated mission-training environment. CCD proficiency is developed through practicing and incorporating lessons learned from exercises and operations. Generally, CCD is additive and synergistic with other defensive measures. CCD enhances unit survivability and increases the likelihood of mission success.

1.5.3. **Evaluation**. CCD training should be realistic and integrated with training evaluations. Employ the following techniques to enhance training evaluations:

1.5.3.1. Have evaluators evaluate their unit's CCD efforts from an enemy's viewpoint. How a position looks from a few meters away is probably of little importance. Evaluators should consider the following:

1.5.3.1.1. Could an approaching enemy detect and place aimed weapons fire on the position?

1.5.3.1.2. From what distance can an enemy detect the position?

1.5.3.1.3. Was there a CCD principle ignored that allowed detection?

1.5.3.1.4. Was there a CCD technique that increased the possibility of detection?

1.5.3.2. Use binoculars, night-vision, or thermal devices when possible to show a unit how their CCD efforts would appear to an enemy.

1.5.3.3. Use photographs and videotapes, if available, of a unit's deployments and positions to allow self-evaluation.

1.6. Other Considerations. When employed correctly, expedient CCD countermeasures are often the most effective means of confusing an enemy. Along with the standard items and materials listed above, Airmen can use battlefield by-products, construction materials, and indigenous or locally procurable items to enhance unit CCD posture. However, as with all CCD countermeasures, ensure that expedient treatments project the desired signatures to the enemy and do not actually increase the unit's vulnerability to detection. Expedient CCD countermeasures are also beneficial because the enemy has less time to study and become familiar with the selected countermeasures. A sample CCD checklist is provided in **Attachment 2** to help develop a unit’s CCD program.

Chapter 2

THREAT

2.1. Overview. The enemy employs a variety of sensors to detect and identify United States (US) troops, equipment, and supporting installations. These sensors may be visual, near infrared (NIR), IR, ultraviolet (UV), acoustic, or multispectral/hyperspectral. They may be employed by dismounted troops or ground-, air-, or space-mounted platforms. Such platforms are often capable of supporting multiple sensors. Friendly troops rarely know the specific sensor systems or combination of systems that an enemy employs. When possible, friendly troops should protect against all known threat surveillance systems.

2.2. Data Collection. An enemy collects information about US forces for two basic reasons—target acquisition and intelligence production. Enemy weapons systems often have sensors that locate and identify targets at long ranges in precise detail. Troops and units should take actions to hinder the enemy's target-acquisition process. These actions include all practical CCD operations expected to reduce the identification of Airmen, units, and facilities.

2.2.1. An enemy uses detection and sensor systems to locate and identify large formations, logistics centers, communication nodes, and headquarters (HQ) to predict future activities and intentions.

2.2.2. An enemy uses tactical recon to provide additional information on US forces' dispositions and the terrain in which they are going to operate. The enemy's tactical recon also attempts to identify targets for later attack by long-range artillery, rockets, aircraft, and ground forces.

2.3. Sensor Systems. An enemy uses many different types of electronic surveillance equipment. Sensor systems are classified according to the part of the EM spectrum in which they operate. An enemy uses detection sensors that operate in the active or passive mode. Active sensors emit energy that reflects from targets and is recaptured by the emitting or other nearby sensor, indicating the presence of a target. Examples of active sensors are searchlights and radar. Passive sensors do not emit energy; they collect energy,

which may indicate the presence of a target. Examples of passive sensors are the human eye, night-vision devices (NVDs) (**Figure 2.1.**), IR imaging devices, acoustic sensors, and photographic devices.

Figure 2.1. Night-Vision Device in Use.

2.3.1. **Visual.** Visual sensors work in the parts of the EM spectrum that are visible to the human eye. Enemy troops' eyes are the principle sensors on a battlefield. They may be aided by binoculars, telescopic sights, and image intensifiers (**Figure 2.2.**). Civilian populations, enemy agents, recon teams, and patrols are visual-sensor systems from the enemy's intelligence viewpoint. Three types of enemy visual sensors are:

Figure 2.2. Binoculars Used for Surveillance.

2.3.1.1. **Image Intensifiers.** Image intensifiers are passive night-observation devices. They amplify the low-level light that is present on even the darkest

nights. These devices are used for surveillance and as weapon sights on small arms and vehicles. Airborne platforms are also capable of supporting image intensifiers.

2.3.1.2. **Low-light Television (LLTV).** LLTV combines image intensification with television technology, and it is usually mounted on airborne platforms.

2.3.1.3. **Aerial Recon, Remote Sensing, and Imagery.** Aerial photography, satellite imagery, and video imagery allow image analysts to record and study visual information. These analysts then produce target nomination lists that are, in effect, priority lists of targets in a given target scene. Since analysts often have to make subjective determinations of the identity and/or importance of a given target, the ranking of targets provides the defender with an opportunity to use CCD to impact an enemy's target-prioritization process. Video systems allow transmission of visual images to the ground while the manned aircraft, satellite, or unmanned aerial vehicle (UAV) is still in flight.

2.3.2. **Near Infrared.** NIR sensors operate at a wavelength immediately above the visible light wavelength of the EM spectrum. NIR energy reflects well from live vegetation but reflects better from dead vegetation and most man-made materials. NIR sensors, such as sights and periscopes, allow the human eye to detect targets based on differences in their reflection of NIR energy. NIR sensors are partially blocked by fog, mist, and smoke operations, although not as completely as visual sensors. An enemy's combat vehicles may use active NIR sensors that employ searchlights, scopes, and sights; but these sensors are rapidly being replaced with image intensifiers and thermal gun sights.

2.3.3. **Infrared.** IR sensors detect the contrasts in heat energy that targets radiate on the battlefield and display the contrasts as different colors or shades. Because longer wavelength IR radiation is more susceptible to atmospheric absorption than NIR radiation, IR sensors are less affected by typical concentrations of fog or conventional smoke.

2.3.3.1. Differences in thermal mass and surface properties (reflectivity) of man-made and natural materials result in target-to-background contrasts.

These contrast levels change dramatically over a daily cycle. For example, operating vehicles and generators, heated buildings and tents, and soldiers are usually hotter than their background. Also, equipment exposed to direct sunlight appears hotter than most natural backgrounds. At night, however, equipment might appear cooler than its background if it is treated with special emissivity coatings. In other words, military equipment, particularly metallic equipment, generally heats up and cools off more quickly than its background.

2.3.3.2. Sophisticated, passive IR sensors (such as the Forward-Looking Infrared System [FLIRS]) can be mounted on aircraft. FLIRS sensors provide aircrews and enemy ground forces with real-time IR imagery that is displayed on video monitors.

2.3.3.3. Recon aircraft often employ special IR films to record temperature differences. Due to film processing, however, these systems are subject to time delays in obtaining the data. Newer versions of this sensor produce non-film-based images.

2.3.4. **Ultraviolet.** The UV area is the part of the EM spectrum immediately below visible light. UV sensors are more important in snow-covered areas, because snow reflects UV energy well and most white paints and man-made objects do not reflect UV energy very well. Photographic intelligence systems with simple UV filters highlight military targets as dark areas against snow-covered backgrounds. These backgrounds require specially designed camouflage that provides a high UV reflectance.

2.3.5. **Radar.** Radar uses high-frequency radio waves to penetrate atmospheric impediments such as fog, mist, and smoke. Radar works by transmitting a very strong burst of radio waves and then receiving and processing the reflected waves. In general, metal objects reflect radar waves well, while radar waves are either weakly reflected by or pass through most other objects. The shape and size of a metal object determine the strength of the reflected signal. A large, metal object generally reflects more signal than a small object. Therefore, large, metal objects can be detected from greater distances. The method by which the received radio wave is processed determines the type of radar.

2.3.6. **Acoustic.** The enemy can locate friendly forces through the detection of noise; therefore, it is important to practice noise discipline where a threat of detection exists. The three predominant types of acoustical detection systems are:

2.3.6.1. **Human Ear.** Every Airman, whether engaged in normal operations or at a listening post, is an acoustic sensor. However, visual confirmation is usually preferred.

2.3.6.2. **Flash-Sound Ranging.** Flash-sound ranging is used against artillery. Light travels faster than sound, so enemy sound-ranging teams can determine the distance to a gun tube by accurately measuring the time between seeing a muzzle flash and hearing the sound. If the sound is detected by two or more teams, analysts plot the ranges using automated data-processing computers. The target is located where the plots intersect.

2.3.6.3. **Ground-Based Microphone Array.** Ground-based microphone-array systems allow listeners to record acoustic signatures and accurately triangulate their positions.

2.3.7. **Radio.** Threat forces make a great effort to search for, detect, and locate the sources of US radio communications. They use various direction-finding techniques to locate opposing emitters. Once an emitter is detected, an enemy can take a number of actions, ranging from simply intercepting the transmissions to jamming or targeting the emitter for destruction.

2.3.8. **Multispectral and Hyperspectral.** Recent advancements in sensor acquisition and information-processing technologies have fostered the advent of multispectral and hyperspectral sensors. These sensors can acquire a target by collecting data through scanning a few broad-band channels or the continuous portion of the EM spectrum

2.4. CCD versus Threat Sensors. Target acquisition can be accomplished by a variety of sensors that operate throughout the EM spectrum. This poses a challenge in CCD planning and employment—determining which enemy sensor(s) that CCD operations should be designed to defeat. Unfortunately, no single answer is correct for all situations. Unit commanders without specific guidance from higher echelons assess their tactical situation and plan

CCD operations accordingly. If intelligence data indicate that an enemy will use visual sensors for recon and target acquisition, then visual countermeasures must be employed. For IR or radar sensors, countermeasures that are effective in those spectra must be employed. If a multispectral or hyperspectral threat is anticipated, CCD operations are conducted to protect a unit in its most vulnerable EM bandwidths. Very few available camouflage materials or techniques provide complete broadband protection.

Chapter 3

FUNDAMENTALS

3.1. Overview. To remain a viable force on the battlefield, units must understand CCD fundamentals because they are essential to survivability. To design and place effective CCD, Airmen must constantly consider an enemy's point of view. (What will it see? What characteristics will its sensors detect?) Placing a low priority on CCD because of time constraints, minimal resources, or inconvenience could result in mission failure and unnecessary loss of life.

3.2. Avoiding Detection. The primary goal of CCD is to avoid enemy detection; however, this is not always feasible. In some cases, CCD may succeed by merely preventing an enemy from identifying a target. Simply avoiding identification is often sufficient to increase survivability. The following seven rules are critical when considering how to avoid detection or identification:

3.2.1. Identify the enemy's detection capabilities.

3.2.2. Avoid detection by the enemy's routine surveillance.

3.2.3. Take countermeasures against the enemy's sensors.

3.2.4. Employ realistic, CCD countermeasures.

3.2.5. Minimize movement.

3.2.6. Use decoys properly.

3.2.7. Avoid predictable operational patterns.

3.3. Identifying the Threat. Obtain as much information as possible about an enemy's surveillance capability (see **Chapter 2**). Intelligence preparation of the battlefield (IPB) should:

3.3.1. Include the sensors that an enemy may use in a particular AO.

3.3.2. Include information on the enemy's tactical employment of the sensors, if possible.

3.3.3. Assess the impact of the enemy's surveillance potential on the target under consideration. This assessment varies with the relative positions of the sensor and the target on the battlefield, the role of the target, and the physical characteristics of the sensor and the target.

3.4. Avoiding Detection by Routine Surveillance. Sophisticated sensors often have narrow fields of view. Furthermore, sensors can be very expensive and are unlikely to be deployed in such numbers as to enable coverage of the entire battlefield at all times.

3.4.1. Sophisticated sensors are most likely to be deployed in those areas where an enemy suspects that friendly targets are deployed. The enemy may suspect that an area contains targets because of detection by less sophisticated, wider-coverage sensors or because of tactical analysis. Therefore, an important aspect of remaining undetected is to avoid detection by routine enemy surveillance.

3.4.2. Many sensors operate as well at night as they do during the day. Therefore, darkness does not provide effective protection from surveillance (**Figure 3.1.**). Passive sensors are very difficult to detect, so assume that they are being used at night. Do not allow anti-detection efforts to lapse during the hours of darkness. For example, conceal spoil while excavating a fighting position, even at night. Certain types of smoke will also defeat NVDs.

Figure 3.1. Darkness May Not Protect You from Surveillance.

3.5. Taking Countermeasures. In some cases, it might be appropriate to take action against identified enemy sensors. The ability to deploy counter-

measures depends on a number of factors—the effective range of friendly weapons, the distance to enemy sensors, and the relative cost in resources versus the benefits of preventing the enemy's use of the sensor. An additional factor to consider is that the countermeasure itself may provide an enemy with an indication of friendly intentions.

3.6. Employing Realistic CCD. The more closely a target resembles its background, the more difficult it is for an enemy to distinguish between the two. Adhering to this fundamental CCD principle requires awareness of the surroundings, proper CCD skills, and the ability to identify target EM signatures that enemy sensors will detect.

3.6.1. **Visual Sensors.** The most plentiful, reliable, and timely enemy sensors are visual. Therefore, CCD techniques effective in the visual portion of the EM spectrum are extremely important. Something that cannot be seen is often difficult to detect, identify, and target. Airman battle uniforms (ABU), standard camouflage screening paint patterns (SCSPPs), lightweight camouflage screen systems (LCSS) (**Figure 3.2.**), and battlefield obscurants are effective CCD techniques against visual sensors. Full-coverage CCD helps avoid visual detection by the enemy. When time is short, apply CCD first to protect the target from the most likely direction of attack and then treat the remainder of the target as time allows.

Figure 3.2. Correct Use of LCSS Can Help Defeat Visual Sensors.

3.6.2. **NIR Sensors.** NIR sights are effective at shorter ranges (typically 900 meters) than enemy main guns. While red filters help preserve night vision, they cannot prevent NIR from detecting light from long distances. Therefore, careful light discipline is an important countermeasure to NIR sensors and visual sensors (such as image intensifiers). ABUs, SCSPPs LCSS, and battlefield obscurants are designed to help defeat NIR sensors.

3.6.3. **IR Sensors.** Natural materials and terrain shield heat sources from IR sensors and break up the shape of cold and warm military targets viewed on IR sensors. Do not raise vehicle hoods to break windshield glare because this exposes a hot spot for IR detection. Even if the IR system is capable of locating a target, the target's actual identity can still be disguised. Avoid building unnecessary fires. Use vehicle heaters only when necessary. ABU dyes, LCSSs, IR-defeating obscurants, and chemical-resistant paints help break up IR signatures; but they will not defeat IR sensors.

3.6.4. **UV Sensors.** UV sensors are a significant threat in snow-covered areas. Winter paint patterns, the arctic LCSS, and terrain masking are critical means for defending against these sensors. Any kind of smoke will defeat UV sensors. Field-expedient countermeasures, such as constructing snow walls, also provide a means of defeating UV sensors.

3.6.5. **Radar.** AF engineer forces are vulnerable when an enemy uses Moving-Target Indicator (MTI) and imaging radars. Mission dictates the appropriate defense, while techniques depend on the equipment available.

3.6.5.1. **MTI.** MTI radar is a threat to ground forces near a battle area. Radar-reflecting metal on uniforms has been reduced, and Kevlar helmets and body armor are now radar-transparent. Plastic canteens are standard issue, and buttons and other nonmetal fasteners have replaced metal snaps on most field uniforms. An Airman wearing only the ABU cannot be detected until he is very close to MTI radar.

3.6.5.1.1. Airmen still carry metal objects (ammunition, magazines, weapons, tools) to accomplish their mission, and most radars can detect these items. Therefore, movement discipline is very important. Moving by covered routes (terrain masking) prevents radar detection. Slow, deliberate move-

ments across areas exposed to radar coverage helps avoid detection by MTI radar.

3.6.5.1.2. Vehicles are large radar-reflecting targets, and a skilled MTI operator can even identify the type of vehicle. Moving vehicles can be detected by MTI radar from 20 kilometers, but travelling by covered routes helps protect against surveillance.

3.6.5.2. **Imaging.** Imaging radar is not a threat to individual Airmen. Concealing vehicles behind earth, masonry walls, or dense foliage effectively screens them from imaging radar. Light foliage may provide complete visual concealment; however, it is sometimes totally transparent to imaging radar. When properly deployed, the LCSS effectively scatters the beam of imaging radar.

3.6.6. **Acoustic Sensors.** Noise discipline defeats detection by the human ear. Pyrotechnics or loudspeakers can screen noise, cover inherently noisy activities, and confuse sound interpretation.

3.6.7. **Radio Sensors.** The best way to prevent an enemy from locating radio transmitters is to minimize transmissions, protect transmissions from enemy interception, and practice good radiotelephone-operator (RATELO) procedures. Preplanning message traffic, transmitting as quickly as possible, and using alternate communication means whenever possible ensure that transmissions are minimized. To prevent the enemy from intercepting radio communications, change the radio frequencies and use low-power transmissions, terrain masking, or directional or short-range antennas.

3.7. Minimizing Movement. Movement attracts the enemy's attention and produces a number of signatures (tracks, noise, hot spots, dust). In operations that inherently involve movement (such as offensive operations), plan, discipline, and manage movement so that signatures are reduced as much as possible.

3.8. Using Decoys. As mentioned previously, decoys fall outside the responsibility of AF engineers; however, engineers may be tasked to assist with decoy operations and therefore they should be aware of their use.

3.8.1. Use decoys to confuse an enemy. The goal is to divert enemy resources into reporting or engaging false targets. An enemy who has mistakenly identified decoys as real targets is less inclined to search harder for the actual, well-hidden targets. The keys to convincing an enemy that it has found the real target are:

3.8.1.1. Decoy fidelity (realism), which refers to how closely the multispectral decoy signature represents the target signature.

3.8.1.2. Deployment location, which refers to whether or not a decoy is deployed so that the enemy will recognize it as typical for that target type. For example, a decoy jet is not properly located if it is placed in the middle of a motor pool.

3.8.2. A high-fidelity decoy in a plausible location often fools an enemy into believing that it has acquired the real target. Deploying low-fidelity decoys, however, carries an associated risk. If an enemy observes a decoy and immediately recognizes it as such, it will search harder for the real target since decoys are generally deployed in the same vicinity as the real targets. Plausible, high-fidelity decoys specifically designed to draw enemy fire away from real targets should be deployed to closely represent the multispectral signatures of the real targets. Properly deployed decoys have been proven in operational employment and experimental field tests to be among the most effective of all CCD techniques.

3.9. Applying Recognition Factors. To camouflage effectively, continually consider the threat's viewpoint. Prevent patterns in anti-detection countermeasures by applying the following recognition factors to tactical situations. These factors describe a target's contrast with its background. If possible, collect multispectral imagery to determine which friendly target signatures are detectable to enemy sensors.

3.9.1. **Reflectance.** Reflectance is the amount of energy returned from a target's surface as compared to the energy striking the surface. Reflectance is generally described in terms of the part of the EM spectrum in which the reflection occurs:

3.9.1.1. *Visual reflectance* is characterized by the color of a target. Color contrast can be important, particularly at close ranges and in homogeneous background environments such as snow or desert terrain. The longer the range, the less important color becomes. At very long ranges, all colors tend to merge into a uniform tone. Also, the human eye cannot discriminate color in poor light.

3.9.1.2. *Temperature reflectance* is the thermal energy reflected by a target (except when the thermal energy of a target is self-generated, as in the case of a hot engine). IR imaging sensors measure and detect differences in temperature-reflectance levels (known as thermal contrast).

3.9.1.3. *Radar-signal reflectance* is the part of the incoming radio waves that is reflected by a target. Radar sensors detect differences in a target's reflected radar return and that of the background. Since metal is an efficient radio-wave reflector and metals are still an integral part of military equipment, radar return is an important reflectance factor.

3.9.2. **Shape.** Natural background is random, and most military equipment has regular features with hard, angular lines. Even an erected camouflage net takes on a shape with straight-line edges or smooth curves between support points. An enemy can easily see silhouetted targets, and its sensors can detect targets against any background unless their shape is disguised or disrupted. Size, which is implicitly related to shape, can also distinguish a target from its background.

3.9.3. **Shadow.** Shadow can be divided into two types:

3.9.3.1. A *cast shadow* is a silhouette of an object projected against its background. It is the more familiar type and can be highly conspicuous. In desert environments, a shadow cast by a target can be more conspicuous than the target itself.

3.9.3.2. A *contained shadow* is the dark pool that forms in a permanently shaded area. Examples are the shadows inside a trench, inside an open fighting position, or under a vehicle. Contained shadows show up much darker than their surroundings and are easily detected by an enemy.

3.9.4. **Movement.** Movement always attracts attention against a stationary background. Slow, regular movement is usually less obvious than fast, erratic movement.

3.9.5. **Noise.** Noise and acoustic signatures produced by military activities and equipment are recognizable to the enemy.

3.9.6. **Texture.** A rough surface appears darker than a smooth surface, even if both surfaces are the same color. For example, vehicle tracks change the texture of the ground by leaving clearly visible track marks. This is particularly true in undisturbed or homogeneous environments, such as a desert or virgin snow, where vehicle tracks are highly detectable. In extreme cases, the texture of glass or other very smooth surfaces causes a shine that acts as a beacon. Under normal conditions, very smooth surfaces stand out from the background. Therefore, eliminating shine must be a high priority in CCD.

3.9.7. **Patterns.** Rows of vehicles and stacks of war materiel create equipment patterns that are easier to detect than random patterns of dispersed equipment. Equipment patterns should be managed to use the surroundings for vehicle and equipment dispersal. Equipment dispersal should not be implemented in such a way that it reduces a unit's ability to accomplish its mission.

3.9.7.1. Equipment paint patterns often differ considerably from background patterns (**Figure 3.3.**). The critical relationships that determine the contrast between a piece of equipment and its background are the distance between the observer and the equipment and the distance between the equipment and its background. Since these distances usually vary, it is difficult to paint equipment with a pattern that always allows it to blend with its background. As such, no single pattern is prescribed for all situations. Field observations provide the best match between equipment and background.

3.9.7.2. The overall terrain pattern and the signatures produced by military activity on the terrain are important recognition factors. If a unit's presence is to remain unnoticed, it must match the signatures produced by stationary equipment, trucks, and other activities with the terrain pattern. Careful attention must also be given to vehicle tracks and their affect on the local terrain during unit ingress, occupation, and egress.

Figure 3.3. Match Paint Pattern to the Background.

3.10. Site Selection. Site selection is extremely important because the location of personnel and equipment can eliminate or reduce recognition factors. If a truck is positioned so that it faces away from probable enemy sensor locations, the thermal signature from its hot engine compartment is minimized. If a vehicle is positioned under foliage, the exhaust will disperse and cool as it rises, reducing its thermal signature and blending it more closely with the background. Placing equipment in defilade (dug-in) positions prevents detection by ground-mounted radar. The following factors govern site selection:

3.10.1. **Mission.** The mission is the most important factor in site selection. A particular site may be excellent from a CCD standpoint, but the site is useful only if the mission is accomplished. If a site is so obvious that the enemy will acquire and engage a target before mission accomplishment, the site was poorly selected to begin with. Survivability is usually a part of most missions, so commanders must first evaluate the worthiness of a site with respect to mission accomplishment and then consider CCD.

3.10.2. **Dispersion.** Dispersion requirements dictate the size of a site. A site has limited usefulness if it will not permit enough dispersal for survivability and effective operations (see **Chapter 8** for more information on dispersal procedures).

3.10.3. **Terrain Patterns.** Every type of terrain, even a flat desert, has a discernible pattern. Terrain features can blur or conceal the signatures of military activity. By using terrain features, CCD effectiveness can be enhanced without relying on additional materials. The primary factor to consider is

whether using the site will disturb the terrain pattern enough to attract an enemy's attention. The goal is not to disturb the terrain pattern at all. Any change in an existing terrain pattern will indicate the presence of activity. Terrain patterns have distinctive characteristics that are necessary to preserve. The five general terrain patterns are:

3.10.3.1. **Agricultural.** Agricultural terrain has a checkerboard pattern when viewed from aircraft. This is a result of the different types of crops and vegetation found on most farms.

3.10.3.2. **Urban.** Urban terrain is characterized by uniform rows of housing with interwoven streets and interspersed trees and shrubs.

3.10.3.3. **Wooded.** Woodlands are characterized by natural, irregular features, unlike the geometric patterns of agricultural and urban terrains.

3.10.3.4. **Barren.** Barren terrain presents an uneven, irregular work of nature without the defined patterns of agricultural and urban areas. Desert environments are examples of barren terrain.

3.10.3.5. **Arctic.** Arctic terrain is characterized by snow and ice coverage.

3.11. CCD Discipline. CCD discipline is avoiding an activity that changes the appearance of an area or reveals the presence of military equipment. CCD discipline is a continuous necessity that applies to every Airman. If the prescribed visual and audio routines of CCD discipline are not observed, the entire CCD effort may fail. Vehicle tracks, spoil, and debris are the most common signs of military activity. Their presence can negate all efforts of proper placement and concealment.

3.11.1. CCD discipline denies an enemy the indications of a unit's location or activities by minimizing disturbances to a target area. To help maintain unit viability, a unit must integrate all available CCD means into a cohesive plan. CCD discipline involves regulating light, heat, noise, spoil, trash, and movement. Successful CCD discipline depends largely on the actions of individual Airmen. Some of these actions may not be easy on an Airman, but failure to observe CCD discipline could defeat an entire unit's CCD efforts and possibly impact the unit's survivability and mission success.

3.11.2. SOPs prescribing CCD procedures aid in enforcing CCD discipline, and they should:

3.11.2.1. List specific responsibilities for enforcing established CCD countermeasures and discipline.

3.11.2.2. Detail procedures for individual and unit conduct in assembly areas or other situations that may apply to the specific unit.

3.11.3. Units should have frequent CCD training sessions. CCD discipline is a continuous requirement that calls for strong leadership, which produces a disciplined CCD consciousness throughout the entire unit.

3.11.4. **Light and Heat.** Light and heat discipline, though important at all times, is crucial at night. As long as visual observation remains a primary recon method, concealing light signatures remains an important CCD countermeasure. Lights that are not blacked out at night can be observed at great distances. For example, the human eye can detect camp fires from 8 kilometers and vehicle lights from 20 kilometers. Threat surveillance can also detect heat from engines, stoves, and heaters from great distances. When moving at night, vehicles in the forward combat area should use ground guides and blackout lights. When using heat sources is unavoidable, use terrain masking, exhaust baffling, and other techniques to minimize thermal signatures of fires and stoves.

3.11.5. **Noise.** Individuals should avoid or minimize actions that produce noise. For example, muffle generators by using shields or terrain masking or place them in defilade positions. Operate communications equipment at the lowest possible level that allows them to be heard and understood. Depending on the terrain and atmospheric conditions, noise can travel great distances and reveal a unit's position to an enemy.

3.11.6. **Spoil.** The prompt and complete policing of debris and spoil is an essential CCD consideration. Proper spoil discipline removes a key signature of a unit's current or past presence in an area.

3.11.7. **Track.** Vehicle tracks are clearly visible from the air, particularly in selected terrain. Therefore, track and movement discipline is essential. Use existing roads and tracks as much as possible. When using new paths, ensure

that they fit into the existing terrain's pattern. Minimize, plan, and coordinate all movement; and take full advantage of cover and dead space.

3.12. Techniques. CCD is an essential part of tactical operations. It must be integrated into METT-TC analyses and the IPB process at all echelons. CCD is a primary consideration when planning OPSEC. The skillful use of CCD techniques is necessary if a unit is to conceal itself and survive. A general knowledge of CCD methods and techniques also allows friendly troops to recognize CCD better when the enemy uses it. **Table 3.1.** lists the five general techniques of employing CCD—hiding, blending, disguising, disrupting, and decoying.

Table 3.1. CCD Techniques.

CCD Techniques	*Sensor Systems*		
	Optical	*Thermal*	*Radar*
Hiding	Earth cover Earth embankments Vegetation LCSS Screens Smoke	Earth cover Earth embankments Vegetation LCSS Screens Smoke	Chaff Earth cover Earth embankments Vegetation Nets Radar-absorbing material (RAM) LCSS
Blending	Paint Foam Lights Vegetation LCSS Textured mats	Thermal paint Foam Air conditioning/heating Vegetation LCSS Textured mats Water Insulation	Vegetation LCSS RAM Reshaping Textured mats
Disguising	Reshaping Paint LCSS	Reshaping Paint	Corner reflectors

CCD Techniques	*Sensor Systems*		
	Optical	*Thermal*	*Radar*
Disrupting	Camouflage sails False operating surfaces (FOS) Pyrotechnics Smudge pots Balloons Strobe lights Tracer simulators Smoke	Flares Smoke	Chaff Corner reflectors
Decoying	Decoy target (pneumatic or rigid structures) Lights Smoke	Decoy target Flares Air conditioning/ heating Smoke	Decoy target Corner reflectors Signal generators

3.12.1. **Hiding.** Hiding is screening a target from an enemy's sensors. The target is undetected because a barrier hides it from a sensor's view. Every effort should be made to hide all operations; this includes using conditions of limited visibility for movement and terrain masking. Examples of hiding include:

3.12.1.1. Placing vehicles beneath tree canopies.

3.12.1.2. Placing equipment in defilade positions.

3.12.1.3. Covering vehicles and equipment with nets.

3.12.1.4. Hiding roads and obstacles with linear screens.

3.12.1.5. Using battlefield obscurants, such as smoke.

3.12.2. **Blending.** Blending is trying to alter a target's appearance so that it becomes a part of the background. Generally, it is arranging or applying camouflage material on, over, and/or around a target to reduce its contrast with the background (**Figure 3.4.**). Characteristics to consider when blending

include the terrain patterns in the vicinity and the target's size, shape, texture, color, EM signature, and background.

Figure 3.4. Placing Netting over Vehicle to Blend with Background.

3.12.3. **Disguising.** Disguising is applying materials on a target to mislead the enemy as to its true identity. Disguising changes a target's appearance so that it resembles something of lesser or greater significance. For example, a missile launcher might be disguised to resemble a cargo truck or a large building might be disguised to resemble two small buildings.

3.12.4. **Disrupting.** Disrupting is altering or eliminating regular patterns and target characteristics. Disrupting techniques include pattern painting, deploying camouflage nets over selected portions of a target, and using shape disrupters (such as camouflage sails) to eliminate regular target patterns.

3.12.5. **Decoying.** Decoying is deploying a false or simulated target(s) within a target's scene or in a position where the enemy might conclude that it has found the correct target (**Figure 3.5.**). Decoys generally draw fire away from real targets. Depending on their fidelity and deployment, decoys will greatly enhance survivability.

3.13. Natural Conditions. Properly using terrain and weather is a first priority when employing CCD. Cover provided by the terrain and by conditions of limited visibility is often enough to conceal units. The effective use of

natural conditions minimizes the resources and the time devoted to CCD. The terrain's concealment properties are determined by the number and quality of natural screens, terrain patterns, and the type and size of targets.

Figure 3.5. F-16 and Fuel Truck Decoys…Which F-16 is real?

3.13.1. **Forests.** Forests generally provide the best type of natural screen against optical recon, especially if the crowns of the trees are wide enough to prevent aerial observation of the ground. Forests with undergrowth also hinder ground observation. Deciduous (leafing) forests are not as effective during the months when trees are bare, while coniferous (evergreen) forests preserve their concealment properties all year. When possible, unit movements should be made along roads and gaps that are covered by tree crowns. Shade should be used to conceal vehicles, equipment, and personnel from aerial observation.

3.13.2. **Open Terrain.** Limited visibility is an especially important concealment tool when conducting operations in open terrain. The threat, however, will conduct recon with a combination of night-surveillance devices, radar, IR sensors, and terrain illumination. When crossing open terrain during limited visibility, supplement concealment with smoke.

3.13.3. **Dead Space.** Units should not locate or move along the topographic crests of hills or other locations where they are silhouetted against the sky (**Figure 3.6.**). They should use reverse slopes of hills, ravines, embankments,

and other terrain features as screens to avoid detection by ground-mounted sensors. IPB concealment and terrain overlays should identify areas of dead space. If overlays are not available, use the line-of-sight (LOS) method to identify areas of dead space.

Figure 3.6. Avoid Being Silhouetted Against the Sky.

3.13.4. **Weather.** Conditions of limited visibility (fog, rain, snowfall) hamper recon by optical sensors. Dense fog is impervious to visible sensors and some thermal sensors, making many threat night-surveillance devices unusable. Dense fog and clouds are impenetrable to thermal sensors (IR). Rain, snow, and other types of precipitation hinder optical, thermal, and radar sensors.

3.13.5. **Smoke.** Smoke is an effective CCD tool when used by itself or with other CCD techniques. It can change the dynamics of a battle by blocking or degrading the spectral bands that an enemy's target-acquisition and weapons systems use, including optical and thermal bands.

3.14. Materials. Using natural conditions and materials is the first CCD priority, but using manmade materials can greatly enhance CCD efforts. Available materials include pattern-painted equipment, camouflage nets (LCSS), radar-absorbing paint (RAP), RAM, FOSs, vegetation, expedient paint, decoys, and battlefield by-products (construction materials, dirt).

3.14.1. **Pattern Paint.** Pattern-painted vehicles blend well with the background and can hide from optical sensors better than those painted a solid,

subdued color (**Figure 3.7.**). Pattern-painted equipment enhances anti-detection by reducing shape, shadow, and color signatures. Improved paints also help avoid detection by reducing a target's reflectance levels in the visible and IR portions of the EM spectrum. The result is a vehicle or an item of equipment that blends better with its background when viewed by threat sensors. While a patterned paint scheme is most effective in static positions, it also tends to disrupt aim points on a moving target.

Figure 3.7. HMMWV with Pattern Paint Applied.

3.14.2. **Camouflage Nets.** The LCSS is the standard camouflage net currently available, and it can be ordered through normal unit supply channels (**Figure 3.8.**). The LCSS reduces a vehicle's visual and radar signatures. Stainless steel fibers in the LCSS material absorb some of the radar signal and reflect most of the remaining signal in all directions. The result is a small percentage of signal return to the radar for detection. The radar-scattering capabilities of the LCSS are effective only if there is at least 2 feet of space between the LCSS and the camouflaged equipment and if the LCSS completely covers the equipment. Do not place a radar-scattering net over a radar antenna because it interferes with transmission. The LCSS is also available in a radar-transparent model. The three different LCSS color patterns are desert, woodland, and arctic. Each side of each LCSS has a slightly different pattern to allow for seasonal variations. The LCSS uses modular construction that allows the coverage of various sizes of equipment (see **Attachment 3** LCSS Erection Instructions).

Figure 3.8. Manmade Materials, such as LCSS, Enhance CCD Efforts.

3.14.3. **Vegetation.** Use branches and vines to temporarily conceal vehicles, equipment, and personnel. Attach vegetation to equipment with camouflage foliage brackets, spring clips, or expedient means (such as plastic tie-wraps). Use other foliage to complete the camouflage or to supplement natural-growing vegetation. Also use cut foliage to augment other artificial CCD materials, such as branches placed on an LCSS to break up its outline. Be careful when placing green vegetation since the underside of leaves presents a lighter tone in photographs. Replace cut foliage often because it wilts and changes color rapidly. During training exercises, ensure that cutting vegetation and foliage does not adversely affect the natural environment (coordinate with local authorities).

3.14.3.1. **Living Vegetation.** Living vegetation can be obtained in most environments, and its color and texture make it a good blending agent. However, foliage requires careful maintenance to keep the material fresh and in good condition. If branches are not placed in their proper growing positions, they may reveal friendly positions to enemy observers. Cutting large amounts of branches can also reveal friendly positions, so cut all vegetation away from target areas. Living vegetation presents a chlorophyll response at certain NIR wavelengths. As cut vegetation wilts, it loses color and its NIR-blending properties, which are related to the chlorophyll response. Replace

cut vegetation regularly because over time it becomes a detection cue rather than an effective concealment technique.

3.14.3.2. **Dead Vegetation.** Use dead vegetation (dried grass, hay, straw, branches) for texturing. It provides good blending qualities if the surrounding background vegetation is also dead. Dead vegetation is usually readily available and requires little maintenance; however, it is flammable. Due to the absence of chlorophyll response, dead vegetation offers little CCD against NIR sensors and hyperspectral sensors operating in the IR regions.

3.14.3.3. **Foliage Selection.** When selecting foliage for CCD, consider the following:

3.14.3.3.1. Coniferous vegetation is preferred to deciduous vegetation since it maintains a valid chlorophyll response longer after being cut.

3.14.3.3.2. Foliage cut during periods of high humidity (at night, during a rainstorm, or when there is fog or heavy dew) will wilt more slowly.

3.14.3.3.3. Foliage with leaves that feel tough to the fingers and branches with large leaves are preferred because they stay fresher longer.

3.14.3.3.4. Branches that grow in direct sunlight are tougher and will stay fresher longer.

3.14.3.3.5. Branches that are free of disease and insects will not wilt as rapidly.

3.14.4. **Chlorophyll Response.** Standard-issue camouflage materials (LCSS) are designed to exhibit an artificial chlorophyll response at selected NIR wavelengths. Nonstandard materials (sheets, tarps) are not likely to exhibit a chlorophyll response and will not blend well with standard CCD material or natural vegetation. Use nonstandard materials only as CCD treatments against visual threat sensors, not against NIR or hyperspectral threat sensors.

3.14.5. **Expedient Paint.** Use earth, sand, and gravel to change or add color, provide a coarse texture, simulate cleared spots or blast marks, and create shapes and shadows. Mud makes an excellent field expedient for toning down bright, shiny objects (glass, bayonets, watches). Add clay (in mud

form) of various colors to crankcase oil to produce a field-expedient paint. Expedient paint containing motor oil should be used with extreme caution. **Table 3.2.** provides instructions on how to mix soil-based expedient paints. Use surface soils to mimic natural surface color and reflectivity.

Caution
Expedient paint containing motor oil should be used with extreme caution.

Table 3.2. Expedient Paints.

Paint Materials	*Mixing*	*Color*	*Finish*
Earth, bar soap, water, soot, paraffin	Mix soot with paraffin, add to solution of 8 gal water and 2 bars soap, and stir in earth.	Dark gray	Flat, lusterless
Oil, clay, water, gasoline, earth	Mix 2 gal water with 1 gal oil and to gal clay, add earth, and thin with gasoline or water.	Depends on earth colors	Glossy on metal, otherwise dull
Oil, clay, GI soap, water, earth	Mix 1 bars soap with 3 gal water, add 1 gal oil, stir in 1 gal clay, and add earth for color.	Depends on earth colors	Glossy on metal, otherwise dull
NOTE: *Use canned milk or powdered eggs to increase the binding properties of field-expedient paints.*			

3.14.6. **RAM.** RAM was designed for placement on valuable military equipment. It absorbs radar signals that are transmitted in selected threat wave bands and reduces the perceived radar cross section (RCS) of the treated equipment. RAM is expensive relative to other CCD equipment and is not yet widely available. RAP offers the same RCS reduction benefits as RAM, and it is also expensive.

3.14.7. **Battlefield By-Products.** Battlefield by-products (construction materials, dirt) can be used to formulate expedient CCD countermeasures. For example, use plywood and two-by-fours to erect expedient target decoys or use dirt to construct concealment berms.

3.14.8. **Decoys.** Decoys are among the most effective of all CCD tools. Their main use is to draw enemy fire away from high-value targets (HVTs). Decoys are generally expendable, and they can be elaborate or simple. Their design depends on several factors, such as the target to be decoyed, a unit's tactical situation, available resources, and the time available to a unit for CCD employment. Decoys can also be preconstructed or made from field-expedient materials. Except for selected types, preconstructed decoys are not widely available. Proper decoy employment serves a number of tactical purposes, to include:

3.14.8.1. Increasing the survivability of key unit equipment and personnel.

3.14.8.2. Deceiving the enemy about the strength, disposition, and intentions of friendly forces.

3.14.8.3. Replacing friendly equipment removed from the forward line of own troops.

3.14.8.4. Drawing enemy fire, which reveals its positions.

3.14.8.5. Encouraging the enemy to expend munitions on relatively low-value targets (decoys).

Chapter 4

DEFENSIVE OPERATIONS

4.1. Overview. Successful defensive operations require strong emphasis on OPSEC. Proper OPSEC denies the enemy information about a friendly force's defensive preparations. CCD, by virtue of its inherent role in counter- efforts, plays an important role in both battles.

4.2. Preparations. The purpose of CCD during defensive preparations is to mask key or sensitive activities. Successful CCD of these activities leads to an enemy force that is blinded or deceived and therefore more easily influenced to attack where the defender wants (at the strengths of the defense). These key activities include: 1) preparing reserve and counterattack forces' locations; 2) preparing survivability positions and constructing obstacles (minefields, tank ditches, etc.); 3) establishing critical command and control (C2) nodes.

4.2.1. **Signatures.** A number of signatures may indicate the intentions of friendly defensive preparations, and an enemy analyzes these signatures to determine the defensive plan. Specific signatures that could reveal defensive plans include: 1) working on survivability positions (**Figure 4.1.**); 2) emplacing obstacles; 3) moving different types of combat materiel into prepared positions; 4) Preparing routes and facilities; and 5) constructing strongpoints or hardened positions.

Figure 4.1. Survivability Positions Provide Signals to the Enemy.

4.2.1.1. **Planning.** Proper planning is essential to avoid threat detection and prevent successful enemy analysis of the engineer efforts that are integral to defensive preparations. Engineer equipment creates significant signatures, so minimize its use to a level that is commensurate with available time and manpower. Disperse engineer equipment that is not required at the job site. Complete as much work as possible without using heavy equipment, and allow heavy equipment on site only when necessary. Engineers should minimize their time on site by conducting thorough, extensive planning and preparation. Additional signatures include:

4.2.1.1.1. Supplies, personnel, and vehicles arriving to and departing from the unit area.

4.2.1.1.2. Survivability positions being constructed.

4.2.1.1.3. Smoke and heat emitting from kitchens, fires, or stoves.

4.2.1.1.4. Communications facilities being operated.

4.2.1.1.5. Educational and training exercises being conducted.

4.2.1.2. **Movement.** Move along preplanned, concealed routes. Move and occupy selected locations at night or during other conditions of limited visibility. Practice light, noise, and track discipline to the greatest extent possible. Develop a traffic flow plan that minimizes vehicle and troop movement to and from the unit area.

4.2.1.3. **Placement and Dispersal.** Site selection is crucial when concealing engineer effort. Proper placement and dispersal of equipment and operations are essential (**Chapter 8** discusses dispersal in greater detail).

4.2.1.3.1. Use natural screens (terrain masking). When using forests as natural screens carefully consider factors such as the height and density of vegetation, the amount and darkness of shadows cast by the screen, and the appropriateness of the particular screen for the season. The condition and quality of natural screens have a decisive effect on the capability to conceal units. Commanders should evaluate natural screens during engineer recon missions and conduct the missions on a timely, extensive basis.

4.2.1.3.2. The probability of detection increases considerably when survivability positions are prepared. Detection is easier due to the increased size of the targets to be concealed, the contrasting upturned soil, and the difficulty of concealing survivability effort. Despite these considerations, the enhanced protection afforded by survivability positions usually dictates their use. To minimize the probability of detection, employ a combination of natural screens and overhead nets to conceal construction sites.

4.2.2. **Camouflage Nets.** Use camouflage nets (LCSS) to conceal vehicles, tents, shelters, and equipment (**Figure 4.2.**). These nets are designed with two seasonal sides (i.e., spring/summer or fall/winter) for year round use. Several pieces can be laced together to increase area coverage. When doing so, ensure all pieces use the same correct seasonal pattern; mixing patterns can be counterproductive to concealment. Use vegetation to further disrupt the outline of the target rather than completely hide it. Ensure that vegetation is not removed from a single location, because it could leave a signature for threat detection. Gather vegetation sparingly from as many remote areas as possible. This technique allows the immediate area to remain relatively undisturbed.

Figure 4.2. Camouflage Nets can Conceal High-Valued Targets.

4.2.3. **Stoves and Fires.** Strictly control the use of stoves and fires because they produce visual and thermal signatures detectable to threat sensors. If fires are necessary, permit them only during daylight hours and place them in dead ground or under dense foliage. Use nets and other expedient thermal screens to dissipate rising heat and reduce the fire's thermal signature.

4.2.4. **Communications.** Monitor communications to prevent enemy intelligence teams from identifying unit locations.

4.2.5. **CCD Discipline.** Strict CCD discipline allows the continued concealment of a unit's position. The longer a unit stays in one location, the harder it is for it to maintain CCD discipline. Extended encampments require constant command attention to CCD discipline. The evacuation of an area also requires CCD discipline to ensure that evidence (trash, vehicle tracks) is not left for enemy detection.

4.3. Survivability Positions and Obstacles. Survivability positions include fighting positions, protective positions (shelters), and trench-work connections. Such positions are usually constructed of earth and logs but may also be composed of man-made building materials such as concrete.

4.3.1. **Placement.** Properly occupying positions and placing obstacles are critical CCD considerations. When possible, place obstacles and occupy positions out of the direct view of threat forces (such as a reverse-slope defense), at night, or under conditions of limited visibility.

4.3.2. **Backgrounds.** Select backgrounds that do not silhouette positions and obstacles or provide color contrast. Use shadows to hinder an enemy's detection efforts. If possible, place positions and obstacles under overhead cover, trees, or bushes or in any other dark area of the terrain. This technique prevents the disruption of terrain lines and hinders aerial detection. CCD efforts, however, should not hinder the integration of obstacles with fires. When using the terrain's natural concealment properties, avoid isolated features that draw the enemy's attention. Do not construct positions directly on or near other clearly defined terrain features (tree lines, hedge rows, hill crests). Offsetting positions into tree lines or below hill crests avoids silhouetting against the background and also counters enemy fire.

4.3.3. **Natural Materials.** Use natural materials to supplement artificial materials. Before constructing positions and obstacles, remove and save natural materials (turf, leaves, humus, etc.) for use in restoring the terrain's natural appearance for deception purposes. During excavation, collect spoil in carrying devices for careful disposal. When preparing survivability positions and obstacles:

4.3.3.1. Avoid disturbing the natural look of surroundings. Use camouflage nets and natural vegetation to further distort the outline of a position, to hide the bottom of an open position or trench, and to mask spoil used as a parapet. To further avoid detection, replace natural materials regularly or when they wilt or change color.

4.3.3.2. Use natural materials to help conceal machine-gun emplacements. Machine guns are priority targets, and concealing them is an essential combat task. Although CCD is important, placement is the primary factor in concealing machine guns.

4.3.3.3. Place ammunition in defilade positions. Proper placement, coupled with the use of artificial and natural CCD materials, provides the maximum possible concealment. Also consider removable overhead concealment.

4.3.3.4. Use decoy positions and phony obstacles to draw enemy attention away from actual survivability positions and traces of obstacle preparation. Decoys serve the additional function of drawing enemy fire, allowing easier targeting of an enemy's weapons systems.

4.4. Battle. CCD during the defensive battle is essentially the same as for the offensive battle. While a majority of the battle is normally fought from prepared, concealed positions, defensive forces still maneuver to prevent enemy breakthroughs or to counterattack. When maneuvering, units should:

4.4.1. Adapt to the terrain.

4.4.2. Make optimum use of concealed routes.

4.4.3. Preselect and improve concealed routes to provide defensive forces with a maneuver advantage.

4.4.4. Plan smoke operations to provide additional concealment for maneuvering forces.

Chapter 5

HIGH-VALUE TARGETS

5.1. Overview. The purpose of threat doctrine is for enemy forces to locate, target, and destroy deep targets, thereby degrading friendly capabilities while adding offensive momentum to attacking enemy forces. Enemy commanders focus their most sophisticated sensors in search of HVTs. By attacking these targets, enemy forces hope to deny adequate C2, combat support, or resupply operations to forward friendly forces throughout the battle-space. Therefore, properly employing CCD at key fixed installations, such as command posts (CPs) and airfields, is essential to survival on a battlefield.

5.2. Plans. No single solution exists for enhancing the survivability of HVTs with CCD (except for large-area smoke screens). The characteristics of many such targets are unique and require the creative application of CCD principles and techniques. Therefore, the CCD planning process presented in this section is not intended to impose a regimen that must be followed at all costs. Rather, it suggests a logical sequence that has proven successful over time. In fact, the steps outlined below often lead to creative CCD solutions simply because they allow designers to consider the many options, benefits, and pitfalls of CCD employment. No CCD plan is wrong if it achieves the intended signature-management goals and does not impair mission accomplishment. Each commander should develop the unit's CCD plan based on awareness, if not a comprehensive assessment, of detectable EM signatures emitted by HVTs under his command. He or she should evaluate these signatures by considering the enemy's expected RSTA capabilities (airborne and ground-based), knowledge of the target area, and weapons-on-target capability.

5.3. Objective. A CCD plan increases target survivability within the limits of available resources. The design procedure must systematically determine which features of a given target are conspicuous, why those features are conspicuous, and how CCD principles and techniques can best eliminate or reduce target signatures. CCD should decrease the effectiveness of enemy attacks by interfering with its target-acquisition process, which in turn increases target survivability.

5.4. Planning Process. The steps outlined below provide guidance for designing CCD plans for HVTs. The detailed planning approach is applicable in any situation where CCD employment is necessary, but more so when the plans include HVTs.

5.4.1. **Step 1-Identify the Threat.** Identify the principal threat sensors, weapon-delivery platforms, and likely directions of attack.

5.4.2. **Step 2-Identify Critical Facilities.** Identify critical HVTs. Include those that are critical from an operational standpoint and those that may provide reference points (cues) for an attack on more lucrative targets.

5.4.3. **Step 3-Evaluate facilities.** Once the critical HVTs are identified, focus efforts on identifying the target features that might be conspicuous to an enemy RSTA. Consider multispectral (visual, thermal, NIR, radar) signatures in this assessment. The seven recognition factors (**Chapter 3**) are an excellent framework for conducting this assessment. Include a review of area maps, site plans, photographs, and aerial images of the target area.

5.4.4. **Step 4-Quantify Signatures.** Quantify the multispectral signatures that are emitted by high-value facilities. Base the quantification on actual surveys of critical facilities, using facsimiles of threat sensors when possible. Specify the EM wavelengths in which targets are most vulnerable, and develop signature-management priorities.

5.4.5. **Step 5-Establish CCD Goals.** Establish specific CCD goals for HVTs. These goals should indicate the signature reduction (or increase) desired and the resources available for CCD implementation. Base these goals on the results of steps 1 through 4. Change the CCD goals as the planning process develops and reiterate them accordingly.

5.4.5. **Step 6-Select Materials and Techniques.** Select CCD materials and techniques that best accomplish signature-management goals within logistical, maintenance, and resource constraints. Expedient, off-the-shelf materials and battlefield by-products are not identified in this publication, but they are always optional CCD materials.

5.4.6. **Step 7-Organize the Plan.** Develop a CCD plan that matches goals with available materials, time and manpower constraints, and operational

considerations. If the goals are unobtainable, repeat steps 5 and 6 until a manageable plan is developed.

5.4.7. **Step 8-Execute the Plan.** Once a feasible CCD plan is developed, execute it. Store temporary or expedient materials inconspicuously. Conduct deployment training on a schedule that denies enemy intelligence teams the opportunity to identify the countermeasures or develop methods to defeat the CCD.

5.4.8. **Step 9-Evaluate the CCD.** The final step in the CCD planning process is to evaluate the deployed CCD materials and techniques. Important questions to ask in this evaluation include the following:

5.4.8.1. Does CCD increase the survivability of HVTs?

5.4.8.2. Does deployed CCD meet the signature-management goals outlined in the plan?

5.4.8.3. Is deployed CCD operationally compatible with the treated target(s)?

5.4.8.4. Are CCD materials and techniques maintainable within manpower and resource constraints?

5.5. Fixed Installations. Fixed installations (bases, airfields, CPs, warehouses, roadways, pipelines, railways, and other lines-of-communication [LOC] facilities) provide scarce, nearly irreplaceable functional support to ground maneuver forces. The threat to these facilities is both ground-based and aerial. The CCD techniques for the two attack types do not necessarily change, but the defender must be aware of the overall implications of the CCD plan.

5.5.1. **Ground Attacks.** Ground attacks against fixed installations (enemy offensives, terrorist attacks, and enemy special-force incursions) require constant operational awareness by the defenders. While most CCD techniques are conceptually designed to defend against an aerial attack, these same techniques can affect the target-acquisition capabilities of an enemy's ground forces to the benefit of the defender. SCSPP, LCSS, and natural vegetation provide CCD against a ground attack. CCD discipline (light, noise, spoil) involves prudent operational procedures that friendly troops should observe

in any tactical situation, particularly in the presence of hostile ground forces. (See **Chapter 4** for more information.)

5.5.2. **Aerial Attacks.** Fixed installations are susceptible to aerial attacks because of their long residence time and immobility. However, fighter-bomber and helicopter aircrews face unique target-acquisition problems due to the relatively short time available to locate, identify, and lock onto targets. Fighter-bombers typically travel at high speeds, even during weapons delivery. This means attacking aircrews have limited search time once they reach the target area. Helicopters travel at slower speeds but generally encounter similar time-on-target limitations. Because of lower flying altitudes and slower speeds, helicopters are more vulnerable to ground defenses. In either case, proper CCD can increase target search time making the aircraft more vulnerable to counterattack.

5.5.3. **Enemy Intelligence.** The location and configuration of most fixed installations are usually well known. CCD techniques that protect against sophisticated surveillance sensor systems, particularly satellite-based systems, can be costly in terms of manpower, materials, and time. Steps can be taken to reduce an enemy's detection of relocatable targets. Fixed installations are difficult to conceal from RSTA sensors due to the relatively long residence time of fixed installations versus relocatable targets. Unless the construction process for a given fixed installation was conducted secretly, defenders can safely assume that enemy RSTA sensors have previously detected and catalogued its location. Defenders can further assume that attacking forces have intelligence data leading them to the general area of the fixed installation. CCD design efforts, therefore, should focus on the multispectral defeat or impairment of the enemy's local target-acquisition process.

5.5.4. **CCD Techniques.** Selected CCD techniques should capitalize on terrain features that are favorable to the defender and on the short time available to attacking aircrews for target acquisition. Use artificial and natural means to camouflage the installation. Where time and resources allow, deploy alternative targets (decoys) to draw the attention of the attacking aircrews away from the fixed installation. Comprehensive CCD designs and techniques for fixed installations can be costly, yet field tests have shown that simple, expedient techniques can be effective. HVTs are usually supplied

with artificial CCD materials. If they are not, Airmen increase the survivability of an installation by using CCD principles.

5.5.5. **Other Considerations.** While standard CCD materials are designed to enhance fixed-installation survivability, they have practical limitations that are not easily overcome. Materials applied directly to a fixed installation may achieve the signature-management goals stated in the CCD plan. However, if other features of the target scene are not treated accordingly, the target may be well hidden but remain completely vulnerable.

5.5.5.1. For example, three weapons-storage-area (WSA) igloos are in a row. The middle igloo is treated with CCD materials while the other two are not. The middle igloo will still be vulnerable. The enemy knows that three igloos exist and will probably locate the middle one no matter how well the CCD plan is designed. However, if all three igloos are treated with CCD materials and three decoy igloos are placed away from them, the treated igloos' survivability will increase.

5.5.5.2. Furthermore, if a man-made object (traffic surface) or a natural feature (tree line) is close to the igloos, attacking forces will use these cues to proceed to the target area even if all three igloos are treated with CCD materials. Remember, an HVT is part of an overall target scene and an attacker must interpret the scene. Do not make his task easy. CCD plans that treat only the target and ignore other cues (man-made or natural) within the target scene are insufficient.

5.5.6. **Command Posts (UCC).** C2 systems provide military leaders with the capability to make timely decisions, communicate the decisions to subordinate units, and monitor the execution of the decisions. CPs contain vital C2 systems.

5.5.6.1. **Signatures.** Since World War II, the size and complexity of CPs have increased dramatically. Their signatures have correspondingly increased from a physical and communications perspective (more types of antennas and transmission modes at a wider range of frequencies). As a result, the enemy can use several conspicuous signatures to detect and target CPs for attack. Therefore, CPs require excellent CCD to survive on the battlefield.

5.5.6.1.1. **LOCs.** CPs are usually located near converging LOC, such as road or rail junctions, and often require new access and egress routes. Consider the following regarding CCD and CPs:

5.5.6.1.1.1. **Vehicle traffic.** When evaluating EM signatures that CPs emit, consider concentrations of vehicles, signs of heavy traffic (characteristic wear and track marks), and air traffic. Park vehicles and aircraft a significant distance from CPs.

5.5.6.1.1.2. **Antennas.** Antennas and their electronic emissions and numerous support towers are common to most CPs. Paint antennas and support equipment with nonconductive green, black, or brown paint if the surfaces are shiny. If tactically feasible, use remote antennas to reduce the vulnerability of the radio system to collateral damage.

5.5.6.1.1.3. **Security Emplacements.** Security measures (barbwire, barriers, security and dismount points, and other types of emplacements) can indicate CP operations. Barbwire exhibits a measurable RCS at radar frequencies. Ensure that barbwire and concertina wire follow natural terrain lines and are concealed as much as possible.

5.5.6.1.2. **Equipment.** Power generators and other heat sources produce signatures that an enemy's surveillance and target-acquisition sensors can detect. Place heat-producing equipment and other thermal sources in defilade positions, within structures, or under natural cover. Heat diffusers, which tone down and vent vehicle exhaust away from threat direction, are an expedient means of thermal-signature reduction.

5.5.6.1.3. **Defensive Positions.** Defensive positions (berms, revetments, fighting positions) for protection against direct- and indirect-fire attackers typically create scarred earth signatures and detectable patterns due to earth excavation.

5.5.6.2. **CCD.** CCD improves OPSEC and increases survivability by minimizing the observable size and EM signatures of CPs. CP CCD requires recon, planning, discipline, security, and maintenance. Carefully controlled traffic plans decrease the possibility of disturbing natural cover and creating new, observable paths. Decoys are a highly effective means of confusing the

enemy's target-acquisition process, particularly against airborne sensors. Against ground threats, the same general rules of CCD discipline apply; however, recon and heightened security patrols enhance CCD efforts against ground attack.

5.5.6.3. **Sites.** CP sites, which could move every 24 hours, are still occupied for a longer period than assembly areas. CP site selection is crucial, therefore units should:

5.5.6.3.1. Consider the needs of supporting an extended occupation while minimizing changes to natural terrain patterns. When constructing defensive positions, minimize earth scarring as much as possible. If scarred earth is unavoidable, cut vegetation, toned-down agents (paint), and camouflage nets help conceal scarred areas.

5.5.6.3.2. Use existing LOC (roads, trails, streams, etc.). If a site requires construction of roads or paths, make maximum use of natural concealment and existing terrain. The fewer new lines required, the better the CP blends, leaving natural features relatively unchanged.

5.5.6.3.3. Never locate a CP at a road junction. Road junctions are high-priority targets for enemy forces and are easily detectable.

5.5.6.3.4. Locate a CP in an existing civilian structure, if possible, which simplifies hiding military activity; however, ensure the structure falls within the Laws of Armed Conflict. Choose a structure in an area where a sufficient number of buildings with similar EM signatures can mask its location.

5.5.6.4. **Telecommunications Procedures.** By strictly complying with proper radio, telephone, and digital communications procedures, the opportunities for an enemy to detect friendly telecommunications activities are minimized. Consider the following:

5.5.6.4.1. Place antennas in locations using natural supports when possible (trees for dipoles). As a rule of thumb, place antennas a minimum of one wavelength away from surrounding structures or other antennas. **NOTE:** One wavelength is 40 meters (typically) for low frequencies and 1 meter for very high frequencies (VHFs).

5.5.6.4.2. Move antennas as often as possible within operational constraints.

5.5.6.4.3. Use directional antennas when possible. If using non-directional antennas, employ proper terrain-masking techniques to defeat the threat's radio direction-finding efforts.

5.5.6.4.4. Use existing telephone lines as much as possible. Newly laid wire is a readily observable signature that can reveal a CP's location. Communications wire and cable should follow natural terrain lines and be concealed in the best way possible.

5.5.6.5. **CCD Discipline.** Maintain CCD discipline after occupying a site. Establish and use designated foot paths to, from, and within a CP's area. If a unit occupies a site for more than 24 hours, consider periodically rerouting foot paths to avoid detectable patterns. Conceal security and dismount points and other individual emplacements, and make paths to the CP inconspicuous. Enforce proper disposal procedures for trash and spoil. Rigidly enforce light and noise discipline. Enhance the realism of a decoy CP by making it appear operational. Allow CCD discipline to be lax in the decoy CP, thus making it a more conspicuous target than the genuine CP.

5.5.7. **Supply and Water Points.** Supply and water points provide logistical support—the backbone of sustained combat operations. As these targets are relatively immobile and the object of an enemy's most sophisticated sensors, using CCD is one of the most effective means to improve their survivability.

5.5.7.1. **Operations.** Many CCD methods associated with assembly areas and CPs also apply to supply and water points, but with additional requirements. Large amounts of equipment and supplies are quickly brought into tactical areas and delivered to supply points located as close to personnel as possible. Supplies must be unloaded and concealed quickly, while supply points remain open and accessible for distribution. Under these conditions, multiple supply points are generally easier to camouflage than single, large ones. Decoy supply and water points can also confuse a threat's targeting efforts.

5.5.7.2. **CCD.** Take maximum advantage of natural cover and concealment. Configure logistics layouts to conform to the local ground pattern. Creativity

can play a role in this effort. The following guidance enhances concealment of these operations:

5.5.7.2.1. Avoid establishing regular (square or rectangular) perimeter shapes for an area.

5.5.7.2.2. Select locations where concealed access and egress routes are already established and easily controlled.

5.5.7.2.3. Use roads with existing overhead concealment if you need new access roads. Conceal access over short, open areas with overhead nets.

5.5.7.2.4. Control movement into and out of the supply area.

5.5.7.2.5. Mix and disperse supply-point stocks to the maximum extent possible. This not only avoids a pattern of stockpile shapes but also avoids easy destruction of one entire commodity.

5.5.7.2.6. Space stocks irregularly (in length and depth) to avoid recognizable patterns. Stack supplies as low as possible to avoid shadows. Dig supplies in if resources allow. In digging operations, disperse the spoil so as not to produce large piles of earth.

5.5.7.2.7. Cover stocks with nets and other materials that blend with background patterns and signatures. Flattops (large, horizontal CCD nets) are effective for concealing supply-point activities when resources allow their construction and when supply points are not too large. Dunnage from supply points provides excellent material for expedient decoys.

5.5.7.3. **Traffic Control.** Ensure that vehicles cause minimal changes to the natural terrain as a result of movement into, within, and out of the area. Provide concealment and control of vehicles waiting to draw supplies. Rigidly practice and enforce CCD discipline and OPSEC. Debris control could be a problem and requires constant attention.

5.5.7.4. **Water Points.** CCD for water points includes the following additional considerations:

5.5.7.4.1. **Spillage.** Water spillage can have positive and negative effects on a unit's CCD posture. Standing pools of water reflect light that is visible to

observers. Pools can also scatter radar waves, resulting in conspicuous black-hole returns on radar screens. Therefore, minimize water spillage and provide adequate drainage for runoff. On the other hand, dispersed water can be used to reduce the thermal signatures of large, horizontal surfaces. However, use this technique sparingly and in such a way that pools do not form.

5.5.7.4.2. **Equipment.** Use adequate natural and artificial concealment for personnel, storage tanks, and specialized pumping and purification equipment. Conceal water-point equipment to eliminate shine from damp surfaces. Conceal shine by placing canvas covers on bladders, using camouflage nets, and placing foliage on and around bladders. This also distorts the normal shape of the bladders.

5.5.7.4.3. **Scheduling.** Enhance CCD discipline at water points by establishing and strictly enforcing a supply schedule for units. The lack of or violation of a supply schedule produces a concentration of waiting vehicles that is difficult to conceal.

5.5.8. **Airfields.** Airfields are among the most important of all battlefield HVTs. CE is responsible for a number of airfield assets and should consider CCD measures to protect them.

5.5.8.1. **Aircraft Arresting Systems (AASs).** Consider camouflaging AASs to prevent direct targeting.

5.5.8.2. **Emergency Airfield Lighting Systems (EALS).** Camouflage EALS generators and regulators to enhance survivability.

5.5.8.3. **Defensive Positions.** Constructing defensive positions can create detectable areas of scarred earth. Minimize disturbances to the surrounding area when constructing defensive positions. Cover scarred earth with cut vegetation, camouflage nets, or toned-down agents.

5.5.8.4. **Vehicles**. Large vehicles can be effectively concealed with camouflage nets. Also, properly placing these vehicles to use terrain features and indigenous vegetation increases their survivability. Expedient vehicle decoys provide an enemy with alternate targets, and proper CCD discipline is essential.

5.5.8.5. In addition, airfields are typically comprised of several parts that make up the whole, including parking aprons, aircraft maintenance areas, and arming and refueling points. While CE may not be responsible for these parts, the Wing may request CE's help in protecting these assets.

5.5.8.5.1. **Parking Aprons.** Aircraft are highly conspicuous targets because of their awkward shape, distinctive thermal signatures, and large RCS. An enemy expends a lot of time and energy attempting to locate aircraft when they are most vulnerable, parked on the ground. Once it finds them, the enemy aggressively directs offensive operations against them.

5.5.8.5.2. **Aircraft Maintenance Areas.** The most conspicuous features of aircraft maintenance areas are the hangers or large transportable maintenance shelters. These shelters are highly visible and indicate the presence of aircraft to an enemy. Maintenance areas occupy large areas to allow for ground handling of aircraft. Traffic patterns around maintenance areas are also strong visual cues to the enemy. Maintenance assets, including aviation shops, have characteristically distinct multispectral cues.

5.5.8.5.3. **Arming and Refueling Points.** Arming and refueling points provide POL and ammunition support to airfields and other base units. Arming and refueling points consists of fuel bladders, large vehicles, fueling apparatus, and bulk ammunition. Due to safety requirements, arming and refueling points are dispersed as much as possible within terrain and operational constraints. Each element is detectable with multispectral radar. In a forward arming and refueling point (FARP):

5.5.8.5.3.1. Fuel bladders contain petroleum liquids whose thermal mass is a strong IR cue relative to the background. Bladders are usually bermed, which means that visible earth scarring is necessary to construct the berm.

5.5.8.5.3.2. Large vehicles are conspicuous in all wavelengths.

5.5.8.5.3.3. Fueling areas are generally arranged in such a way that the fueling apparatus (hoses, pumps) are arranged linearly in an open area for safe and easy access. The linear deployment of these hoses is a strong visual cue, and their dark color usually contrasts with the background. The dark hoses

experience solar loading and the petroleum, oils, and lubricants (POL) within the hoses can provide a thermal cue.

5.5.8.5.4. **Equipment.** Palletized ammunition and support equipment accompany airfields. Such equipment is often stacked in regular, detectable patterns.

5.5.8.5.5. **Aircraft.** Aircraft create large dust plumes when deployed to unpaved or dusty areas. Such plumes are distinct visual cues and indicate the presence of aircraft to an enemy. To avoid dust, park aircraft next to grassy areas or where the earth is hard-packed. If such areas are unavailable, disperse water on the area to minimize dust plumes. However, water-soaked earth can also be an IR detection cue so use this option sparingly and, if possible, at night. Several chemical dust palliatives are available that provide excellent dust control for aviation areas.

5.5.8.5.5.1. **Parked Aircraft.** Camouflage nets, berms, stacked equipment, and revetments can effectively conceal parked aircraft. Vertical screens constructed from camouflage nets help conceal parked aircraft, particularly against ground-based threats. However, CCD techniques for rapid-response aircraft must not impair operational requirements, meaning that obtrusive, permanent CCD techniques are generally not an option. Also, foreign object damage (FOD) is a critical concern for all aviation assets. CCD for parked aircraft depends on the expected ground time between flights. The commander must approve all aircraft CCD techniques before implementation.

5.5.8.5.5.2. **Aircraft Refueling.** Aircraft refueling positions, particularly fuel hoses, should be dispersed and arrayed in a nonlinear configuration. The hoses can be concealed at periodic locations with cut vegetation or a light earth/sod covering to reduce visual and thermal signatures.

5.5.8.5.6. **Dunnage**. Quickly conceal all dunnage and packing materials to minimize the evidence of airfield use.

Chapter 6

SPECIAL ENVIRONMENTS

6.1. Overview. The fundamentals of CCD do not change between environments. The seven rules for avoiding detection and the seven recognition factors that are listed in **Chapter 3** and the three CCD principles—preventing detection, improving survivability, and improving deception capabilities—still apply. However, the guidelines for their application change. Different environments require thoughtful, creative, and unique CCD techniques. This chapter discusses different CCD techniques that have proven effective in three special environments—desert, snow-covered areas, and urban terrain.

6.2. Desert. The color of desert terrain varies from pink to blue, depending on the minerals in the soil and the time of the day. No color or combination of colors matches all deserts. Patches of uniform color in the desert are usually 10 times larger than those in wooded areas. These conditions have led to the development of a neutral, monotone tan as the best desert CCD paint color.

6.2.1. **Topography.** Although desert terrain may appear featureless, it is not completely flat. In some ways, desert terrain resembles unplowed fields; barren, rocky areas; grasslands; and steppes.

6.2.2. **Shadows.** The closer a target is to the ground, the smaller its shadow; and a small shadow is easier to conceal from aerial observation. The proper draping of CCD nets will alter or disrupt the regular, sharp-edged shadows of military targets and allow target shadows to appear more like natural shadows. When supplemented by artificial materials, natural shadows cast by folds of the ground can be used for CCD purposes. The best solution to the shadow problem in desert terrain is to dig in and use overhead concealment or cover. Otherwise, park vehicles in a way that minimizes their broadside exposure to the sun.

6.2.3. **Placement.** Proper placement and shadow disruption remain effective techniques. Take advantage of terrain masking by placing assets in gullies, washes, wadis (dry streambeds), and ravines; this reduces their shadows and silhouettes (be sure to get weather forecasts before placing assets in areas

subject to flooding). More dispersion is necessary in desert terrain than in wooded areas. Move assets as the sun changes position to keep equipment in shadows.

6.2.4. **Terrain Mottling.** Use terrain mottling (mark with spots or blotches of a different color or shade) when the ground offers little opportunity for concealment. This technique involves scarring the earth with bulldozers, which creates darker areas on which to place equipment for better blending with the background. Ensure that the mottled areas are irregularly shaped and at least twice the size of the target you are concealing. Place the target off center in the mottled area and drape it with camouflage nets. When employing the scarring technique, dig two to three times as many scars as pieces of equipment being concealed. Doing this prevents the mere presence of mottled areas from giving away a unit's location.

6.2.5. **Movement Discipline.** Movement discipline is especially important in the desert. Desert terrain is uniform and fragile, making it easily disturbed by vehicle tracks. Vehicle movement also produces dust and diesel plumes that are easily detectable in the desert. When movement is necessary, move along the shortest route and on the hardest ground. Shine is a particularly acute desert problem due to the long, uninterrupted hours of sunlight. To deal with this problem, remove all reflective surfaces or cover them with burlap. Use matte CCD paint or expedient paints (see **Table 3.2.**) to dull the gloss of a vehicle's finish. Shade optical devices (binoculars, gun sights) when using them.

6.2.6. **Noise and Light Discipline.** Noise and light discipline is particularly important in desert terrain since sound and light can be detected at greater distances on clear desert nights. The techniques for reducing these signatures remain the same as for other environments. Be aware that thermal sensors, while not as effective during the day, have an ideal operating environment during cold desert nights. Starting all vehicle and equipment engines simultaneously is a technique that can be used to confuse enemy acoustical surveillance efforts.

6.3. Snow-Covered Areas. When the main background is white, apply white paint or whitewash over the permanent CCD paint pattern. The amount of

painting should be based on the percentage of snow coverage on the ground: If the snow covers less than 15 percent of the background, do not change the CCD paint pattern; if the snow cover is 15 to 85 percent, substitute white for green in the CCD paint pattern; if the snow cover is more than 85 percent, paint the vehicles and equipment completely white.

6.3.1. **Placement.** A blanket of snow often eliminates much of the ground pattern, causing natural textures and colors to disappear. Blending under these conditions is difficult. However, snow-covered terrain is rarely completely white so use the dark features of the landscape. Place equipment in roadways, in streambeds, under trees, under bushes, in shadows, and in ground folds. Standard ABUs and personal equipment contrast with the snow background, so use CCD to reduce these easily recognized signatures (**Figure 6.1.**).

Figure 6.1. Arctic CCD.

6.3.2. **Movement.** Concealing tracks is a major problem in snow-covered environments. Movement should follow wind-swept drift lines, which cast shadows, as much as possible. Vehicle drivers should avoid sharp turns and follow existing track marks. Wipe out short lengths of track marks by trampling them with snowshoes or by brushing them out.

6.3.3. **Thermal Signatures.** Snow-covered environments provide excellent conditions for a threat's thermal and UV sensors. Terrain masking is the best solution to counter both types of sensors. Use arctic LCSS and winter ca-

mouflage paint to provide UV blending, and use smoke to create near-whiteout conditions.

6.4. Urban Terrain. Urbanization is reducing the amount of open, natural terrain throughout the world. Therefore, modern military units must be able to apply effective urban CCD. Many of the CCD techniques used in natural terrain are effective in urban areas.

6.4.1. **Planning.** Planning for operations in urban areas presents unique difficulties. Tactical maps do not show man-made features in enough detail to support tactical operations. Therefore, they must be supplemented with aerial photographs and local city maps. Local government and military organizations are key sources of information that can support tactical and CCD operations. They can provide diagrams of underground facilities, large-scale city maps, and/or civil-defense or air-raid shelter locations.

6.4.2. **Selecting Site.** The physical characteristics of urban areas enhance CCD efforts. The dense physical structure of these areas generates clutter (an abundance of EM signatures in a given area) that increases the difficulty of identifying specific targets. Urban clutter greatly reduces the effectiveness of a threat's surveillance sensors, particularly in the IR and radar wavelengths. Urban terrain, therefore, provides an excellent background for concealing CPs, reserves, combat-service-support (CSS) complexes, or combat forces. The inherent clutter in urban terrain generally makes visual cues the most important consideration in an urban CCD plan.

6.4.2.1. The regular pattern of urban terrain; the diverse colors and contrast; and the large, enclosed structures offer enhanced concealment opportunities. Established, hardened road surfaces effectively mask vehicle tracks. Depending on the nature of the operation, numerous civilian personnel and vehicles may be present and may serve as clutter. This confuses an enemy's ability to distinguish between military targets and the civilian population. Underground structures (sewers, subways) are excellent means of concealing movement and HVTs.

6.4.2.2. When augmented by artificial means, man-made structures provide symmetrical shapes that provide ready-made CCD. The CCD for fighting positions is especially important because of the reduced identification and

engagement ranges (100 meters or less) typical of urban fighting. Limit or conceal movement and shine. These signatures provide the best opportunity for successful threat surveillance in urban terrain. Careful placement of equipment and fighting positions remains important to provide visual CCD and avoid detection by contrast (thermal sensors detecting personnel and equipment silhouetted against colder buildings or other large, flat surfaces).

6.4.3. **Establishing Fighting Positions.** The fundamental CCD rule is to maintain the natural look of an area as much as possible. Buildings with large, thick walls and few narrow windows provide the best concealment. When selecting a position inside a building, Airmen should:

6.4.3.1. Avoid lighted areas around windows.

6.4.3.2. Stand in shadows when observing or firing weapons through windows.

6.4.3.3. Select positions with covered and concealed access and egress routes (breaches in buildings, underground systems, trenches).

6.4.3.4. Develop decoy positions to enhance CCD operations.

6.4.4. **Placing Vehicles.** Hide vehicles in large structures, if possible, and use local materials to help blend vehicles with the background environment. Paint vehicles and equipment a solid, dull, dark color. If you cannot do this, use expedient paints to subdue the lighter, sand-colored portions of the SCSPP. When placing vehicles outdoors, use shadows for concealment. Move vehicles during limited visibility or screen them with smoke.

Chapter 7

INDIVIDUAL CCD

7.1. Overview. Each Airman is responsible for camouflaging himself, his equipment, and his position. CCD reduces the probability of an enemy placing aimed fire on an Airman.

7.2. Materials. Use natural and artificial materials for CCD. Natural CCD includes defilade, grass, bushes, trees, and shadows. Artificial CCD for Airmen includes ABUs, camouflage nets, skin paint (**Figure 7.1.**), and natural materials removed from their original positions. To be effective, artificial CCD must blend with the natural background.

Figure 7.1. Airman Applying Skin Paint.

7.3. Discipline. Noise, movement, and light discipline contribute to individual CCD:

7.3.1. Noise discipline muffles and eliminates sounds made by soldiers and their equipment.

7.3.2. Movement discipline minimizes movement within and between positions and limits movement to routes that cannot be readily observed by an enemy.

7.3.3. Light discipline controls the use of lights at night. Avoid open fires, do not smoke tobacco in the open, and do not walk around with a lit flashlight.

7.4. Dispersal. Dispersal is the deliberate deployment of Airmen and equipment over a wide area. It is a key individual survival technique. Dispersal creates a smaller target mass for enemy sensors and weapons systems. Therefore, it reduces casualties and losses in the event of an attack and also makes enemy detection efforts more difficult.

7.5. Considerations. Every Airman should have a detailed understanding of the recognition factors described in **Chapter 3**. While all of these factors remain important when applying individual CCD, the following factors are critical:

7.5.1. **Movement.** Movement draws attention, whether it involves vehicles on the road or individuals walking around positions. The naked eye, IR, and radar sensors can detect movement. Minimize movement while in the open and remember that darkness does not prevent observation by an enemy equipped with modern sensors. When movement is necessary, slow, smooth movement attracts less attention than quick, irregular movement.

7.5.2. **Shape.** Use CCD materials to break up the shapes and shadows of positions and equipment. Stay in the shadows whenever possible, especially when moving, because shadows can visually mask objects. When conducting operations close to an enemy, disguise or distort helmet and body shapes with artificial CCD materials because an enemy can easily recognize them at close range.

7.5.3. **Shine and Light.** Shine can also attract attention. Pay particular attention to light reflecting from smooth or polished surfaces (mess kits, mirrors, eyeglasses, watches, windshields). Plastic map cases, dust goggles worn on top of a helmet, and clear plastic garbage bags also reflect light. Cover these items or remove them from exposed areas. Vehicle headlights, taillights, and safety reflectors not only reflect light but also reflect laser energy used in weapon systems. Cover this equipment when the vehicle is not in operation (**Figure 7.2.**). Red filters on vehicle dome lights and flashlights, while designed to protect an Airman's night vision, are extremely sensitive to detection by NVDs. Red-lensed flashlights and lit cigarettes and pipes can be seen with a starlight scope from 4 kilometers. To reduce the chances of detection, replace red filters with blue-green filters and practice strict light discipline.

Use measures to prevent shine at night because moonlight and starlight can be reflected as easily as sunlight.

Figure 7.2. Burlap Covering Headlight.

7.5.4. **Color.** The contrast of skin, uniforms, and equipment with the background helps an enemy detect opposing forces. Individual CCD should blend with the surroundings; or at a minimum, objects must not contrast with the background. Ideally, blend colors with the background or hide objects with contrasting colors.

7.6. Employment. Study nearby terrain and vegetation before applying CCD to Airmen, equipment, or the fighting position. During recon, analyze the terrain in lieu of the CCD considerations listed above and then choose CCD materials that best blend with the area. Change CCD as required when moving from one area to another.

7.6.1. **Skin.** Exposed skin reflects light and may draw attention. Even very dark skin, because of natural oils, will reflect light. CCD paint sticks cover these oils and help blend skin with the background. Avoid using oils or insect repellent to soften the paint stick because doing so makes skin shiny and defeats the purpose of CCD paint. Airmen applying CCD paint should work in pairs and help each other (**Figure 7.3.**). Self-application may leave gaps, such as behind ears. Use the following technique:

Figure 7.3. Work in Pairs when Applying Skin Paint.

7.6.1.1. Paint high, shiny areas (forehead, cheekbones, nose, ears, chin) with a dark color.

7.6.1.2. Paint low, shadow areas with a light color.

7.6.1.3. Paint exposed skin (back of neck, arms, hands) with an irregular pattern.

7.6.1.4. When CCD paint sticks are unavailable, use field expedients such as burnt cork, bark, charcoal, lampblack, or mud. Mud contains bacteria, some of which is harmful and may cause disease or infection, so consider mud as the last resource for individual CCD field-expedient paint. **Table 7.1.** describes the proper method to apply camouflage face paint to skin.

7.6.2. **Uniforms.** ABUs have a CCD pattern but often require additional CCD, especially in operations occurring very close to the enemy. Attach leaves, grass, small branches, or pieces of LCSS to uniforms and helmets. These items help distort the shape of an Airman, and they blend with the natural background (**Figure 7.4.**). ABUs provide visual and NIR CCD. Do not starch ABUs because starching counters the IR properties of the dyes. Replace excessively faded and worn ABUs because they lose their CCD effectiveness as they wear. When operating in snow-covered ground wear over-whites (if issued) to help blend with the snow. If over-whites are not issued, use white cloth, such as white bed sheets, to get the same effect.

Table 7.1. Application of Camouflage Face Paint to Skin.

Camouflage Material	*Skin Color*	*Shine Areas*	*Shadow Areas*
	Light or Dark	*Forehead, Cheek-bones, Ears, Nose & Chin*	*Around eyes, under nose, & under chin*
Loam & Light Green Stick	All troops use in areas with green vegetation	Use loam	Use light green
Sand & Light Green Stick	All troops use in areas lacking green vegetation	Use light green	use sand
Loam & White	All troops use only in snow-covered terrain	Use loam	Use white
Burnt Cork, Bark Charcoal, or Lamp Black	All troops, if camouflage sticks not available	Use	Do not use
Light-Colored Mud	All troops, if camouflage sticks not available	Do not use	Use

Figure 7.4. CCD Applied to Helmet.

7.6.3. **Equipment.** Inspect personal equipment to ensure that shiny items are covered or removed. Take corrective action on items that rattle or make other noises when moved or worn. Airmen assigned equipment, such as vehicles

or generators, should be knowledgeable of their appropriate camouflage techniques.

7.6.4. **Individual Fighting Positions.** When constructing fighting positions you must seek cover from fire, and concealment from observation (**Figure 7.5.**). From the time you prepare and occupy a fighting position, you should continue to improve it. How far you get depends on how much time you have, regardless of whether it is a hasty position or a well-prepared one with overhead cover (OHC).

Figure 7.5. Camouflaged Fighting Position.

7.6.4.1. **Cover.** To get this protection in the defense, build a fighting position to add to the natural cover afforded by the terrain. The cover of your fighting position will protect you from small arms fire and indirect fire fragments, and place a greater thickness of shielding material or earth between you and the blast wave of nuclear explosions. Three different types of cover—overhead, frontal, and flank/rear cover—are used to make fighting positions. In addition, positions can be connected by tunnels and trenches. These allow Airmen to move between positions for engagements or resupply, while remaining protected.

7.6.4.1.1. **Overhead Cover.** Your completed position should have OHC, which enhances survivability by protecting you from indirect fire and fragmentation.

7.6.4.1.2. **Frontal Cover.** Your position needs frontal cover to protect you from small arms fire to the front. Frontal cover allows you to fire to the oblique, as well as to hide your muzzle flash.

7.6.4.1.3. **Flank and Rear Cover.** When used with frontal and overhead cover, flank and rear cover protects you from direct enemy and friendly fire. Natural frontal cover such as rocks, trees, logs, and rubble is best, because it is hard for the enemy to detect. When natural cover is unavailable, use the dirt you remove to construct the fighting position. You can improve the effectiveness of dirt as a cover by putting it in sandbags. Fill them only three-quarters full.

7.6.4.4. **Concealment.** If your position can be detected, it can be hit by enemy fire. Therefore, your position must be so well hidden that the enemy will have a hard time detecting it, even after he reaches hand-grenade range.

7.6.4.4.1. **Natural, Undisturbed Materials.** Natural, undisturbed concealment is better than man-made concealment. While digging your position, try not to disturb the natural concealment around it. Put the unused dirt from the hole behind the position and camouflage it. Camouflage material that does not have to be replaced (rocks, logs, live bushes, and grass) is best. Avoid using so much camouflage that your position looks different from its surroundings. Natural, undisturbed concealment materials are already prepared, seldom attract enemy attention, and need no replacement.

7.6.4.4.2. **Man-made Materials.** Your position must be concealed from enemy aircraft as well as from ground troops. If the position is under a bush or tree, or in a building, it is less visible from above. Spread leaves, straw, or grass on the floor of the hole to keep freshly dug earth from contrasting with the ground around it. Man-made concealment must blend with its surroundings so that it cannot be detected, and must be replaced if it changes color or dries out.

7.6.4.5. **Camouflage.** When building a fighting position, camouflage it and the dirt taken from it (**Figure 7.6.**). Camouflage the dirt used as frontal, flank, rear, and overhead cover (OHC). Also, camouflage the bottom of the hole to prevent detection from the air. If necessary, take excess dirt away from the position (to the rear).

Figure 7.6. Camouflaged Dug-in Fighting Position.

7.6.4.5.1. Too much camouflage material may actually disclose a position. Get your camouflage material from a wide area. An area stripped of all or most of its vegetation may draw attention. Do not wait until the position is complete to camouflage it. Camouflage the position as you build.

7.6.4.5.2. Hide mirrors, food containers, and white underwear and towels. Do not remove your shirt in the open. Your skin may shine and be seen. Never use fires where there is a chance that the flame will be seen or the smoke will be smelled by the enemy. Also, cover up tracks and other signs of movement. When camouflage is complete, inspect the position from the enemy's side. This should be done from about 38 feet (11 meters) forward of the position. Then check the camouflage periodically to ensure it is natural-looking and conceals the position. When the camouflage no longer works, change and improve it. Never look up when aircraft fly overhead (one of the most obvious features on aerial photography is the upturned faces of troops).

Chapter 8

DISPERSAL PROCEDURES

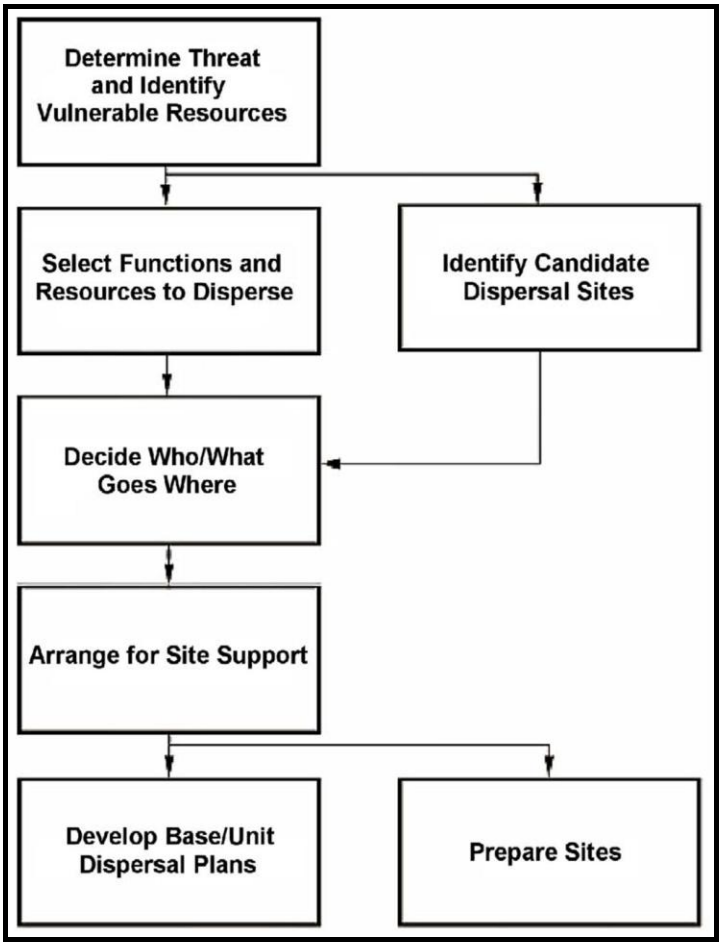
8.1. Introduction. Dispersal is the separation or relocation of resources, preferably away from a threat or pending disaster, for the purpose of increasing survivability. Dispersal creates a smaller target mass for enemy sensors and weapons systems. Therefore, it reduces casualties and losses in the event of a natural or manmade disaster or an attack by making enemy detection efforts more difficult. Dispersion of assets may be necessary at any base: CONUS, overseas, permanent, contingency, and bare bases. Dispersal can be incorporated into everyday installation operations through intelligent facility layout. However, dispersal is usually viewed as an expedient measure to protect important installation resources from a pending disaster or wartime threat by temporarily relocating them. Include dispersal plans in the CEMP 10-2, In-Garrison Expeditionary Site Plans (IGESP), and Expeditionary Site Plans (ESP).

8.2. Planning and Preparing for Dispersal. Effective temporary dispersal depends upon the circumstance dictating dispersal and the location where resources are dispersed. For example, dispersing personnel and equipment into a wooded area prior to a hurricane could cause greater injury and damage from falling branches and trees than if the resources remained in the open. However, the same action prior to a hostile attack could save lives and protect equipment by removing them from likely target areas and providing concealment from enemy forces. As discussed in this handbook, seven steps are involved in planning and preparing for resource dispersal. Those steps are outlined in **Figure 8.1.** and discussed below. Because dispersal is an installation-wide effort, all units should provide inputs to each step.

8.2.1. **Determine the Threats and Identify Vulnerable Resources.** As used here, a threat can be a manmade or natural disaster as well as an enemy attack. Each installation must decide what threats it faces and which resources are vulnerable for each threat. A threat analysis will determine whether individual facilities and facility groupings will be dispersed or nondispersed, whether electrical and water plants will be dispersed or centrally located, and whether revetments and airfield damage repair sets will be re-

quired. The fact that an adversary has a certain type of aircraft mix could mean that an air attack should be expected and hardening and dispersal actions should be considered.

Figure 8.1. Dispersal Planning and Preparation Flowchart.



8.2.2. **Identify What Resources and Functions Should Be Dispersed.** Usually, these are high-value or mission critical assets that are not protected by other measures. Each unit should identify key resources to disperse for each threat and outline the priority in which they should be dispersed. The major consideration is usually how important a resource is towards continuing or reestablishing the base mission or recovery effort. Personnel should be on top of the list if shelters are not available for everyone. No two bases have exactly the same requirements; therefore, each base should carefully evaluate needs and assign dispersal priorities.

8.2.3. **Select Candidate Dispersal Sites.** Include in the CE Contingency Response Plan (CRP) dispersal sites that are to be used during hostile attacks that are located away from high-threat areas of the installation and provide concealment and protection from attacking forces. Look for multiple dispersal sites to increase resource survivability. Select sites on base, or convenient to it, with at least two access routes. Choose sites that provide good natural cover and concealment, and avoid open areas. Pick sites that need the least amount of advance preparation. Sites with in-place facilities, utilities, and communications are ideal if they are not easily identified as targets in their own right. Avoid recommending sites where radio contact with the base cannot be established. Ideally, each site should have pavement for parking vehicles or the soil should be capable of supporting fully loaded, wheeled vehicles during inclement weather. Provide adequate security for sites with mission-critical or high-value assets. Examples of possible dispersal locations to consider are discussed in the following paragraphs.

8.2.3.1. **Aircraft Hangars.** Under certain conditions (e.g., hurricane evacuation or aircraft unit deployment) base aircraft are relocated to other installations. At such times, vacant hangers may be used for dispersing high-valued equipment for protection. If hangar doors are electrically operated, ensure there are alternative means to open them during power outages. ***Be aware that hangars may be a target during wartime***.

8.2.3.2. **Munitions Storage Areas.** Some installations have abandoned or unused munitions storage facilities that are ideal dispersal points for resources. These structures are usually hardened and provide substantial protection from the destructive effects of a major disaster. Special arrangements

may have to be made if hardened structures interfere with radio communications. In peacetime, munitions bunkers can shield vehicles and equipment from the effects of high winds if vehicles and equipment are placed close enough to the structures.

8.2.3.3. **Base Housing.** When hostilities are expected in overseas areas, military dependents will be relocated stateside, time permitting. Vacant base housing units can then be used as dispersal areas for personnel, as well as beddown facilities for incoming forces.

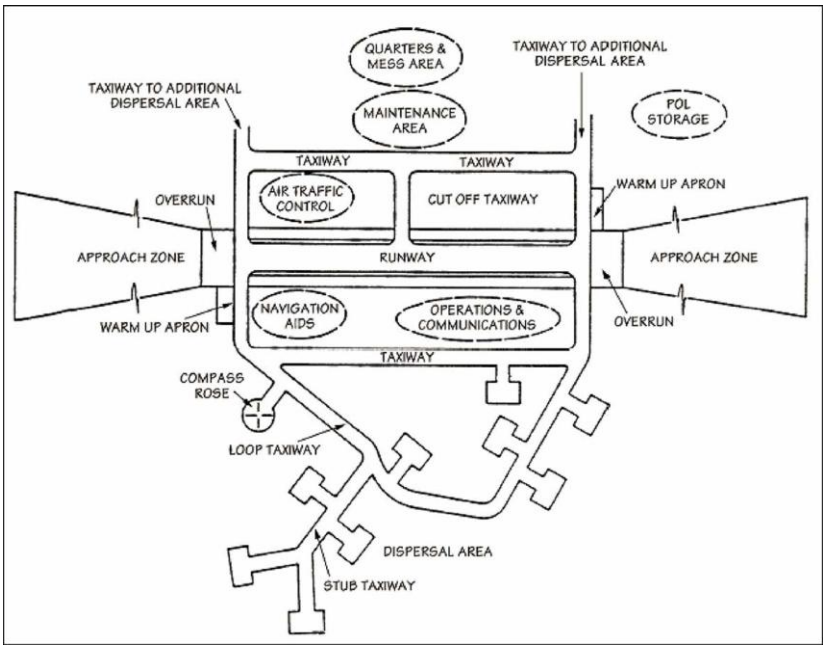
8.2.3.4. **Off-Base Warehouses and Storage Facilities.** Depending on the location, civilian warehouses or other storage facilities near the installation may be rented as temporary dispersal locations during an emergency. Railheads and port facilities in the vicinity of the installation make good dispersal facilities, but they may also be targets.

8.2.3.5. **Recreation Halls/Gymnasiums.** Large base structures such as recreation halls and gymnasiums may be used during emergencies as temporary dispersal points or emergency shelters for personnel. Facilities of this type should be evaluated carefully to ensure that they provide adequate protection from the anticipated threat.

8.2.4. **Dispersed Base Layout and Pattern.** **Figure 8.2.** shows a conceptual base layout and dispersal pattern. Base planners should consider these concepts when siting facilities or selecting dispersal sites. See AFPAM10-219, Volume 5, *Bare Base Conceptual Planning Guide*, for facility group and individual facility dispersal distances.

8.2.4.1. **Aircraft.** When aircraft are not sheltered or revetted, random dispersal of parked aircraft increases their survivability during an attack. When attacked by aircraft dropping general purpose bombs, the survivability rate increases from two to four times when aircraft, usually parked at 50-foot separations, are dispersed to irregular parking with minimum separations of 300 feet. An aircraft dispersal plan should consider operational requirements, maintenance, installation security, existing parking areas, and the availability of real estate for additional aircraft parking.

Figure 8.2. Dispersed Base Layout.



8.2.4.2. **Generators.** Base power generating plants should be located in at least two separate areas. Even though centrally located high voltage generators offer the most advantageous primary distribution system, they should be dispersed in a high threat area (separated by distances of 1,500 and 3,000 feet) between prime and slave power plant locations to improve survivability. Multiple power plants and primary distribution loops that interconnect these plants are especially critical in high threat locations. If a power plant becomes inoperative for any reason, the electrical grid can be energized from the remaining power plant(s). Where there are several individual generators at each location, they should be positioned with adequate separation or each unit hardened to provide maximum survivability.

8.2.4.3. **Munitions.** Accidental or deliberate detonation of stored munitions is reduced by maximum separation between explosives and other resources. Explosives should be dispersed into small compatible groups. Ammunition should not be located near an installation perimeter where exposed ammunition could easily be damaged by small arms fire. Consider splitting key storage or other munitions operations into sub-operations.

8.2.4.4. **Petroleum, Oils, and Lubricants (POL).** Petroleum products should not be stored near the perimeter of an area where small arms may damage storage containers.

8.2.4.5. **Vehicles and Heavy Equipment.** Motor vehicles should not be pooled. Parking motor vehicles under or beside trees, next to earthen embankments, or behind buildings (**Figure 8.3.**) provides partial concealment as well as dispersal. The "harder" the structure—the better, unless it is likely to be targeted by the enemy.

Figure 8.3. Dispersing Key Equipment Behind Buildings.

8.2.4.6. **Fire Protection Equipment.** Develop a dispersal plan for fire protection equipment and materials so that a firefighting capability remains intact after an attack or disaster.

8.2.5. **Determine Who and What Goes to Each Dispersal Site.** When deciding where to disperse specific assets or functions, consider factors such as

resource priority, distance to dispersal sites, mobility challenges, and how much advance warning is likely. Split capabilities and do not cluster vital assets. Do not concentrate personnel with the same specialty in one spot. Likewise, do not put all equipment, vehicles, and response teams of the same type in one place. If possible, keep dispersed personnel within easy walking distance of their equipment; this improves the success of the dispersal. Airfield damage repair (ADR) equipment and materials should be dispersed to at least three separate sites. When selecting dispersed shelters for damage assessment response teams (DARTs), ensure each team is able to maintain communications with the unit control center (UCC) either by land line or radio. Maintain team integrity of DARTs; however, do not place more than one team in the same dispersed location. This action provides a degree of redundancy in the event one or more of the shelters is hit. If there is a choice of shelters for the DARTs, choose shelters that are closest to the UCC. This eases the reassembly of the teams and subsequent flow of information to the teams from the UCC. Be careful not to overload a dispersal site.

8.2.6. **Arrange for Support Needed at Each Site.** Selected services, facilities, utilities, and communications may be required at dispersal sites under certain circumstances. However, planners should attempt to minimize the amount of centralized support required at each site; none is the ideal. Units and individuals should provide their own support whenever possible. Each person can carry his or her own sleeping bag, food, water, and cold weather gear. Work details can be formed from each dispersed unit to provide services such as obtaining water, digging latrines, erecting tents, removing refuse, and operating the contamination control area (CCA). Identify and consider resources normally available at the site or in the nearby area. Provide only limited support in the short term—enough for survival. Increase support as the duration of the dispersal increases. Each installation must determine its own priorities for providing this support. As a minimum, consider the following items and provide for them in dispersal plans.

8.2.6.1. **Shelters or Tents.** Personnel can sleep in or under vehicles for a day or two if required. Facilities may be required to shelter personnel from the elements, especially if personnel must disperse frequently or for extended periods. Units may transport and erect their own tents, if available.

8.2.6.2. **Sleeping Bags, Blankets, and Cots.** Individuals should carry their own sleeping bags; blankets can substitute for sleeping bags. If not already issued when the dispersal order is given, make arrangements to have these items pulled from unit mobility gear storage area, or base supply, and delivered to the dispersal site. This especially applies when dispersing during cold weather or for long durations. Cots are a nice-to-have item for frequent or long-term dispersals.

8.2.6.3. **Food.** Individuals should carry enough Meals, Ready to Eat (MREs) to last a couple of days; if necessary, units can carry more MREs for longer periods. Explore food service options with food services if dispersing for more than seven days.

8.2.6.4. **Water.** Individuals should disperse with enough water supply to last at least two days if water is not available at the dispersal site. If water is not available, make arrangements for delivery after two days. Treating a nearby water source is an option if equipment is available.

8.2.6.5. **Electrical Power.** Arrange for generator power and limited distribution for the few dispersed functions that may need power.

8.2.6.6. **Fuel Storage and Dispensing (Vehicle and Heating Fuels).** If the dispersal site is not near the installation, some capability to refuel vehicles and provide heating fuels may be necessary. A small refueling truck from base supply is one option. That same truck could also be used to provide fuel to expedient storage and dispensing points at more than one dispersal site. Bladders, and even 55-gallon drums, can be used to store or transport fuel. Even at dispersal sites, fuels must be stored away from shelters and other resources to minimize the explosive hazard.

8.2.6.7. **Sanitation (Latrines and Refuse Collection).** Each site must provide a way to collect and dispose of human and solid waste to prevent a public health problem. Expedient latrines are sufficient for human waste. Generally, a refuse pit periodically covered with a layer of soil is sufficient for solid waste. Emergency contracting for portable latrines and dumpsters may be an option. If so, include those plans in the CE CRP.

8.2.6.8. **Vehicle Maintenance.** If necessary, request that the transportation squadron provide a maintenance capability at the dispersal site, or place a mobile maintenance truck on standby. Do not forget to make spare parts available for key equipment. If maintenance and repair procedures are unique, consider taking maintenance technical orders for special equipment.

8.2.6.9. **Communications with Dispersed Forces.** Skilled personnel, critical equipment, and valuable materials are not normally dispersed to an area and left to operate on their own. To effectively use these forces, command personnel must maintain communications with dispersal sites. Dispersed forces must be kept informed of conditions at the base and kept ready to respond. If a dispersal site is permanently established, consider installing a land line telephone or making cellular phones available to stay in contact with the base. At sites where a telephone connection is not feasible or when telephones are inoperative, a radio network can be used. Other communications measures that may be employed include runners, signal flags, and signal lights. Any communication method used is appropriate so long as the message received is the same as the one sent. If signals are used, their meanings must be prearranged and simple. If necessary, use intermediate locations to relay messages; another dispersal site that is closer to the main base could serve this function. When making plans, the base must decide who maintains contact with the dispersed forces: the installation control center (ICC), the emergency operations center (EOC), or UCC for their own personnel. For multiple on-base sites, UCCs can generally perform a better job. At off-base sites with multiple organizations, the ICC or the EOC may elect to maintain communications and provide direction.

8.2.6.10. **Transportation.** Determine how personnel, vehicles, and equipment will be moved. This can be a unit responsibility, a consolidated base effort, or a combination. For extended dispersals prior to hostilities, units may use their own vehicles to transport personnel and equipment as required. Base shuttles may be set up to run scheduled routes for long-term dispersals.

8.2.6.11. **Contamination Control Area (CCA) Operations.** In a CBRN environment, dispersal sites should be in toxic-free areas if possible. To process personnel, vehicles, and equipment into and out of the dispersal site, a contamination control area and a vehicle/equipment decontamination sta-

tion must be set up, manned, and operated. The responsibility for these tasks can be assigned to one unit permanently, to all units on a rotation, or to CCA teams formed by detailing individuals from the different units at the site. For around-the-clock operations, at least two—preferably three—CCA teams are required. Decide who will set up the CCA and who will supervise the CCA teams. See **AFMAN 32-4005, *Personnel Protection and Attack Actions***, (until rescinded by AFMAN 10-2502 Series publications) for tips on CCA set up. Plans should specify who will obtain, store, and maintain CCA equipment and materials.

8.2.6.12. **Security.** At on-base sites, units should expect to provide security for their own assets. This does not mean the assets have to be guarded on a full-time basis; each installation and situation is different. Civil engineers should work out details with the security forces. When off base at overseas locations, additional security is required. Depending upon the location, the civilian countryside surrounding an overseas airbase may be relatively peaceful or extremely hostile. Even during peacetime dispersals, security remains an important consideration. Resources available from base security forces, US Army units, or host nation security forces determine the level of protection available to dispersed assets. Civil engineers and other units at the dispersal site may be called upon to assist security forces.

8.2.7. **Develop Base and Unit Dispersal Plans.** The base plan (CEMP 10-2) provides the big picture, such as what units disperse and where. The unit dispersal plans (CE CRP) identify what specific resources and which personnel disperse and how dispersal is accomplished.

8.2.7.1. **Base Dispersal.** The base dispersal plan should detail which units disperse, where each goes, under what conditions dispersal will be necessary, the priority of the resources, who provides what support, and the command and control structure. When more than one unit is dispersed to the same location, the plan may outline which part of the site each unit occupies. However, do not expect this level of detail very often. The plan should clearly outline the command and control structure, especially for off-base sites, to control the initial chaos and to direct site operations during extended stays. It is reasonable to expect that the senior ranking person will be in charge. The plan could also designate a lead unit and the senior person of that unit to be

in charge. Civil engineers should be prepared to offer recommendations to the senior leader with regard to "facility" siting, utilities, sanitation, hardening, and CCA operations. Do not discuss locations of off-base wartime dispersal sites. Keeping them a secret may be impossible, but do not draw attention to them. Have enough alternate sites established so you can keep an enemy guessing where the actual dispersal site is located. When dispersal plans are exercised, alternate deployments between each site to avoid tipping off which site is favored among all locations. If dispersal plans are to another installation or location far from the home base, convoys or other mass transportation efforts will have to be planned.

8.2.7.2. **Unit Dispersal.** The unit plan provides the specifics. It should identify personnel, equipment, and vehicles to disperse, in what priority order, and to what location. Specify who moves which vehicles and equipment items, and designate where repair materials will be located. The methods of dispersal are generally determined by the distance to the dispersal site. Powered equipment may be driven to dispersal sites on base; other equipment may be transported by truck or similar vehicle, or personnel may physically carry smaller pieces of equipment and materials. To the greatest extent possible, disperse resources by teams.

8.2.7.2.1. Create dispersal checklists and load plans. The checklists should include items such as obtaining food, water, sleeping bags, chemical warfare ensembles, tents, camouflage netting, hand tools, shovels, picks, sandbags, extra consumables (oil, grease, hydraulic fluid, air filters, etc.), and vehicle servicing supplies (fuel, engine oil, air in tires, jacks, spare tires, etc.). The load plans should identify what items are to be loaded on each vehicle. Load plans minimize confusion and ensure the most important assets are moved first.

8.2.7.2.2. If possible, inspect designated dispersal sites in advance. Determine what site improvements are required before and after dispersal. Decide what support items should be taken and estimate how much.

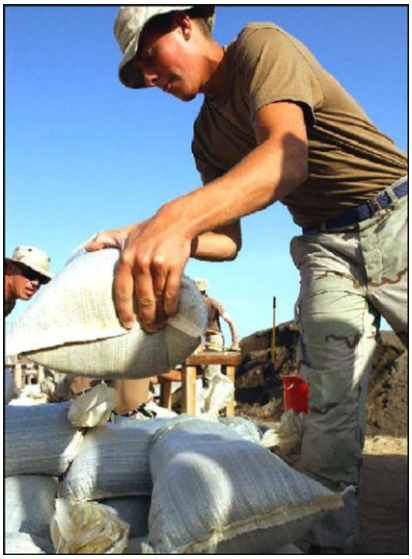
8.2.7.2.3. Perform operational checks and service equipment before dispersal. To save time later, load vehicles with repair materials likely needed early on during base recovery.

8.2.7.2.4. When preparing for enemy attack, disperse at night, if possible. This concealment is especially important in the desert where dust from moving vehicles can reveal activity and your position. Be sure to cover vehicle tracks to and from a dispersal area.

8.2.7.2.5. Use natural and man-made features to hide dispersed assets. Park vehicles close to buildings and in shadows. Do not position assets in open areas or in straight lines where a single bomb or strafing run can destroy numerous assets. Attempt to position priority vehicles where they are easily accessible. Position assets to allow observation of personnel and equipment on either side of them.

8.2.8. **Enhancing Dispersal Sites.** This is the last step. With proper site selection and limited site support, advance preparations can be eliminated or minimized. However, units can make good use of their time after dispersal by improving such things as shelters, facility hardening, and fighting positions at their dispersal sites (**Figure 8.4.**).

Figure 8.4. Airmen Use Sandbags to Enhance Shelter Survivability.



8.3. Hasty Planning and Preparations. Ideally, dispersal planning is accomplished during the leisure of peacetime, but not every contingency can be foreseen. If the unit only has time for hasty planning, the common sense steps outlined above still apply. Just do not labor over the options. Quickly decide which of your resources are most important to protect and go with the most obvious. From personal knowledge of the installation and the surrounding area, determine which sites are best for dispersal. Decide how to move the resources and who will do it. Determine what communication methods will be used to keep all unit personnel informed, and ensure all personnel understand how this is to be accomplished when dispatched. Ideally, each vehicle group traveling between the installation and a dispersal site should have at least one working radio.

8.4. CE Dispersal in Continental US (CONUS). The primary purpose of dispersal in CONUS is to escape the destruction of natural disasters and to get personnel and priority assets out of harm's way. Some installations may support a survival, recovery, and reconstitution (SRR) plan which calls for dispersal.

8.4.1. **On-Base Dispersal.** When establishing CONUS on-base dispersal sites, resources should be identified for pre-positioning to save time during dispersal. Materials that have extended shelf lives, such as sand, gravel, and other building items, are suitable candidates for pre-positioning at dispersal sites. A fuel storage facility at dispersal locations ensures continued operation of dispersed vehicles if primary fuel storage facilities are damaged or destroyed. If personnel are dispersed for an extended period of time, utilities, billeting, and food service will be required.

8.4.2. **Dispersal to Other Military Installations.** If the civil engineer unit is required to disperse resources to another installation during an emergency, numerous details must be considered. Transportation arrangements are a primary concern. When reasonable distances are involved, a truck convoy may constitute the best method. Qualified personnel should supervise the loading and movement of the convoy. Seemingly insignificant details overlooked during transportation planning have a tendency to become large problems during convoy movements. During disasters, as in war, transportation routes tend to become overloaded with military and civilian traffic. Sound

convoy procedures should be followed. Close coordination with the receiving installation is essential. The BCE should appoint an experienced person to coordinate billeting and food service support upon arrival at the final destination. Communications capabilities should also be assessed to ensure that contact can be maintained with the dispersing force throughout the movement and subsequent stay at the dispersal site.

8.4.3. **Dispersal to Civilian Locations.** If a situation arises where dispersal to civilian locations becomes necessary under peacetime conditions, the Base Civil Engineer (BCE) must ensure that close coordination is established with local property owners and civilian government officials. Approval of the property owner must be obtained, and civil engineer personnel must carefully document any property damage that occurs as a result of the dispersal. This documentation greatly facilitates the handling of any claims for reimbursement following the dispersal. If civilian dispersal locations are a reasonable alternative for a CONUS BCE during a peacetime emergency, consider negotiating prior use or rental agreements with civilian property owners or local community officials. Dispersal to civilian locations should only be done after careful consideration of on-base and other military base alternatives.

8.5. CE Dispersal Outside the Continental United States (OCONUS). Dispersal as a means of resource protection overseas is accomplished for many of the same reasons as in the CONUS. In addition, consider dispersal as a means of protecting resources from chemical, biological, radiological, nuclear, and high yield explosives (CBRNE) attacks. Forces OCONUS might be dispersed to a remote location on base, to a collocated operating base (COB), or to a civilian location.

8.5.1. **On-Base Dispersal Locations.** Engineers overseas, like their CONUS counterparts, should select locations on the main base which provide optimum protection against any foreseeable disaster. An area of difference is protection against CBRNE attacks. The overseas air base is more vulnerable to a CBRNE attack than a CONUS location; therefore, emphasis should be given to selecting multiple dispersal sites removed from the likely target areas of the installation. Dispersal locations removed from prime air base target areas (such as runways, command and control centers, POL facilities,

and munitions storage areas) contribute to the preservation of resources during an attack. Once these sites have been identified, develop physical protection methods for each location as further resource protection. Fire Emergency Services (FES) should be located in close proximity to the operational infrastructure and should be given special consideration for dispersal locations, concealment, and physical protection.

8.5.2. **COB Dispersal Locations.** A COB is an allied installation that can be used to beddown augmenting forces. Close coordination with the host installation agencies is a primary requirement during any dispersal to a COB. An important aspect of dispersal to a COB is the cultural, procedural, and language differences that civil engineer personnel must overcome.

8.5.3. **Dispersal to Civilian Locations.** Dispersal to a civilian location in an overseas environment is much more complicated than it would be in a CONUS area. The laws of each country differ, and there may be no existing status-of-forces agreements for obtaining rights to use local property as a dispersal site. Again, the base must evaluate needs and determine if off-base dispersal sites would serve a useful purpose. If these sites are determined to be necessary, discuss the possibility of negotiated agreements with the base legal staff, your MAJCOM, and representatives of the host government. Negotiations with foreign property owners are best left to members of the host government.

8.6. **Summary.** Temporary dispersal is a relatively inexpensive and expedient method to protect important installation assets from the effects of disasters and enemy attack, but some advance warning is required to mobilize personnel and assets. The value of wartime dispersal can be improved by employing supplemental protection and hardening measures.

Chapter 9

INFORMATION COLLECTION, RECORDS, AND FORMS

9.1. Information Collections. No information collections are created by this publication.

9.2. Records. The program records created as a result of the processes prescribed in this publication are maintained in accordance with **AFMAN 33-363** and disposed of in accordance with the Air Force RDS located at https://www.my.af.mil/afrims/afrims/afrims/rims.cfm.

9.3. Forms (Adopted and Prescribed).

9.3.1. Adopted Forms: **AF Form 847, *Recommendation for Change of Publication***.

9.3.2. Prescribed Forms. No prescribed forms are implemented in this publication.

HERBERT J. CARLISLE, Lt General, USAF
DCS/Operations, Plans, and Requirements (A3/5)

Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

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Abbreviations and Acronyms

ABU—Airman Battle Uniform

ADR—airfield damage repair

AFOSI—Air Force Office of Special Investigations

AFRIMS—Air Force Records Information Management System

AO—area of operation

AT—Antiterrorism

BCE—Base Civil Engineer

C2—command and control

CBRN—chemical, biological, radiological, and nuclear

CBRNE—chemical, biological, radiological, nuclear, and high yield explosives

CCA—contamination control area

CCD—camouflage, concealment, and deception

CEMP—Comprehensive Emergency Management Plan

COB—collocated operating base

COMSEC—communications security

CONUS—Continental United States

CP—command post

CSS—combat service support

DART—damage assessment and repair team

DISO—deception in support of OPSEC

EM—electromagnetic

EM spectrum—electromagnetic spectrum

EOC—Emergency Operations Center

ESP—Expeditionary Site Plan

FARP—forward arming and refueling point

FES—Fire Emergency Services

FLIRS—Forward-Looking Infrared System

FM—field manual

FOD—foreign object damage

FOS—false operating surfaces

gal—gallon

GI—government issue

GSU—geographically separated unit

HQ—headquarters

HVT—high-value target

IBD—integrated base defense

ICC—Installation Control Center

IGESP—In-garrison Expeditionary Site Plan

IPB—intelligence preparation of the battlefield

IR—infrared

LCSS—Lightweight Camouflage Screen System

LLTV—low-light television

LOC—lines of communication

LOS—line of sight

MAJCOM—Major Command

MDO—Military Deception Officer

MDNCO—Military Deception NCO

METT-TC—mission, enemy, terrain, weather, troops, time available, and civilian considerations

MHz—megahertz

MILDEC—military deception

MRE—meals ready to eat

MTI—moving target indicator

NCO—noncommissioned officer

NIR—near infrared

NSN—national stock number

NVD—night-vision device

OCONUS—outside the Continental United States

OPSEC—operations security

POL—petroleum, oils, and lubricants

RAM—radar-absorbing material

RAP—radar absorbing paint

RATELO—radiotelephone operator

RCS—radar cross section

RDS—Records Disposition Schedule

Recon—reconnaissance

RSTA—reconnaissance, surveillance, and target acquisition

SCSPP—standard camouflage screening paint pattern

SF—Security Forces

SOP—standing operating procedure

SRR—survival, recovery, and reconstitution

Tac-D—tactical deception

TV—television

TWG—Threat Working Group

UAV—unmanned aerial vehicle

UCC—Unit Control Center

US—United States

UV—ultraviolet

VHF—very high frequency

WSA—weapons storage area

Terms

Blending—A CCD technique that causes a target to appear as part of the background. Many target characteristics must be considered when attempting a blending treatment, including target size and shape, regular patterns in the target scene, and rough or smooth target contours.

Camouflage net—Part of a system designed to blend a target with its surroundings and conceal the identity of critical assets (aircraft, fixed targets, vehicles, personnel) where natural cover and/or concealment might be absent or inadequate.

Camouflage net spreader—A plastic or aluminum disc or paddle that is supported by a lightweight pole and used to support camouflage nets above the ground, buildings, or vehicles.

camouflage, concealment, and decoys—Methods and resources to prevent adversary observation or surveillance; confuse, mislead, or evade the adversary; or induce the adversary to act in a manner prejudicial to his interests.

CCD treatment—A combination of CCD equipment and techniques applied to a selected target and/or its background to reduce or delay target acquisition.

Countermeasure—Any technique intended to confuse or mislead hostile sensors.

Concealment—The protection from observation or surveillance

Corner reflector—An object that reflects multiple signals from smooth surfaces mounted mutually perpendicular and produces a radar return of greater magnitude than expected from the size of the object the reflector conceals.

Cover—Any natural or artificial protection from enemy observation and fire.

Deceive—Any action that causes the enemy to believe the false or purposely causes the enemy to make incorrect conclusions based on false evidence.

Deception—Those measures designed to mislead the enemy by manipulation, distortion, or falsification of evidence, inducing him to react in a manner prejudicial to his interests.

Deception in support of Operations Security—A military deception activity that protects friendly operations, personnel, programs, equipment, and other assets from foreign intelligence security services (FISS) collection. **Decoy**—An imitation in any sense of a person, an object, or a phenomenon that is intended to deceive enemy surveillance devices or mislead enemy evaluation. (DISO).

Defilade—Protection or shielding from hostile ground observation and flat projecting fire provided by an artificial or natural obstacle, as a hill.

Detection—The discovery of an existence or presence

Disguise—Any alteration of identity cues for items, signals, or systems sufficient to cause misidentification by the enemy.

Dispersal—Relocation of forces for the purpose of increasing survivability

Disrupt—Any action intended to interrupt the shape or outline of an object or an individual, making it less recognizable.

electromagnetic spectrum—The range of frequencies from zero to infinity where energy is transferred by electric and magnetic waves. EM waves at the lower end of this spectrum (low-frequency navigation aids and AM and shortwave radio services) are refracted back to earth by the ionosphere to frequencies as high as 50 MHz. At frequencies above 50 MHz, propagation is generally limited to LOS. These frequencies are used by TV, FM radio, and land-mobile and point-to-point communication services. They extend on to parts of the EM spectrum generally termed as radar, IR, visible light, UV light, and cosmic rays.

Forward-Looking Infrared System—An imaging IR sensor used to acquire a target's heat signature.

Hardening—The construction of a facility to provide protection against the effects of conventional or nuclear explosions. The facility may also be equipped to provide protection against chemical or biological attacks. Construction usually involves reinforced concrete placement and/or burying the structure.

Hiding—The choice of a position or materials to obstruct direct observation

Hyperspectral—Refers to a sensor or data with many bands extending over a range of the EM spectrum.

Imaging radar—An electronic or optical process for recording or displaying a scene generated by a radar sensor.

intelligence preparation of the battlefield—A systematic approach to analyzing the enemy, weather, and terrain in a specific geographic area. It integrates enemy doctrine with the weather and terrain conditions as they relate

to the mission and the specific battlefield environment. IPB provides the framework for determining and evaluating enemy capabilities, vulnerabilities, and probable courses of action.

Joint Military Deception—Joint MILDEC is planned and conducted in a theater of operations to support military campaigns and major military operations. Joint MILDEC activities are planned and executed by, and in support of, Combatant Commanders, Joint Force Commanders, and Joint Task Force Commanders to cause adversaries to take actions that are favorable to the US commander's objectives. The majority of combatant command planned and executed MILDEC will be Join MILDEC with operational-level effects. Join MILDEC is normally planned prior to, and conducted during, combat operations. (Joint MILDEC)

Low emissivity paint—Paint used to lower the apparent temperature of a target (or nearby scene features), thus making the *hot* target less conspicuous to a thermal target-acquisition sensor. Using a paint that has too low an emissivity (less than 0.6) causes the target to become more visually conspicuous (or shiny).

military deception—Military deception are actions executed to deliberately mislead adversary military, paramilitary, or violent extremist organizations decision makers, thereby causing the adversary to take specific actions (or inactions) that will contribute to the accomplishment of the friendly mission (MILDEC).

Movement techniques—The methods used by a unit to travel from one point to another (traveling, traveling overwatch, and bounding overwatch) are considered movement techniques. The likelihood of enemy contact determines which technique is used.

Multispectral—Refers to a sensor or data in two or more regions of the EM spectrum.

operations security—The process of denying adversaries information about friendly capabilities and intentions by identifying, controlling, and protecting signatures associated with planning for and conducting military operations

and other activities. It includes countersurveillance and physical, signal, and information security.

Radar—A device that uses EM waves to provide information on the range, the azimuth, or the elevation of objects.

Radio direction-finding—The act of determining the azimuth to a radio transmitter, from a specific location, using signal-detecting equipment.

radar-absorbing material—Material that absorbs and dissipates incident radar energy as contrasted to radar-scattering material, which reflects the incident energy in a different direction.

radar cross section—The size of a conducting square, metal plate that would return the same signal to a radar sensor as a target, provided that the radar energy received at the target is reradiated equally in all directions.

Reconnaissance—An exploratory survey of a particular area or airspace by visual, aural, electronic, photographic, IR, or other means. It may imply a physical visit to the area.

Redundancy—The use of multiple systems with similar perceived functional capabilities to provide higher system survivability.

Reverse-slope—A position on the ground that is not exposed to direct fire or observation; for example, a slope that descends away from the enemy.

Revetment—A barrier used to protect assets against attack.

Signature—Detectable indications that forces are occupying or operating in an area. Signatures can be EM (visible, IR, NIR, radar) or mechanical (acoustic, seismic). Common detectable EM signatures include visible vehicle tracks, thermal flames, and radar signal returns. Common mechanical signatures include radio noise, humans conversing, and seismic ground waves produced by tanks and heavy vehicles.

Smoke screen—Smoke generated to deceive or confuse an enemy as to the activities of tactical elements.

Surveillance—A systematic observation of airspace or surface areas by visual, aural, electronic, photographic, IR, or other means.

Tactical Deception—MILDEC planned to support battles and engagements. Tactical MILDEC activities are planned and executed by, and in support of, tactical-level commanders to cause foreign entity actions that are favorable to the U.S. commanders' objectives. Tactical MILDEC is conducted to influence immediate combat operations in order to gain a temporary tactical advantage over and adversary, to mask vulnerabilities in friendly forces, or to enhance the defensive capabilities of friendly forces. Tactical MILDEC is usually "nested" with other operations as part of the combatant command's join MILDCE plan. (Tac-D)

Target acquisition—The process involving the detection and identification of hostile operations and equipment for subsequent engagement.

Target scene—The view of a target area that includes both the target and its surroundings.

Terrain mottling—A camouflage technique normally used in desert terrain. It involves scarring the earth with heavy equipment to expose patches of bare ground. Equipment and supplies are placed on the bare patches to avoid detection by aerial reconnaissance.

Thermal contrast—The difference in radiance (as usually measured in the 8-to-14 micron band) between two features of a scene; for example, a target and its background.

Tone down—The process of blending a target or other high-value asset with the background by reducing its brightness characteristics using nets or coatings. The recommended reflectance of a target as compared with the surrounding scene is 10 percent or less.

Wadis—The channel of a watercourse that is dry except during periods of rainfall

Attachment 2

SAMPLE CCD INSPECTION CHECKLIST

CCD INSPECTION CHECKLIST

1. Command Emphasis.

a. The commander—

_____ (1) Establishes CCD goals.

_____ (2) Executes CCD plans.

_____ (3) Inspects frequently for CCD deficiencies.

_____ (4) Conducts follow-up inspection of CCD deficiencies.

_____ (5) Integrates CCD into training exercises.

b. The unit—

_____ (1) Integrates CCD into its SOPs.

_____ (2) Follows the SOPs.

2. Discipline.

a. The unit—

_____ (1) Observes noise discipline.

_____ (2) Observes light discipline (smoking, fires, and lights).

_____ (3) Conceals highly visible equipment.

_____ (4) Covers shiny surfaces.

_____ (5) Keeps exposed activity to a minimum.

_____ (6) Uses cut vegetation properly.

_____ (7) Uses and conceals dismount points properly.

b. Airmen—

_____ (1) Wear the correct uniform.

_____ (2) Control litter and spoil.

CCD INSPECTION CHECKLIST

3. Techniques. The unit—

_____ a. Places and disperses vehicles and equipment.

_____ b. Disperses the CP.

_____ c. Employs camouflage nets (LCSS)

_____ d. Uses (or minimizes) shadows.

_____ e. Minimizes movement.

_____ f. Hides operations and equipment.

_____ g. Blends operations and equipment with backgrounds.

_____ h. Employs pattern-painting techniques.

_____ i. Employs decoys.

_____ j. Integrates smoke operations with unit movement.

k. Practices individual CCD on—

_____ (1) Helmet.

_____ (2) Face.

_____ (3) Weapon.

_____ (4) Other Equipment.

l. Employs CCD on fighting positions by—

_____ (1) Eliminating or minimizing target silhouettes.

_____ (2) Practicing spoil control.

_____ (3) Eliminating or minimizing regular or geometric shapes and layouts.

_____ (4) Maintaining overhead concealment.

_____ (5) Practicing dust control.

m. Employs CCD on tactical vehicles by—

_____ (1) Minimizing and concealing track marks.

_____ (2) Minimizing or eliminating the shine on vehicles and equipment.

CCD INSPECTION CHECKLIST

_____ (3) Reducing or using shadows to the unit's advantage.
_____ (4) Employing camouflage nets (LCSS).
_____ (5) Painting vehicles to match their surroundings.
_____ (6) Dispersing vehicles and equipment.
_____ (7) Concealing vehicles and supply routes.
_____ (8) Controlling litter and spoil.
_____ (9) Storing and concealing ammunition.

n. Employs CCD on assembly areas by—

_____ (1) Facilitating mission planning for access and egress concealment.
_____ (2) Marking guideposts for route junctions.
_____ (3) Ensuring that turn-ins are not widened by improper use.
_____ (4) Dispersing dismount, mess, and maintenance areas.
_____ (5) Dispersing the CP.
(6) Maintaining CCD by—
_____ (a) Inspecting CCD frequently.
_____ (b) Controlling litter and garbage.
_____ (c) Observing blackout procedures.
(7) Observing evaluation procedures by—
_____ (a) Policing the area
_____ (b) Covering or eliminating tracks.
_____ (c) Preventing traffic congestion.
_____ (d) Concealing spoil.

o. Employs CCD on the CP by—

_____ (1) Ensuring that LOC are not converged.
_____ (2) Dispersing vehicles.

CCD INSPECTION CHECKLIST

_____ (3) Ensuring turn-ins are not widened through improper use.
_____ (4) Ensuring that protective barriers follow terrain features.
_____ (5) Concealing defensive weapons.
_____ (6) Ensuring that existing utility poles are used for LOC.
_____ (7) Maintaining camouflage nets (LCSS).
(8) Using civilian buildings properly by—
_____ (a) Controlling access and egress.
_____ (b) Observing blackout procedures.
_____ (c) Avoiding obvious locations.
p. Employs CCD on supply points by—
_____ (1) Dispersing operations.
_____ (2) Concealing access and egress routes.
_____ (3) Using the vehicle track plan.
_____ (4) Providing concealed loading areas.
_____ (5) Developing and implementing a schedule for the units being serviced.
q. Employs CCD on water points by—
_____ (1) Concealing access and egress routes.
_____ (2) Ensuring that the vehicle track plan is used.
_____ (3) Controlling spillage.
_____ (4) Controlling shine and reflections.
_____ (5) Developing and implementing a schedule for the units being serviced.

Attachment 3

LIGHTWEIGHT CAMOUFLAGE SCREEN SYSTEM

A3.1. Overview. This attachment provides information on the LCSS and describes how to erect it. The LCSS includes six screen systems and two support systems. The screen systems covered and the support systems used for each are identified in **Table A3.1**.

Table A3.1. LCSS Systems.

Screen System	*Support System*
Desert, Lightweight, Radar Scattering (NSN 1080-00-103-1211)	Woodland/Desert (NSN 1080-00-108-1173)
Desert, Lightweight, Radar Transparent (NSN 1080-00-103-1217)	
Woodland, Lightweight, Radar Scattering (NSN 1080-00-103.-1246)	
Woodland, Lightweight, Radar Transparent (NSN 1080-00-103.-1322)	
Snow, Lightweight, Radar Scattering (NSN 1080-00-103-1233)	Snow (NSN 1080-00-556-4954)
Snow, Lightweight, Radar Transparent (NSN 1080-00-103-1234)	

A3.1.1. The LCSS is a modular system consisting of a hexagon-shaped screen, a diamond-shaped screen, a support system, and a repair kit. You can join any number of screens to cover a designated target or area (**Figure A3.1.**). The screens are fastened together by a quick connect/disconnect system to facilitate joining or separating the screens. Use **Figure A3.2.** to determine the number of modules needed for camouflaging a given area.

A3.1.2. The woodland and snow screens come in seasonal patterns; one side of the screen has spring/summer pattern and the other side has a fall/winter pattern. The desert screen has arid and semi-arid sides.

A3.1.3. Erection, striking, and repair procedures are the same for all systems.

Figure A3.1. LCSS Modular System.

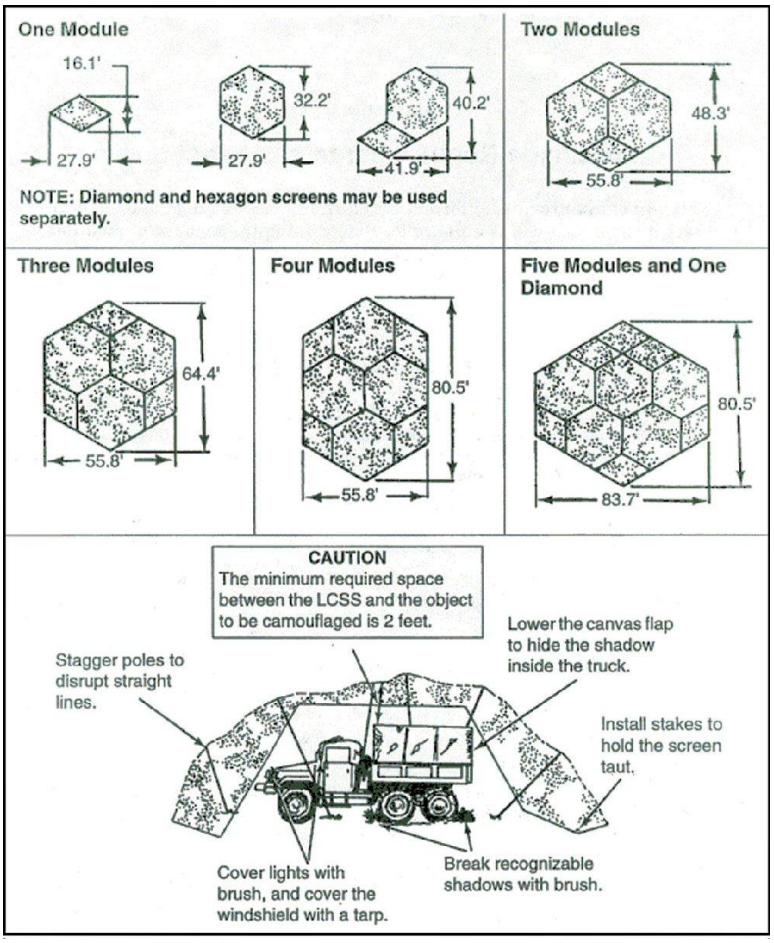
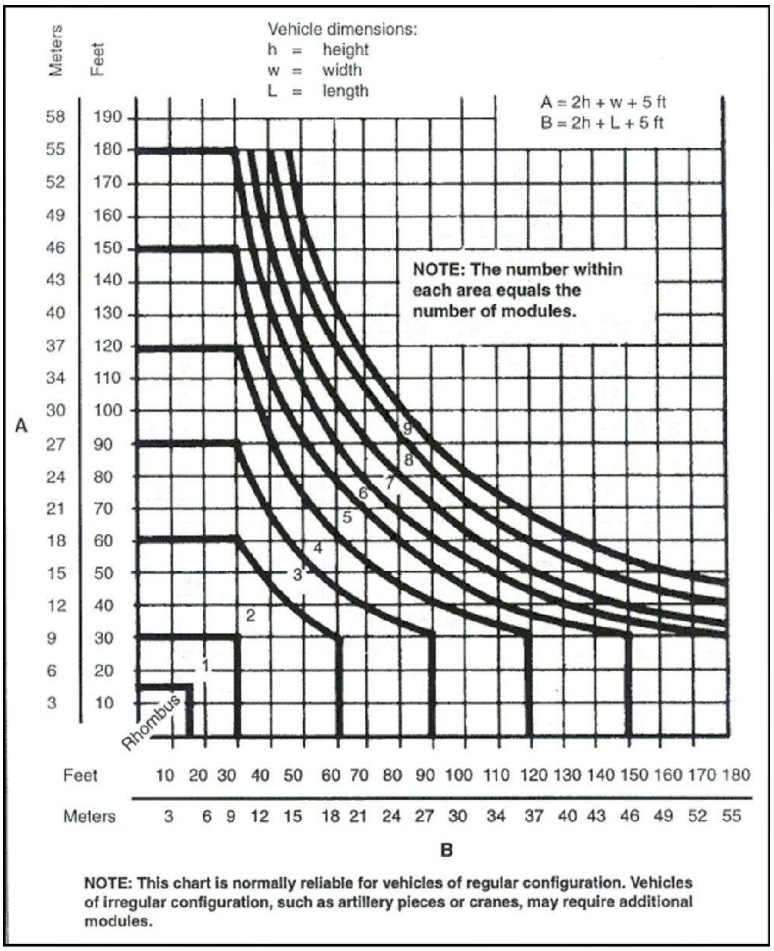


Figure A3.2. Module Determination Chart.



A3.2. Capabilities. The LCSS protects targets in four different ways:

A3.2.1. Casts patterned shadows that break up the characteristic outlines of a target.

A3.2.2. Scatters radar returns (except when radar-transparent nets are used).

A3.2.3. Traps target heat and allows it to disperse.

A3.2.4. Simulates color and shadow patterns that are commonly found in a particular region.

A3.3. Supplemental Camouflage. Camouflage nets are often employed in conjunction with supplemental camouflage because nets alone do not make a target invisible to a threat's multispectral sensors. Use other CCD techniques to achieve effective concealment. Cover or remove all of the target's reflective surfaces (mirrors, windshields, lights). Also ensure that the target's shadow is disrupted or disguised. Use native vegetation, because placing a target in dense foliage provides natural concealment and a smoother transition between the edges of the camouflage net and the target's background. Cover exposed edges of the net with dirt or cut vegetation to enhance the transition.

A3.4. Erecting Procedures.

A3.4.1. To erect camouflage nets effectively:

A3.4.1.1. Keep the net structure as small as possible.

A3.4.1.2. Maintain the net a minimum of 2 feet from the camouflaged target's surface by using the support system. This prevents the net from assuming the same shape and thermal signature as the target it is meant to conceal.

A3.4.1.3. Ensure that the lines between support poles are gently sloped so that the net blends into its background. Slopping the net over the target also minimizes sharp edges, which are more easily detectable to the human eye.

A3.4.1.4. Extend the net completely to the ground to prevent creating unnatural shadows that are easily detected. This ensures that the net effectively disrupts the target's shape and actually absorbs and scatters radar energy.

A3.4.1.5. Extend the net all the way around the target to ensure complete protection from enemy sensors.

A3.4.2. **Step 1**—Open the screen and support system storage cases (**Figure A3.3.**) and orient the components of each case in the desired position of the area/equipment being camouflaged. If necessary, join screens before erecting by clipping the edges together with lanyard cord on underside of screen. All pins should face in the same direction (**Figure A3.4.**).

Figure A3.3. Screen and Support System Storage Cases.

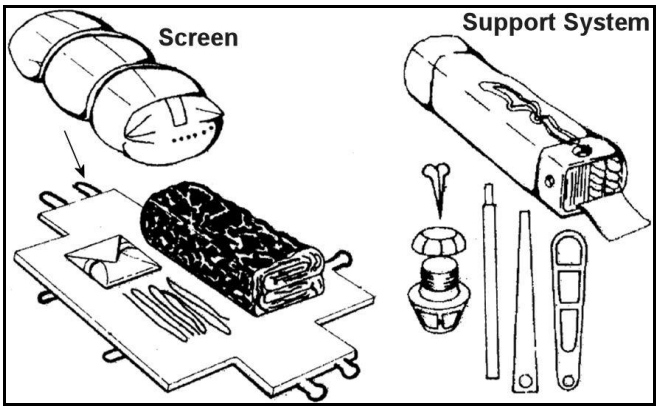
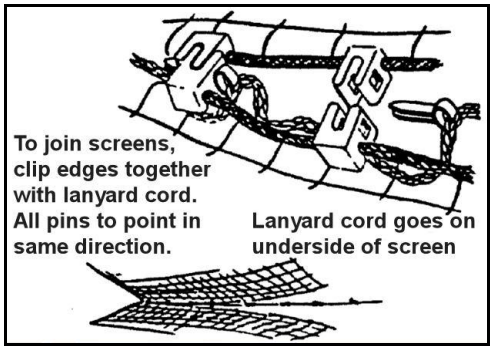


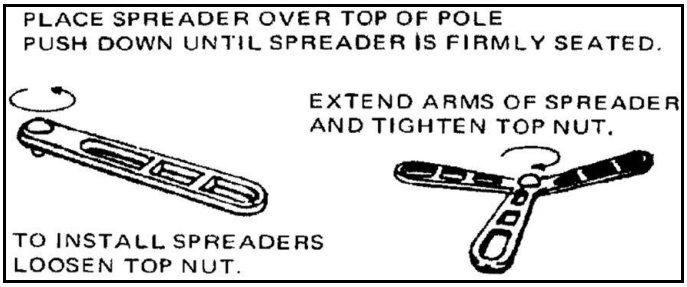
Figure A3.4. Joining Screens with Lanyards.



A3.4.3. **Step 2**—Spread out the screen and stake the corners. Allow one foot of slack when staking the corners. When staking down two module units overlap the corners.

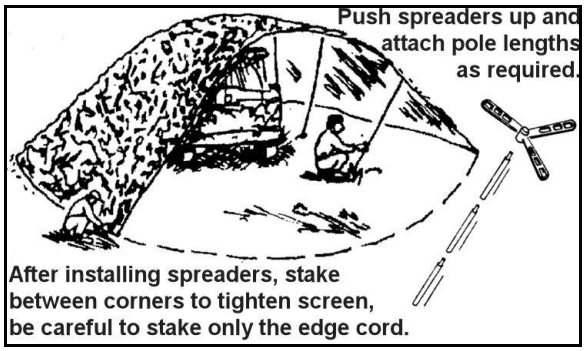
A3.4.4. **Step 3**—Push spreaders down over top of pole sections until firmly seated. Loosen the top nut on the spreaders to extend the arms and then re-tighten the nut (**Figure A3.5.**).

Figure A3.5. Spreader Installation.



A3.4.5. **Step 4**—Raise the net by placing the spreaders under the net and pushing up and place the other end of the pole on the ground. If necessary, attach additional pole lengths until desired height is achieved. Stagger spreader heights to prevent straight lines (**Figure A3.6.**).

Figure A3.6. Spreader Placement.



A3.4.6. **Step 5**—Tighten the screen by staking between corners. Be careful to only stake the edge cord (**Figure A3.6.**).

A3.4.7. After screens are erected they should be checked on a daily basis for proper erection and retightened as required. Screens should be checked more frequently during high winds and/or heavy snowfalls. Do not allow any great accumulation of snow or ice on screens. Snow or ice must be removed from the screens as soon as the screens start to sag and begin to show signs of stress or strain due to the extra weight.