PLAN OF DEVELOPMENT
FOR
HIGH ALTITUDE MOUNTAINOUS ENVIRONMENT TRAINING
RIGHT OF WAY LAND USE GRANT
U.S. DEPARTMENT OF THE ARMY
FORT CARSON

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01. Purpose.

The purpose of High Altitude Mountain Environmental Training (HAMET) is to provide helicopter aircrew members the ability to gain experience and hone skills towards proficiency in operating an aircraft safely at high altitudes and in mountainous terrain. This training serves to ensure aircrew members, consisting of both pilots and crew members, are capable of accomplishing assigned missions safely. It is important that aircrew members be proficient in this type of operation prior to a deployment and before operating in areas with high elevations and/or rugged topography in support of combat or non-combat operations worldwide.

HAMET is especially imperative for deployments to high altitudes and/or mountainous regions. It prepares aviators for high altitudes where the performance characteristics of aircraft operate differently than at sea-level. At altitude, less power is available for certain flight maneuvers such as takeoff and landing. Additionally, wind characteristics are unique in mountainous terrain. Aircrew members train on how to safely maneuver the aircraft in this environment to reduce helicopter accidents and resulting casualties when deployed to remote regions of the world or performing humanitarian aid or disaster relief throughout the United States.

Fort Carson and the surrounding area is one of the preferred locations for this type of aviation training. Tenant aviation units operating from Butts Army Airfield on Fort Carson operate at an elevation of 5,874 feet above mean sea level (MSL). The proposed landing zones offer aircrew members the challenge and complexity of operating between 6268 ft. MSL at Helicopter Landing Zone (HLZ) 506 to 10,646 ft. MSL at HLZ 615. Non-tenant aviation units, such as other Army Combat Aviation Brigades, Army National Guard, Army Reserve aviation units, as well as other department of defense services, would also significantly benefit from this opportunity. This is particularly vital to units deploying worldwide to high altitudes and/or mountainous terrain.

02. Need for a Right-of-way Grant.

Fort Carson has previously executed several casual-use land agreements in coordination with the Bureau of Land Management on public land throughout Fremont, Park, and Teller Counties. Separately, Fort Carson, by special permit (PPK325) issued by the U.S. Department of Agriculture, Forest Service, has 12 active of 16 original helicopter landing zones already established for HAMET.

Multiple helicopter landing zones within both Bureau of Land Management (BLM) and Pikes Peak Forestry Service (PPFS) lands benefits both training aircrews and the surrounding communities. Aircrews must be challenged by a wide variety of terrain and altitudes. Communities will benefit in that aircrews will not over utilize a specific area. Presently, aircrews only have access to 12 landing zones in Pikes Peak National Forest which does not meet the need for variety of locations.

Another need for multiple landing zones is to permit flexibility as it relates to environmental and recreational changes with the growth of surrounding communities. The goal is for aircrews to be able to conduct HAMET while preserving a minimal impact to the environment, recreational activities, and surrounding communities. By having multiple landing zones, aircrews retain the ability to train and have the ability to adjust to future growth and changes in the region. Without an approved right-of-way grant from BLM, HAMET activities would be limited to the existing Pikes Peak Forest Service landing zones and could present a higher rate of use than desired by the Army, the Forest Service, and the public in that area.

Therefore, the need of the Army, Fort Carson, and surrounding communities is for the Bureau of Land Management, as authorized by Title V of the Federal Land Policy Management Act of 1979 as amended, to issue a right-of-way grant authorizing access to the landing zones as described in Appendix B: Proposed Landing Zone Locations.

03. Helicopter Landing Zone Dimensions.

Helicopters Landing Zone(s) (HLZs) for the purpose of HAMET would consist of an area large enough to allow a helicopter to land on the surface of the ground. The typical size required would consist of approximately 260 x 260 feet. However, the landing area utilized will depend on surrounding vegetation and slope of the terrain. Helicopters would only be authorized to land within the boundaries defined for each individual landing zone as illustrated by the example in Figure 1 (Pictorial illustration of a landing zone). Every landing zone would be assigned a name or number for reference.

Figure 1: Pictorial illustration of a landing zone

04. Fort Carson Tenant Aviation Units.

There are two tenant aviation units assigned to Fort Carson based at Butts Army Airfield. These units consist of 4th Combat Aviation Brigade (4th CAB) and 7-158th, 11th Aviation Regiment of the U.S. Army Reserve. 4th CAB is the largest aviation unit at Fort Carson and is equipped with 113 Helicopters. Airframes are itemized as 48 AH-64 Apaches, 12 CH-47 Chinooks, and 53 UH/HH-60 Blackhawks. 7-158th is equipped with 15 HH-60 Blackhawks making a total of 128 airframes operating from Fort Carson.

05. Non-tenant Units.

Non-tenant or transient units are defined as those units and organizations that would utilize approved landing zones on a temporary and/or limited basis. This category is characteristic of deploying Army Combat Aviation Brigades, Army National Guard, Army Reserve, and other Department of Defense services. There are two typical scenarios for how non-tenant aviation units conduct HAMET at Fort Carson.

The first scenario occurs when units of similar size to 4th CAB conduct pre-deployment training requiring all aircrew members to conduct HAMET. These training events are normally of short duration but concentrated. The aviation unit would phase elements through Fort Carson in detachments such as a Battalion or an Aviation Task Force (approximately 30 helicopters). Typically, these units break down into three or four elements in order to rotate through Fort Carson. This type of phased rotation will generally span a 2-4 month time period during which time each subordinate Battalion or Task Force would be allocated 3 to 4 weeks to conduct HAMET. From 2013 to 2016, Fort Carson has only supported one non-tenant aviation brigade training event.

The second scenario is a much smaller scale and negligible in comparison to tenant aviation organization operations. In this scenario, Platoon sized elements or smaller, typically 2-4 helicopters, would base from either Fort Carson or surrounding airports. These units would utilize the mountainous environment and helicopter landing zones for HAMET spanning a period of 3-6 days. This has historically occurred when Army National Guard, Army Reserve, or other aviation units conduct training in support of homeland defense, national disaster, wildland firefighting, or other missions. On average Fort Carson has supported 8-10 of these smaller scaled scenarios annually.

06. Types of Aircraft.

The following types of aircraft are proposed to have access in order to conduct HAMET. While the preponderance of aircraft will be those based at Fort Carson it is important to include those from all branches in the event of joint training events or requirements of transient aviation units. All transient units are required to coordinate with Fort Carson. For detailed aircraft information see Appendix C: Types of Aircraft.

U.S. Army: AH-64D/E Apache, HH/UH-60A/K/L/M Black Hawk, CH/MH-47D/F Chinook, UH-72 Lakota, and AH/OH-6 Little Bird.

U.S. Marine Corp: AH-1W/Z Cobra, UH-1N/Y Twin Huey, CH-53E Super Stallion, CH-46 Sea Knight.

U.S. Air Force: UH-1N Twin Huey, HH-60 Pave Hawk, and CV-22 Osprey.

U.S. Navy: SH/MH/HH-60 Seahawk, and MH-53 Sea Dragon.

07. Projected Utilization.

The overall utilization by units described below is characterized to display the maximum potential utilization that could be seen throughout the BLM area in an annual period. While the daily utilization is difficult to calculate, the following information will help to visualize the projected utilization. The actual utilization will likely fluctuate based on several factors including by not limited to; weather, mission requirements, changes to the operating plan for environmental or wildlife considerations, or flights and landings being conducted or distributed through other land use agreement areas.

HAMET objectives are proficiency based. Therefore projected utilization is based on historical averages. HAMET includes several tasks that are trained and evaluated. While the BLM Right-of-Way authorizes specified helicopter landing zones for the purpose of landing, a large portion of HAMET requires aircrews to conduct mountain navigation and mountain wind assessments.

A typical training flight requires individual aircrews to design and plan a route to a specified HLZ. Aircrews are required to maintain a minimum altitude of 500 ft. Above Ground Level (AGL) enroute to the HLZ. Once the aircraft are within approximately two miles from the aircrews will descend to terrain flight altitudes such as Low Level, Contour, or Nap-of-the-Earth (NOE) as defined in section 09 of this document.

Attaining a HAMET qualification requires aviators to perform both day and night tasks, which require the utilization of either Night Vision Goggles or Forward Looking Infrared (FLIR).This means that the majority of flights will occur in the afternoon (2-6 pm) and in evening hours for 1-2 hours after sunset (Generally 7-10 pm). On occasion, some flights may take place at other times throughout the day or night should weather or maintenance cause unforeseen delays.

Aircrews will avoid designated sensitive areas such as residential, livestock, wildlife, or other areas outlined in the operating plan. The operating plan will be reviewed annually between Fort Carson and BLM to accommodate growth of communities or changes within the environment or wildlife. Additionally, BLM will contact Fort Carson if issues or concerns arise between annual reviews.

Fort Carson’s tenant aviation units will conduct flight operations in mountainous terrain as a normal function. Every aviator stationed at Fort Carson assigned to an aviation unit will require initial mountain qualification training, continuation proficiency flight training, and an Annual Proficiency and Readiness Test (APART) examination.

Each aviator is also required to conduct a landing iteration to the ground. A landing iteration is defined as a landing to the ground and subsequent take-off. These requirements are proficiency based and the number of iterations required may fluctuate based on aviator experience. The following iterations outline those required and take into account averages based on historical training periods. The total landing iterations, on average, per assigned aviator would be 22 iterations annually outlined by the following:

Initial Mountain Qualification: 4 Day / 4 Night (8 total)
Continuation Proficiency Flights: 6 Day / 6 Night (12 total)
Annual Proficiency and Readiness Test (APART) 1 Day / 1 Night (2 total)
*__Note__: Initial mountain qualification is required once per aviator, subsequent years an aviator is assigned will have reduced requirements.

Fort Carson has a total of 343 aviators with 310 assigned to 4th CAB and 33 assigned to Charlie Company, 7-158th Aviation Regiment. 310 aviators, conducting 22 iterations each, equates to 7,542 landing iterations per year. While 7,542 landing iteration are projected, these will be throughout about the proposed 47 BLM helicopter landing zones and the presently established 12 Pikes Peak Forestry Service helicopter landing zones. The 7,542 landing iterations per year, conducted over the course of 12 months, equates to 628.8 landings per month. Of the 628.8 landings per month, they will be further distributed among the 59 helicopter landings zones which equates to 10.7 landing iterations in each helicopter landing zone per month. These figures are based on the assumption all 47 proposed BLM helicopter landing zones are authorized and the 12 Pikes Peak Forestry Service landing zones remain available. It is important to note that many aviators presently assigned are already mountain qualified, which reduces some requirements.

Non-tenant aviation units will be conducting flight operations as a function of either pre-deployment training or in support of other unit training requirements. These type of training events require both the Fort Carson Commander's approval along with informing BLM regarding the type of training and associated time period. The maximum projected usage for a calendar year among non-tenant units conducting HAMET would be with two Combat Aviation Brigades conducting pre-deployment training rotations in addition to Fort Carson tenant units. Non-tenant units would stage from any of the following locations with the intent to conduct HAMET in either BLM or PPFS HLZs:

Fort Carson, CO (Butts Army Airfield (BAAF)
Buckley Air National Guard Base, Denver, CO
Peterson Air Force Base, Colorado Springs, CO
Pueblo Memorial Airport, Pueblo, CO.

Every aviator assigned to a non-tenant aviation unit requires initial mountain qualification training and some form of additional proficiency based flight training in the mountainous environment based on that unit commander's training plan. Each aviator is required to conduct landing iterations to the ground. These requirements are proficiency

based and the number of required iterations may fluctuate based on aviator experience. The following landing iterations outline the required averages based on historical training events. The total landing iterations, on average, per assigned non-tenant aviator would be 20 landing iterations consisting of the following:

Initial Mountain Qualification: 4 Day / 4 Night (8 total)
Continuation Proficiency Flights: 6 Day / 6 Night (12 total)

A Combat Aviation Brigade conducting pre-deployment training would have approximately 310 assigned aviators. Each aviator conducting 20 iterations each, equates to 6200 landing iterations spanning a 2-4 month window. While 6,200 landing iterations are projected, these will also be distributed about the proposed 47 BLM helicopter landing zones and the presently established 12 Pikes Peak Forestry Service helicopter landing zones. The 6,200 landing iterations training period, conducted over the course of 4 months, equates to 1,500 landings per month. Of the 1,500 landings per month they will be further distributed among the 59 helicopter landings zones which equates to 26.3 landing iterations in each helicopter landing zone per month. These figures are also based on the assumption all 47 proposed BLM helicopter landing zones are authorized and the 12 Pikes Peak Forestry Service landing zones remain available.

Each training flight, based on the experience of the aviator, would require that an aircraft spend approximately 30-45 minutes in or around a helicopter landing zone. This time period is long enough to accomplish 6 to 10 landing iterations and associated mountain training tasks. By having multiple helicopter landing zones to utilize, each helicopter landing zone would average around 90 minutes of helicopter utilization in a given month. However, some helicopter landing zones are likely to be used more frequently than others as the intent would be to utilize those helicopter landing zones that allow aviators to complete HAMET training in areas assessed to be more remote and less intrusive to local communities, livestock, wildlife, or identified sensitive areas.

08. Historical Utilization.

The BLM Royal Gorge Field Office (RGFO) has issued several causal use agreements in the past authorizing the use of certain helicopter landing zones. These agreements range from 2010 to 2015 and have supported HAMET pre-deployment training for several units. Each utilization period was reviewed by BLM RGFO and helicopter landing zones were prescribed in each approval letter.

1st Air Calvary Brigade on 24 November 2010
101st Combat Aviation Brigade on 15 February 2012
10th Combat Aviation Brigade on 27 September 2012
An extension to Fort Carson on 1 May 2013 to 31 December 2013
4th Combat Aviation Brigade on 14 October 2015.

The landing iterations calculated during two non-tenant utilization periods demonstrate historical utilization and help to forecast future utilization rates. A landing iteration is defined as 1 Landing and 1 Takeoff.

During the 101st Combat Aviation Brigade training period of 28 February to 26 April 2012, approximately 300 aviators were trained having conducted 1,041 landing iterations on BLM HLZs. During this 40 day period there were 45 HLZs authorized for use. This equates to 26.0 landing iterations per day, theoretically distributed over 45 HLZs equated to 0.6 landing iterations in a helicopter landing zone per day. During that training period, the most utilized HLZ were HLZ 402 with 116 landing iterations, HLZ 409 with 88 landing iterations, and HLZ 403 with 73 landing iterations. The averages presented serve to demonstrate the overall utilization of a non-tenant unit rotation. However, more frequent utilization has and will continue to exist for certain helicopter landing zones that pose the least amount of conflict with local communities or wildlife.

During the 10th Combat Aviation Bridge training period of 23 September to 22 October 2012, a total of 105 aviators were trained having conducted 1000 landing iterations between 21 BLM HLZs and 16 Pikes Peak Forestry Service HLZs. During that 30 day period there were 604 landing iterations conducted on PPFS HLZs and 396 on BLM HLZs. The 396 landing iterations, over 30 days, equates to 13.2 landing iterations per day. Theoretically distributed over 21 HLZs, equates to 0.6 landing iterations in an HLZ per day. Also, during this training period, the most used HLZs were HLZ 510 with 74, HLZ 507 with 43, and HLZ 505 with 40 total iterations.

During the 1st Combat Aviation Brigades training period from 27 November to 12 December 2012, a total of 78 aviators were trained having conducted 817 landing iterations on 26 BLM HLZs and 16 Pikes Peak Forestry Service HLZs. During that 16 day period, 376 landing iterations conducted on PPFS HLZs and 441 on BLM HLZs. Of the 441 BLM landing iterations spanning a 16 day training period equates to an average of 27.6 landing iterations per day. Theoretically distributed over 26 helicopter landing zones equates to 1.1 landing iterations in a helicopter landing zone per day. However, the HLZs used more frequently during this period were HLZ 509 with 55, HLZ 510 with 53, and HLZ 402 with 37 total landing iterations. Again, certain HLZs were used more frequently than the proposed averages as having been prescribed to present the least amount of conflict.

09. Terrain Flight Paths and Altitudes.

Terrain flight paths for HAMET operations will be conducted in Class G airspace defined in Federal Aviation Regulations and in the Aeronautical Information Manual. There are no pre-defined air corridors or designated air routes from Fort Carson to the HLZs. The Federal Aviation Administration (FAA) controls all airspace for both civilian and military aviation. The right-of-way agreement specifically authorizes the use of public lands for aircraft to land on the ground.

BLM will consider, throughout the scope of the right-of-way agreement process, the cumulative effects of the proposed helicopter landing zones on the entire project area (HLZs and the intervening lands). This may require mitigation measures from Fort Carson tenant units or non-tenant units conducting HAMET in order to lessen impacts to resources and people within the area other than the approved HLZs. These may include requests such as approaching or leaving a HLZ in a particular direction, adjustments to the altitude of aircraft in flight, or limiting use of an HLZ to a particular time of day or season of use. Fort Carson's intent is to safely conduct necessary HAMET operations in a safe manner while minimalizing the impact to local communities.

Helicopters performing HAMET operations incorporate terrain flight as a tactical application. Terrain flight categories include Low-level, contour, and Nap-of-the-Earth (NOE) techniques. See Figure 3: Pictorial Illustration of Terrain Flight Categories. This type of training is necessary to best simulate tactical conditions during which the aviator applies a particular technique in order to diminish the enemy's capability to acquire, track, and engage aircraft. Terrain flight categories are defined as follows:

Low-Level: Aviators perform low-level flight at a constant altitude and airspeed, dictated by threat avoidance, generally from 80-200 feet above the highest obstacle. However, aircrews will maintain 200 feet above the highest obstacle as a mitigation measure throughout BLM lands.

Contour: Contour is conducted at low altitudes conforming to the earth's contours. It is characterized by relatively constant airspeed and varying altitude as dictated by terrain and obstacles between 25-80 feet above the highest obstacle. This maneuver will be performed within approximately ½ mile of an established HLZ based on the training requirements.

Nap-of-the-Earth: NOE is conducted at varying airspeeds and varying altitudes as close to the earth's surface as vegetation and obstacles permit from surface to 25 feet above the highest obstacle or vegetation in the flight path. This maneuver will be performed within approximately ½ mile of an established HLZ based on training requirements.

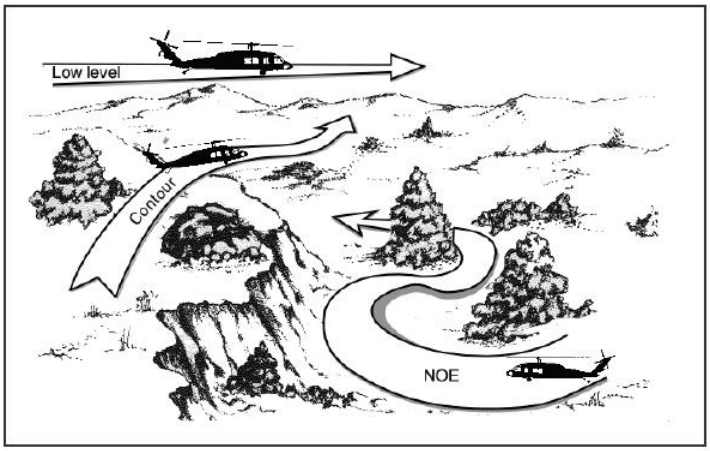


Figure 3: Pictorial illustration of terrain flight categories.

10. Proposed landing zone locations.

The 47 proposed helicopter landing zones for consideration to the Right-of-Way agreement are shown as an overview in Appendix A: Area of Activity. Also, detailed information as to each specific HLZ is shown in Appendix B: Helicopter Landing Zones. Each landing zone undergoes a vetting process that takes into account proximity to residential, cultural, and environmental areas. Any HLZ found to present a conflict as assessed throughout the Right-of-Way process will be either relocated or removed from the Right-of-Way agreement. The ground area authorized for each HLZ will defined by a red outline in each HLZ diagram and HLZ Card utilized by aircrews.

11. Noise level information.

Detailed information regarding aircraft noise can be found in Appendix D: Noise Study. The noise levels discussed represent the maximum noise levels of aircraft from the Operational Noise Assessment for the Combat Aviation Brigade Stationing Implementation Environmental Assessment. The assessment was conducted by the U.S. Army Institute of Public Health, 6 Oct 2011. As a mitigation measure for noise aircrews will maintain a slant distance of 500 feet from populated areas.

12. Operational Considerations.

The public land authorized for use as HLZs will be used only for landing iterations. It is intended that aircrews will not leave the aircraft while it is on the ground. However, in the event that there is a question about the safety of the aircraft that requires outside inspection, it may be necessary for personnel to exit the aircraft until such determination is made.

Fort Carson maintains an Incident Response Plan that encompasses emergency actions the unit will take in the event of an incident. The Incident Response Plan is maintained at Butts Army Airfield and attached to this document as Appendix E: Butts Army Airfield Incident Response Plan.

Both tenant and non-tenant aircrews are required to read and understand the established Operating Plan and Incident Response Plan prior to conducting aviation operations in or around Fort Carson. In the event of a mechanical failure or incident involving aircraft on BLM managed land, Fort Carson will immediately notify the Pueblo Dispatch Center and BLM. Any clean-up activities will be coordinated with the BLM RGFO. Fort Carson will be responsible to restore or remediate any damages caused by an incident operating under the Right-of-Way agreement. The intent is that the HLZ or affected site would be restored to pre-event conditions in accordance with all applicable state and federal regulations.

Maintenance operations, fueling, and administrative activities will not be conducted on any HLZ in this Right-of-Way unless in response to a mechanical failure or incident.

Aviation units will not refuel aircraft on BLM managed public land. Aircrews will not use, transport or store hazardous material on BLM managed public land.

No armament of any sort will be used, transported or stored on or within the Right-of-Way area. Some aircraft may be loaded with training and/or simulated weapon systems, but all of these systems are inert. A common example is the M-36 training missile. This training device looks like an AGM-114 Hellfire missile, but contains no propellant or warhead and cannot be launched from the aircraft.

Fort Carson would prefer to avoid areas of concern where conflicts with resource values or other public land users are identified or foreseeable. These areas of concern include but are not limited to sites that are potentially eligible for the National Register of Historic Places, sensitive plant and wildlife habitats, high-use recreation areas, and other sensitive or protected resources or uses on BLM managed lands.

The BLM RGFO, Field Manager (or Acting Field Manager), will be notified immediately if there are any helicopter crashes, fire ignitions, rescues needed, or material spills. Fort Carson would contact the Pueblo Interagency Dispatch Center at 719-553-1600. Any hazardous material clean-up will be coordinated with the RGFO and will meet or exceed the BLM standards and all applicable Federal, State and local regulations.

Fort Carson will give notice of any shut down, emergency landing or accident occurring on BLM lands as soon as possible, not to exceed a 24 hour period, to the RGFO Field Manager or the duty officer at 719-429-1986, and provide written record within five (5) working days. Fort Carson will provide an immediate contact number so that the BLM and Forest Service emergency helicopters can have use of the airspace in the event of a wildland fire.

Aviators will not use HLZs when wildlife such as elk, deer, antelope, and bighorn sheep or livestock are present. Further, aircrews will avoid areas when human activity is present such as hikers, hunters, or campers, Aircrews are aware that they may encounter hunters with firearms without much notice during hunting seasons will avoid that area.

Fort Carson will adhere to the following Fire Prevention Measures and Precautions. The use of chaff or flares or any type of pyrotechnic are not allowed. Osprey-type aircraft that emit high-temperature exhaust downward during landings are not allowed. Aircrews will avoid any area where there is fire, smoke, evidence of fire, or activities associated with fire.

If any aircrews recognize an unattended wildfire they will report it immediately to the Pueblo Interagency Dispatch Center through radio transmissions to Carson Radio. Fort Carson will immediately cease HAMET landing iterations on BLM lands when notified by BLM that Stage III Fire Restrictions are in effect. Flight operations for the purpose of over-flight, such as mountain navigation or mountain wind assessments, may continue at

500 feet AGL and above. HAMET landing iterations will resume upon notification by BLM that Stage III Fire Restrictions are no longer in effect.

Fort Carson will investigate claims of trespass and any associated damage caused by trespass pursuant to 43CFR 2808§10-12. Fort Carson will be responsible for any damages caused as a result of trespass and will work with BLM RGFO in order to remediate the area.

Aircrews will avoid any areas identified by BLM as avoidance areas. RGFO will coordinate with Fort Carson should an HAMET HLZs create conflicts with other public uses or impacting resources beyond that anticipated under BLM's assessment or guidelines. BLM may adjust the conditions of operation in the Operating Plan in annual review or impose additional restrictions as necessary to east any conflicts. Fort Carson will immediately comply upon written notice from BLM.

13. Government Agencies and Contact Information.

4th Infantry Division Aviation Officer

Fort Carson Air traffic and Airspace Chief: Mr. Ted Wilson

Fort Carson NEPA Program Manager: Ms. Deb Benford

Bureau of Land Management, RGFO Realty Specialist: Jeff Brown, at

Bureau of Land Management, RGFO NEPA Specialist: Nancy Keohane at

Pueblo Interagency Dispatch Center:

Exhibit 1 – Relative location of activity

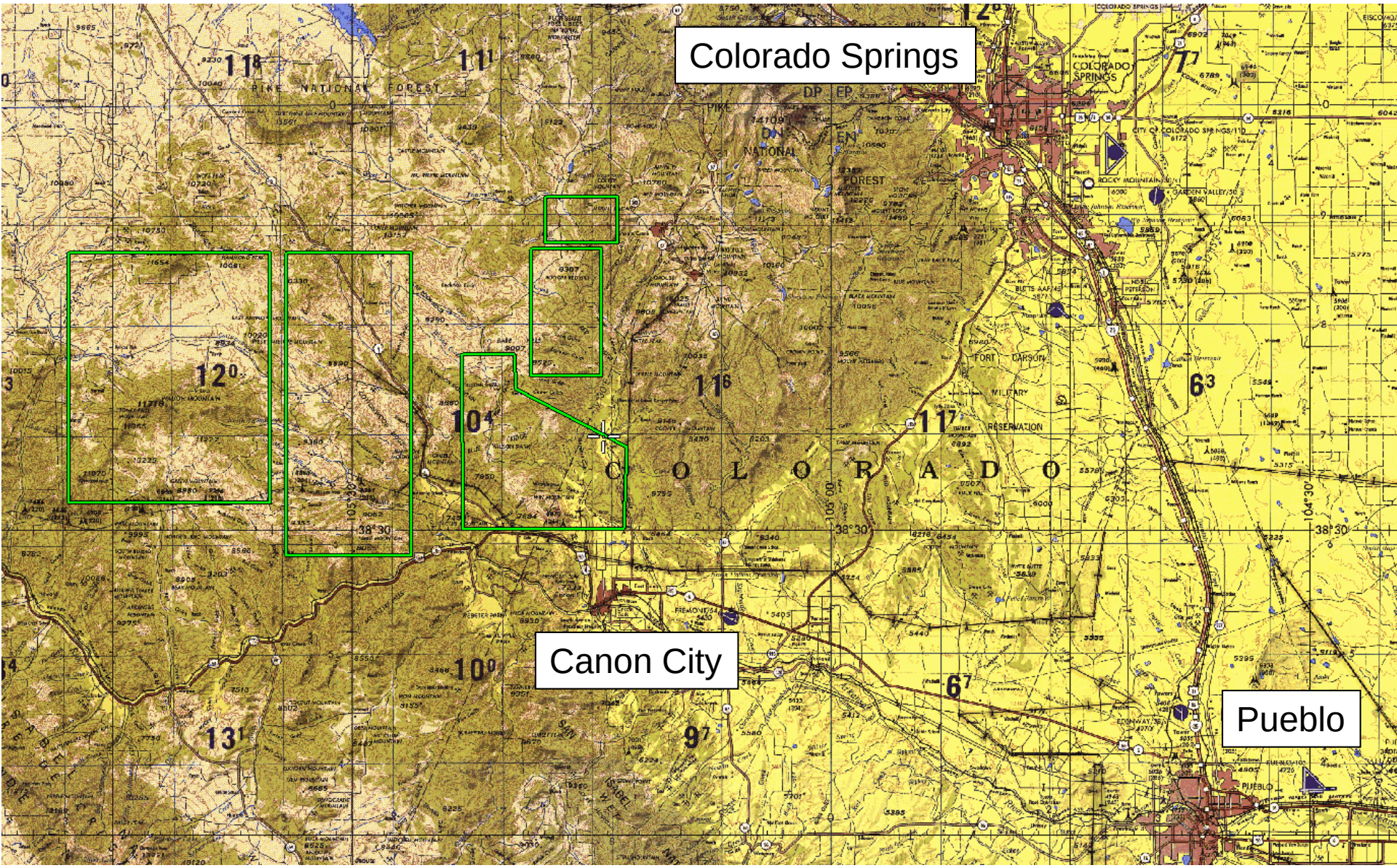


Exhibit 2 (BLM ROW)

HLZ 401 – 280’x280’

N 38° 42.7369' W 105° 15.7723'

13S DC 77146 84882

Exhibit 2 (BLM ROW)

HLZ 402 – 570’x355’

N 38° 41.9507' W 105° 16.3181'

13S DC 76350 83430

Exhibit 2 (BLM ROW)

HLZ 403 – 1127’x283’

N 38° 41.8185' W 105° 16.4965'

13S DC 76091 83186

Exhibit 2 (BLM ROW)

HLZ 404 – 714’x336’

N 38° 42.1766' W 105° 16.3755'

13S DC 76268 83848

Exhibit 2 (BLM ROW)

HLZ 405 – 155’x155’

N 38° 40.7735' W 105° 15.9673'

13S DC 76852 81251

Exhibit 2 (BLM ROW)

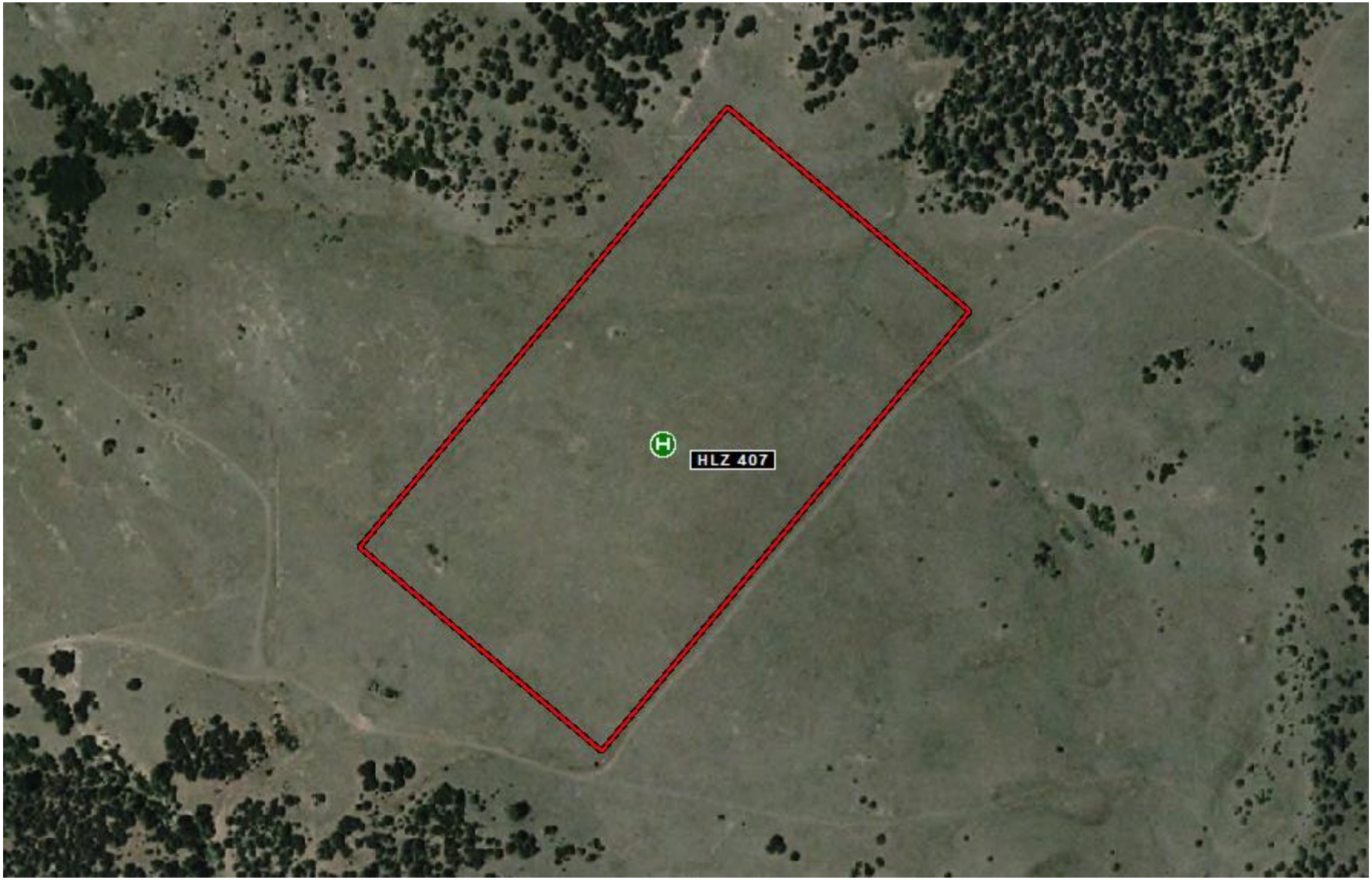
HLZ 406 – 321’x303’

N 38° 40.2230' W 105° 15.8715'

13S DC 76988 80233

Exhibit 2 (BLM ROW)

HLZ 407 – 1225’x678’



N 38° 39.6447' W 105° 17.4120'

13S DC 74751 79170

Exhibit 2 (BLM ROW)

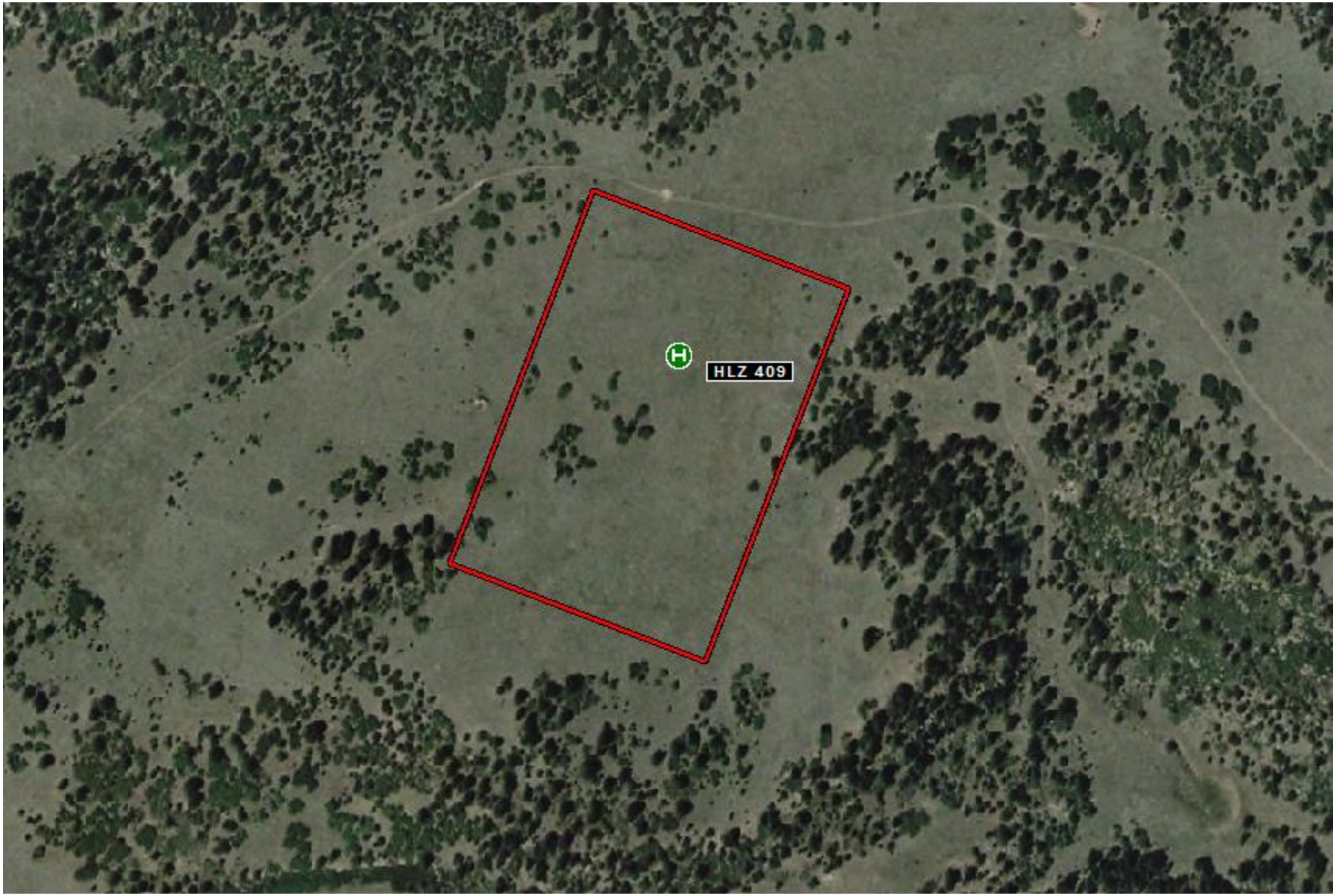
HLZ 408 – 413’x974’

N 38° 38.9643' W 105° 17.8508'

13S DC 74111 77914

Exhibit 2 (BLM ROW)

HLZ 409 – 839’x579’



N 38° 38.1439' W 105° 17.2797'

13S DC 74935 76394

Exhibit 2 (BLM ROW)

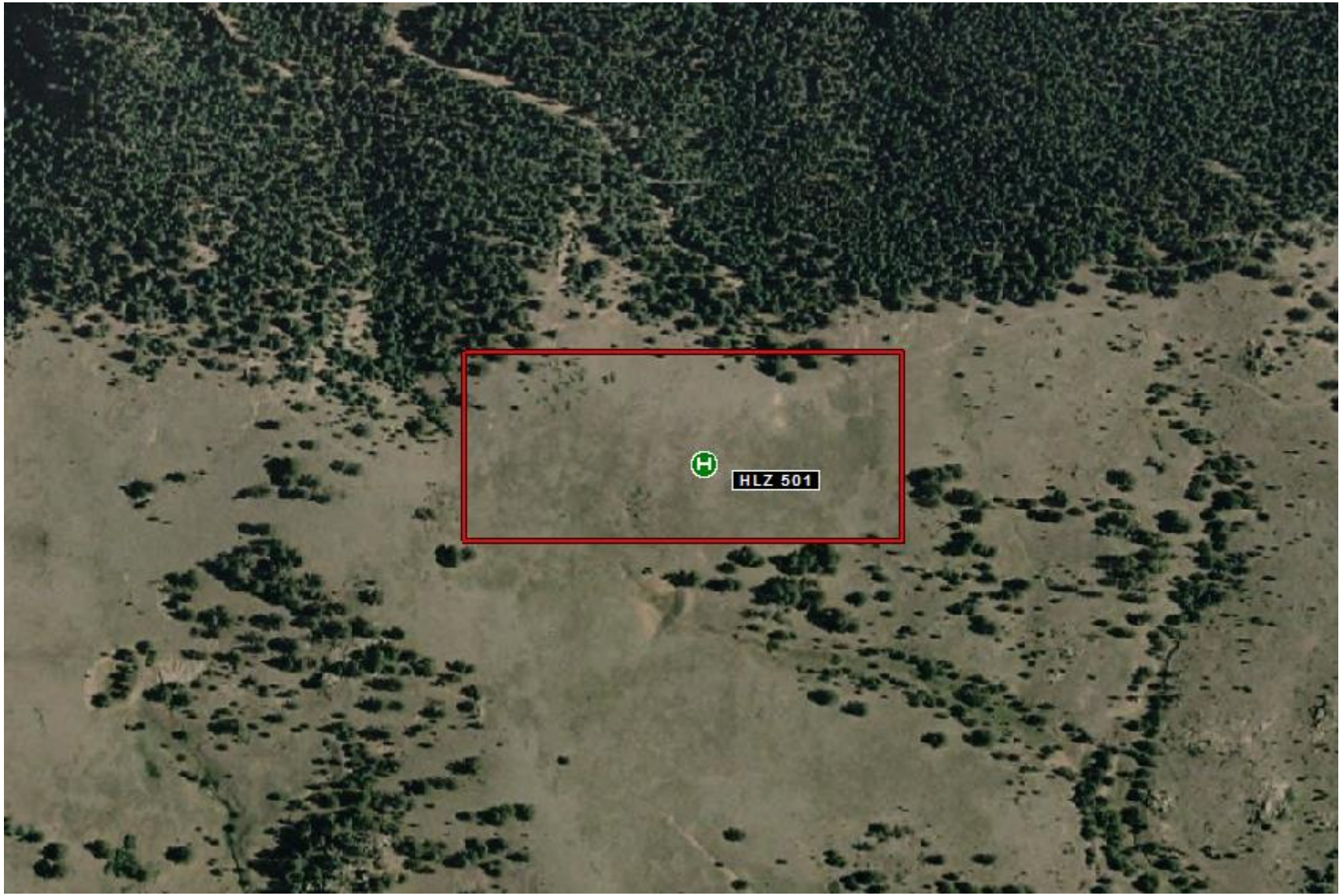
HLZ 410 – 452’x599’

N 38° 43.4997' W 105° 15.8798'

13S DC 76994 86293

Exhibit 2 (BLM ROW)

HLZ 501 – 393’x914’



N 38° 35.5902' W 105° 8.6557'

13S DC 87437 71642

Exhibit 2 (BLM ROW)

HLZ 502 – 655’x533’

N 38° 35.4572' W 105° 8.6525'

13S DC 87441 71396

Exhibit 2 (BLM ROW)

HLZ 503 – 891’x480’

N 38° 35.1233' W 105° 9.2547'

13S DC 86566 70780

Exhibit 2 (BLM ROW)

HLZ 504 – 439’x211’

N 38° 33.9571' W 105° 8.7066'

13S DC 87358 68621

Exhibit 2 (BLM ROW)

HLZ 505 – 275’x385’

N 38° 31.5810' W 105° 13.9185'

13S DC 79780 64243

Exhibit 2 (BLM ROW)

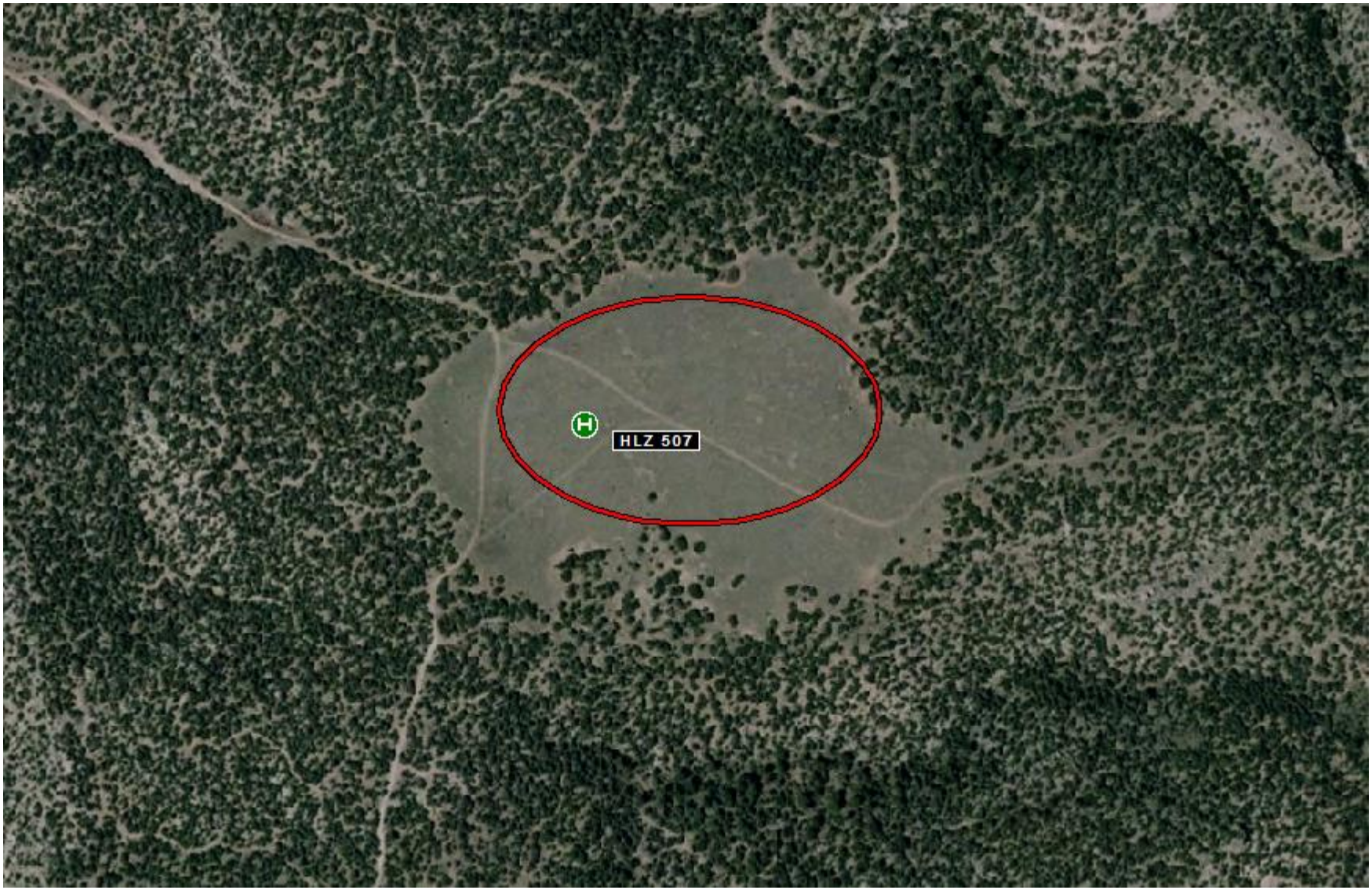
HLZ 506 – 917’x362’

N 38° 33.2254' W 105° 15.9280'

13S DC 76869 67292

Exhibit 2 (BLM ROW)

HLZ 507 – 236’x398’

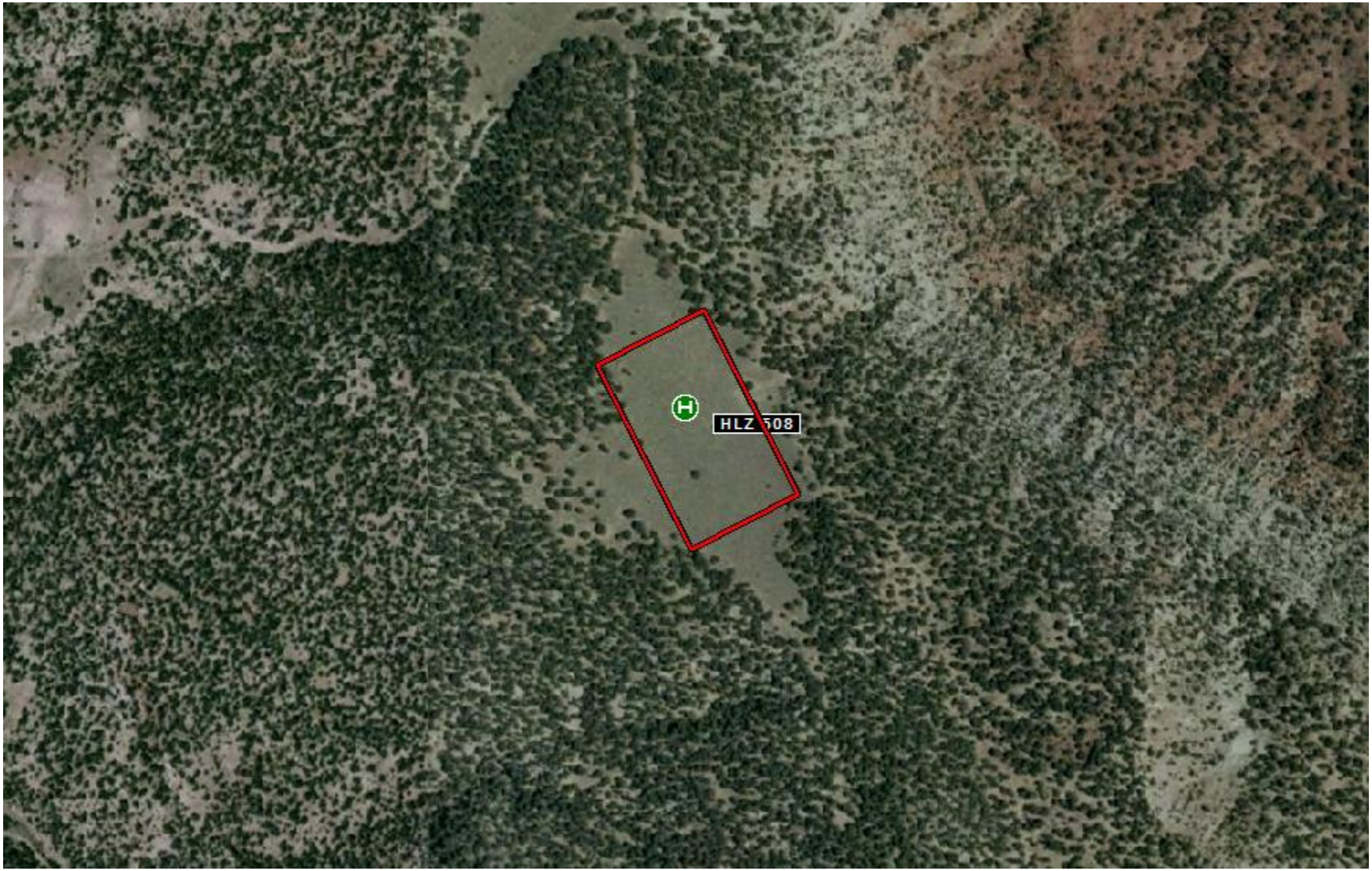


N 38° 33.9969' W 105° 15.9666'

13S DC 76817 68719

Exhibit 2 (BLM ROW)

HLZ 508 – 432’x250’



N 38° 33.7703' W 105° 15.1019'

13S DC 78072 68296

Exhibit 2 (BLM ROW)

HLZ 509 – 563’x230’

N 38° 36.6454' W 105° 20.9476'

13S DC 69604 73641

Exhibit 2 (BLM ROW)

HLZ 510 – 393’x342’

N 38° 32.5650' W 105° 18.6833'

13S DC 72864 66083

Exhibit 2 (BLM ROW)

HLZ 511 – 400’x434’

N 38° 31.1246' W 105° 18.7364'

13S DC 72777 63419

Exhibit 2 (BLM ROW)

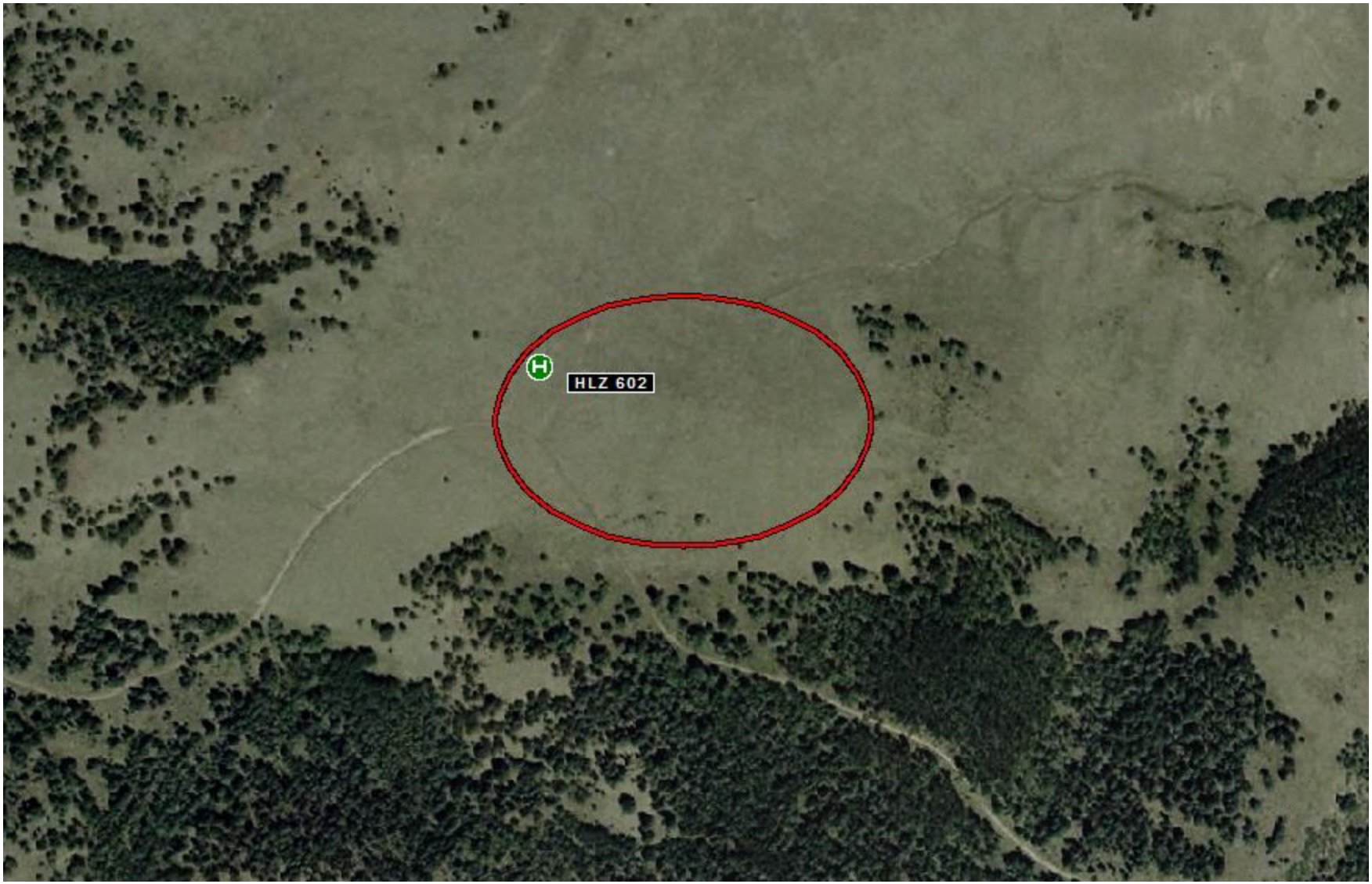
HLZ 601 – 819’x697’

N 38° 40.4163' W 105° 28.1392'

13S DC 59204 80662

Exhibit 2 (BLM ROW)

HLZ 602 – 262’x395’

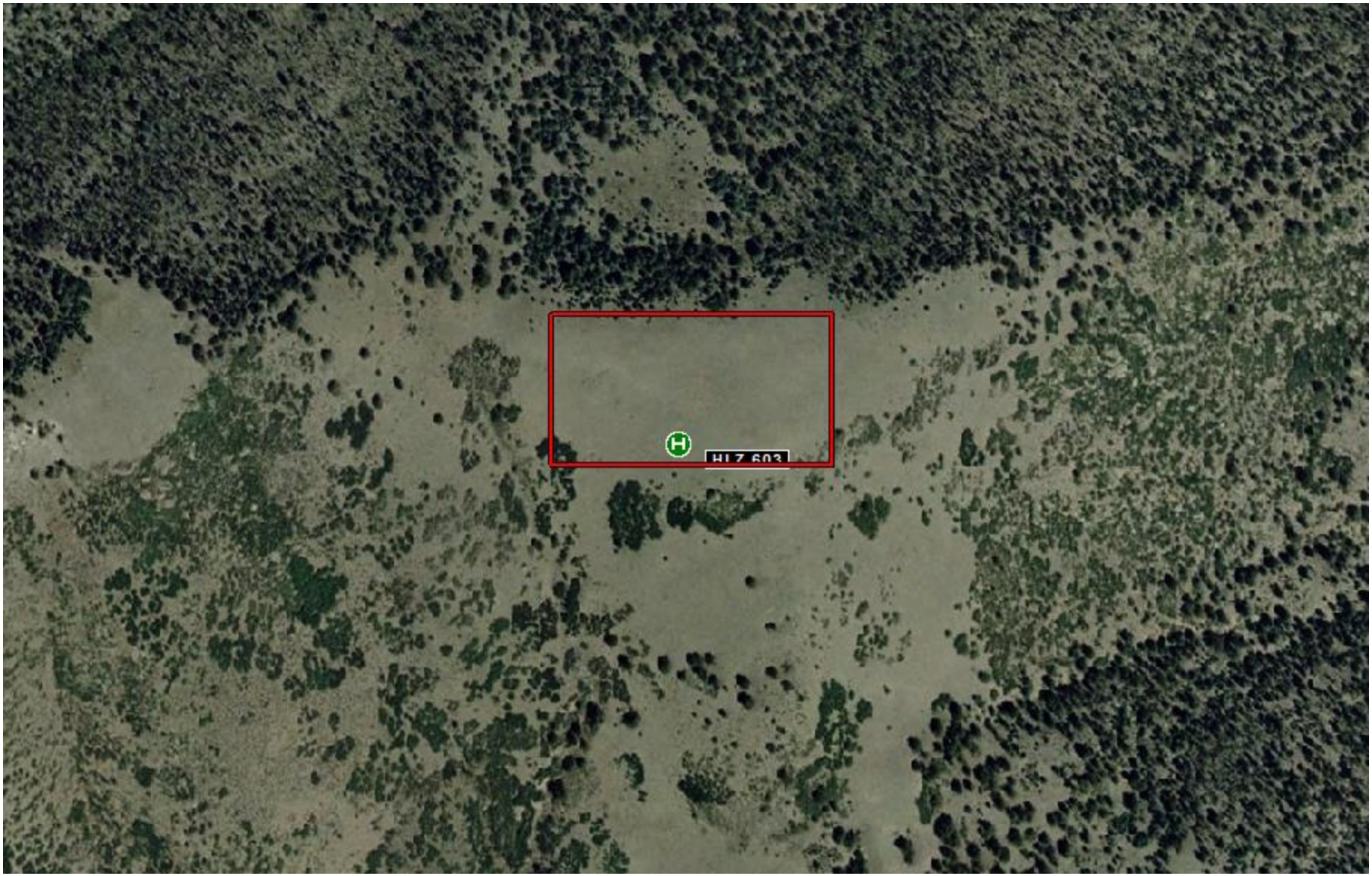


N 38° 42.6520' W 105° 32.9653'

13S DC 52231 84835

Exhibit 2 (BLM ROW)

HLZ 603 – 328’x612’



N 38° 42.6370' W 105° 31.6558'

13S DC 54129 84796

Exhibit 2 (BLM ROW)

HLZ 604 – 491’x783’

N 38° 41.7156' W 105° 31.7353'

13S DC 54004 83093

Exhibit 2 (BLM ROW)

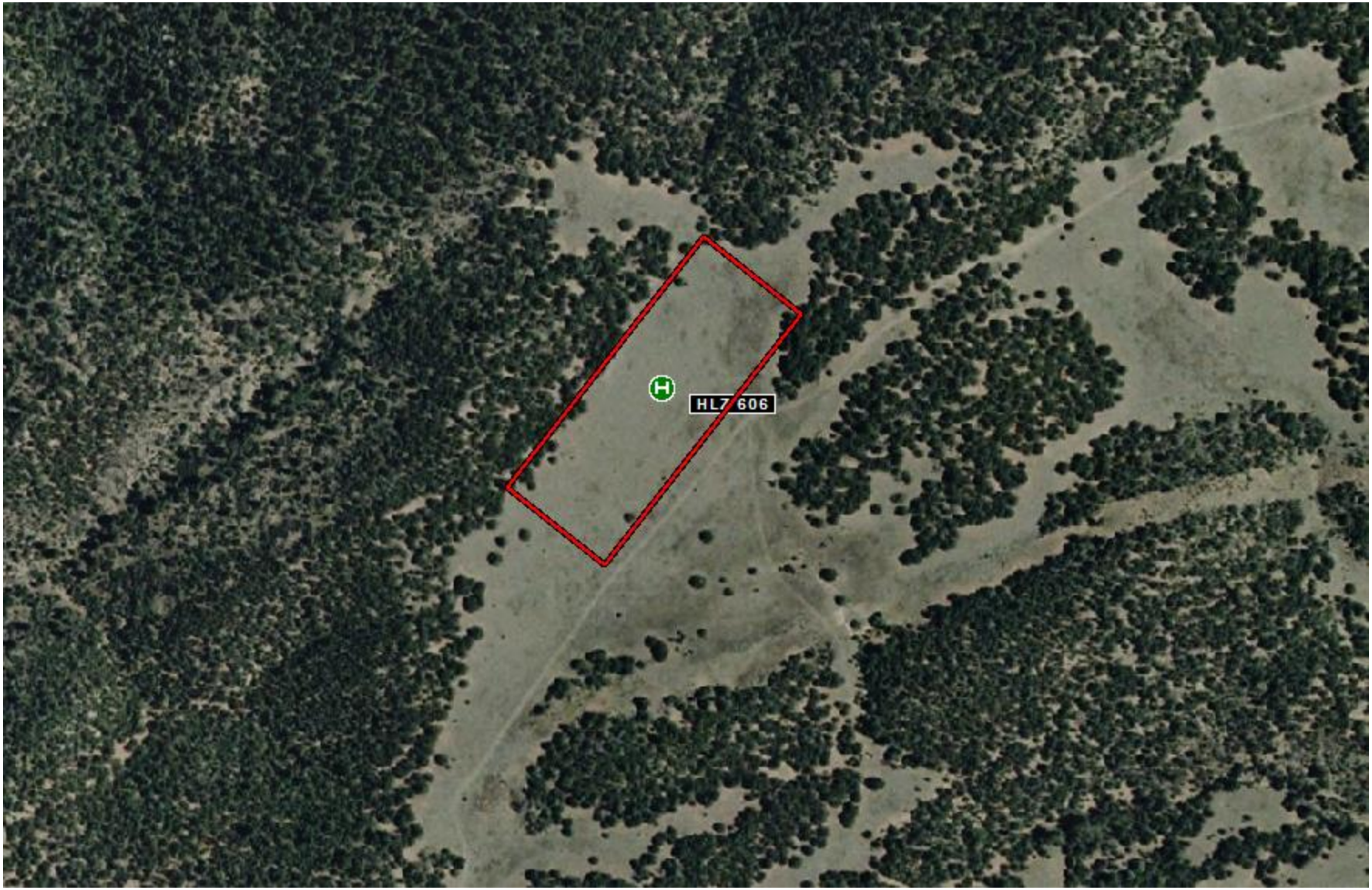
HLZ 605 – 885’x539’

N 38° 42.3953' W 105° 35.9854'

13S DC 47852 84388

Exhibit 2 (BLM ROW)

HLZ 606 – 675’x263’



N 38° 34.3084' W 105° 23.1940'

13S DC 66326 69332

Exhibit 2 (BLM ROW)

HLZ 607 – 603’x474’

N 38° 30.1941' W 105° 27.3299'

13S DC 60283 61751

Exhibit 2 (BLM ROW)

HLZ 608 – 426’x809’

N 38° 30.4364' W 105° 27.9935'

13S DC 59321 62204

Exhibit 2 (BLM ROW)

HLZ 609 – 321’x789’

N 38° 30.4967' W 105° 28.6134'

13S DC 58421 62320

Exhibit 2 (BLM ROW)

HLZ 610 – 314’x579’

N 38° 30.3441' W 105° 31.1007'

13S DC 54805 62057

Exhibit 2 (BLM ROW)

HLZ 611 – 328’x632’

N 38° 29.2348' W 105° 31.0914'

13S DC 54807 60006

Exhibit 2 (BLM ROW)

HLZ 612 – 197’x678’

N 38° 28.6973' W 105° 31.1486'

13S DC 54718 59012

Exhibit 2 (BLM ROW)

HLZ 613 – 328’x868’

N 38° 29.5411' W 105° 28.4651'

13S DC 58627 60551

Exhibit 2 (BLM ROW)

HLZ 614 – 419’x375’

N 38° 30.0859' W 105° 29.9487'

13S DC 56476 61570

Exhibit 2 (BLM ROW)

HLZ 615 – 426’x645’

N 38° 32.9456' W 105° 47.2913'

13S DC 31318 67035

Exhibit 2 (BLM ROW)

HLZ 616 – 288’x178’

N 38° 33.4942' W 105° 45.9056'

13S DC 33339 68033

Exhibit 2 (BLM ROW)

HLZ 701 – 609’x362’

N 38° 44.5093' W 105° 16.6324'

13S DC 75909 88163

Exhibit 2 (BLM ROW)

HLZ 702 – 695’x368’

N 38° 44.6382' W 105° 16.0893'

13S DC 76697 88399

Exhibit 2 (BLM ROW)

HLZ 703 – 622’x467’

N 38° 45.0940' W 105° 16.5098'

13S DC 76090 89244

Exhibit 2 (BLM ROW)

HLZ 704 – 157’x109 ****Omit****’

N 38° 45.4147' W 105° 16.7650'

13S DC 75722 89838

Exhibit 2 (BLM ROW)

HLZ 705 – 387’x184’

N 38° 45.0455' W 105° 15.3008'

13S DC 77841 89149

Exhibit 2 (BLM ROW)

HLZ 706 – 131’x184’

N 38° 45.9700' W 105° 14.7562'

13S DC 78634 90857

Exhibit 3 - Aircraft Information

AH-1J SeaCobra

The Bell AH-1 SuperCobra is a twin-engine attack helicopter based on the United States Army's AH-1 Cobra. The twin Cobra family includes the AH-1J SeaCobra, the AH-1T Improved SeaCobra, and the AH-1W SuperCobra. The AH-1W is the backbone of the United States Marine Corps's attack helicopter fleet, but it will be replaced in service by the Bell AH-1Z Viper upgrade.

The AH-1 Cobra was developed in the mid-1960s as an interim gunship for the U.S. Army for use during the Vietnam War. The Cobra shared the proven transmission, rotor system, and the T53 turboshaft engine of the UH-1 "Huey". By June 1967, the first AH-1G HueyCobras had been delivered. Bell built 1,116 AH-1Gs for the U.S. Army between 1967 and 1973, and the Cobras chalked up over a million operational hours in Vietnam.

The U.S. Marine Corps was very interested in the AH-1G Cobra, but it preferred a *twin-engine* version for improved safety in over-water operations, and also wanted a more potent turret-mounted weapon. At first, the Department of Defense had balked at providing the Marines with a twin-engine version of the Cobra, in the belief that commonality with Army AH-1Gs outweighed the advantages of a different engine fit. However, the Marines won out and awarded Bell a contract for 49 twin-engine AH-1J SeaCobras in May 1968. As an interim measure, the U.S.

Army passed on 38 AH-1Gs to the Marines in 1969. The AH-1J also received a more powerful gun turret. It featured a three barrel 20 mm XM197 cannon that was based on the six barrel M61 Vulcan cannon.

The Marine Corps requested greater load carrying capability in high temperatures for the Cobra in the 1970s. Bell used systems from its Model 309 to develop the AH-1T. This version had a lengthened tailboom and fuselage with an upgraded transmission and engines from the 309. Bell designed the AH-1T to be more reliable and easier to maintain in the field. The version was given full TOW missile capability with targeting system and other sensors. An advanced version, known as the AH-1T+ with more powerful T700-GE-700 engines and advanced avionics was proposed to Iran in the late 1970s, but the overthrow of the Shah of Iran resulted in the sale being canceled.

In the early 1980s, the U.S. Marine Corps sought a new navalized helicopter, but it was denied funding to buy the AH-64 Apache by Congress in 1981. The Marines in turn pursued a more powerful version of the AH-1T. Other changes included modified fire control systems to carry and fire AIM-9 Sidewinder and AGM-114 Hellfire missiles. The new version was funded by Congress and received the AH-1W designation. Deliveries of AH-1W SuperCobras totaled 179 new-built helicopters plus 43 upgrades of AH-1Ts.

The AH-1T+ demonstrator and AH-1W prototype was later tested with a new experimental composite four blade main rotor system. The new system offered better performance, reduced noise and improved battle damage tolerance. Lacking a USMC contract, Bell developed this new design into the AH-1Z with its own funds. By 1996, the Marines were again not allowed to order the AH-64. Developing a marine version of the Apache would have been expensive and it was likely that the Marine Corps would be its only customer. They instead signed a contract for upgrading 180 AH-1Ws into AH-1Zs.

The AH-1Z Viper features several design changes. The AH-1Z's two redesigned wing stubs are longer with each adding a wing-tip station for a missile such as the AIM-9 Sidewinder. Each wing has two other stations for 70 mm (2.75 in) Hydra rocket pods, or AGM-114 Hellfire quad missile launcher. The Longbow radar can be mounted on a wing tip station

General characteristics

- **Crew:** 2: pilot, co-pilot/gunner (CPG)
- **Length:** 53 ft 5 in (16.3 m) (with both rotors turning)
- **Rotor diameter:** 43 ft 11 in (13.4 m)
- **Height:** 13 ft 5 in (4.1 m)
- **Empty weight:** 6,610 lb (2,998 kg)
- **Max. takeoff weight:** 10,000 lb (4,540 kg)
- **Powerplant:** 1 × Pratt & Whitney Canada T400-CP-400 (PT6T-3 Twin-Pac) turboshaft, 1,800 shp (1,342 kW)
- **Total engine output:** 1,530 shp (1,125 kW) limited by helicopter drivetrain
- **Rotor systems**: 2 blades on main rotor, 2 blades on tail rotor
- **Fuselage length:** 45 ft 9 in (13.5 m)

- **Stub wing span:** 10 ft 9 in (3.28 m)

Performance

- **Never exceed speed:** 190 knots (219 mph, 352 km/h)
- **Maximum speed:** 152 knots (175 mph, 282 km/h)
- **Range:** 311 nmi (358 mi, 576 km)
- **Service ceiling:** 10,500 ft (3,215 m)
- **Rate of climb:** 1,090 ft/min (5.54 m/s)

Armament

- 20 mm (0.787 in) M197 3-barreled gatling cannon in the M97 turret (750 rounds ammo capacity)
- 2.75 in (70 mm) Mk 40 or Hydra 70 rockets - 14 rockets mounted in a variety of launchers
- 5 in (127 mm) Zuni rockets - 8 rockets in two 4-round LAU-10D/A launchers
- AIM-9 Sidewinder anti-aircraft missiles - 1 mounted on each hardpoint

Exhibit 3 - Aircraft Information

AH-1Z Viper

The **Bell AH-1Z Viper** is a twin-engine attack helicopter based on the AH-1W SuperCobra, that was developed for the United States Marine Corps. The AH-1Z features a four-blade, bearingless, composite main rotor system, uprated transmission, and a new target sighting system. The AH-1Z is part of the H-1 upgrade program. It is also called "Zulu Cobra" in reference to its variant letter.

Aspects of the AH-1Z date back to the Bell 249 in 1979, which was basically an AH-1S equipped with the four-blade main rotor system from the Bell 412. This helicopter demonstrated Bell's *Cobra II* design at the Farnborough Airshow in 1980. The Cobra II was to be equipped with Hellfire missiles, a new targeting system and improved engines. Later came the Cobra 2000 proposal which included General Electric T700 engines and a four-blade rotor. This design drew interest from the US Marine Corps, but funding was not available. In 1993, Bell proposed an AH-1W-based version for the UK's new attack helicopter program. The derivative design, named *CobraVenom*, featured a modern digital cockpit and could carry TOWs, Hellfire or Brimstone missiles. The CobraVenom design was altered in 1995 by changing to a four-blade rotor system. The design lost to the AH-64D later that year however.

The AH-1Z incorporates new rotor technology with upgraded military avionics, weapons systems, and electro-optical sensors in an integrated weapons platform. It has improved survivability and can find targets at longer ranges and attack them with precision weapons.

The AH-1Z's new bearingless, hingeless rotor system has 75% fewer parts than that of four-bladed articulated systems. The blades are made of composites, which have an increased ballistic survivability, and there is a semiautomatic folding system for storage aboard amphibious assault ships. Its two redesigned wing stubs are longer, with each adding a wing-tip station for a missile such as the AIM-9 Sidewinder. Each wing has two other stations for 2.75-inch (70 mm) Hydra 70 rocket pods, or AGM-114 Hellfire quad missile launchers. The Longbow radar can also be mounted on a wing tip station.

The Z-model's integrated avionics system (IAS) has been developed by Northrop Grumman. The system includes two mission computers and an automatic flight control system. Each crew station has two 8x6-inch multifunction liquid crystal displays (LCD) and one 4.2x4.2-inch dual function LCD display. The communications suite combines a US Navy RT-1824 integrated radio, UHF/VHF, COMSEC and modem in a single unit. The navigation suite includes an embedded GPS inertial navigation system (EGI), a digital map system and Meggitt's low-airspeed air data subsystem, which allows weapons delivery when hovering.

The crew are equipped with the Thales "Top Owl" helmet-mounted sight and display system. The Top Owl has a 24-hour day/night capability and a binocular display with a 40° field of view. Its visor projection provides forward looking infrared (FLIR) or video imagery. The AH-1Z has survivability equipment including the Hover Infrared Suppression System (HIRSS) to cover engine exhausts, countermeasure dispensers, radar warning, incoming/on-way missile warning and on-fuselage laser spot warning systems.

The Lockheed Martin target sight system (TSS) incorporates a third-generation FLIR sensor. The TSS provides target sighting in day, night or adverse weather conditions. The system has various view modes and can track with FLIR or by TV. The same system is also used on the UH-1Y Venom and the KC-130J Harvest HAWK.

General characteristics

- **Crew:** 2: pilot, co-pilot/gunner (CPG)
- **Capacity:** 6,661 lb (3,021 kg)
- **Length:** 58 ft 3 in (17.8 m)
- **Rotor diameter:** 48 ft (14.6 m)
- **Height:** 14 ft 4 in (4.37 m)
- **Disc area:** 1,808 ft² (168.0 m²)
- **Empty weight:** 12,300 lb (5,580 kg)
- **Useful load:** 5,764 lb (2,620 kg)
- **Max. takeoff weight:** 18,500 lb (8,390 kg)
- **Powerplant:** 2 × General Electric T700-GE-401C turboshaft, 1,800 shp (1,340 kW) each
- **Rotor systems:** 4 blades on main rotor, 4 blades on tail rotor

Performance

- **Never exceed speed:** 222 knots (255 mph, 411 km/h) in a dive
- **Cruise speed:** 160 kn (184 mph, 296 km/h)
- **Range:** 370 nmi (426 mi, 685 km)
- **Combat radius:** 125 nmi (144 mi, 231 km) with 2,500 lb (1,130 kg) payload
- **Service ceiling:** 20,000+ ft (6,100+ m)
- **Rate of climb:** 2,790 ft/min (14.2 m/s)

Armament

- **Guns:** 1 x 20 mm (0.787 in) M197 3-barreled gatling cannon in the A/A49E-7 turret (750 round ammo capacity)
- **Hardpoints:** Up to 6 pylon stations on stub wing
- **Rockets:** 2.75 in (70 mm) Hydra 70 rockets – Mounted in LAU-68C/A (7 shot) or LAU-61D/A (19 shot) launchers
- **Missiles:**
    - AIM-9 Sidewinder air-to-air missiles – 1 mounted on each wing tip station (total of 2)
    - AGM-114 Hellfire air-to-surface missiles – Up to 16 missiles mounted in four 4-round M272 missile launchers, two on each wing

Exhibit 3 - Aircraft Information

AH-64D Longbow Apache

The **Boeing AH-64 Apache** is a four-blade, twin-engine attack helicopter with a tailwheel-type landing gear arrangement, and a tandem cockpit for a two-man crew. Originally, the Apache started life as the *Model 77* developed by Hughes Helicopters for the United States Army's Advanced Attack Helicopter program to replace the AH-1 Cobra, and was first flown on 30 September 1975. The AH-64 was introduced to U.S. Army service in April 1986.

The AH-64 Apache features a nose-mounted sensor suite for target acquisition and night vision systems. It is armed with a 30-millimeter (1.2 in) M230 Chain Gun carried between the main landing gear, under the aircraft's forward fuselage. It has four hardpoints mounted on stub-wing pylons, typically carrying a mixture of AGM-114 Hellfire missiles and Hydra 70 rocket pods. The AH-64 has a large amount of systems redundancy to improve combat survivability.

The U.S. Army selected the YAH-64, by Hughes Helicopters, over the Bell YAH-63 in 1976, and later approved full production in 1982. McDonnell Douglas continued production and

development after purchasing Hughes Helicopters from Summa Corporation in 1984. The first production AH-64D Apache Longbow, an upgraded version of the original Apache, was delivered to the Army in March 1997. Production has been continued by Boeing Defense, Space & Security; over 1,000 AH-64s have been produced to date.

The U.S. Army is the primary operator of the AH-64; it has also become the primary attack helicopter of multiple nations, including Greece, Japan, Israel, the Netherlands and Singapore; as well as being produced under license in the United Kingdom as the AgustaWestland Apache. U.S. AH-64s have served in conflicts in Panama, the Persian Gulf, Kosovo, Afghanistan, and Iraq. Israel used the Apache in its military conflicts in Lebanon and the Gaza Strip; both British and U.S. Apaches have seen deployments in Afghanistan and Iraq.

The AH-64 Apache has a four-blade main rotor and a four-blade tail rotor. The crew sits in tandem, with the pilot sitting behind and above the copilot/gunner. The AH-64 is powered by two General Electric T700 turboshaft engines with high-mounted exhausts on either side of the fuselage. Various models of engines have been used on the Apache, those in British service use engines from Rolls-Royce instead of General Electric. In 2004, General Electric Aviation began producing more powerful T700-GE-701D engines, rated at 2,000 shp (1,500 kW) for AH-64Ds.

The crew compartment has shielding between the cockpits, such that at least one crew member can survive hits. The compartment and the rotor blades are designed to sustain a hit from 23-millimeter (0.91 in) rounds. The airframe includes some 2,500 pounds (1,100 kg) of protection and has a self-sealing fuel system to protect against ballistic projectiles. The aircraft was designed to meet the crashworthiness requirements of MIL-STD-1290, which specifies minimum requirement for crash impact energy attenuation to minimize crew injuries and fatalities. This was achieved through incorporation of increased structural strength, crashworthy landing gear, seats and fuel system. Up to six AH-64 Apaches can be safely fitted inside the cargo hold of a USAF Lockheed C-5 Galaxy.

Avionics and targeting

One of the revolutionary features at the introduction of the Apache was its helmet mounted display, the Integrated Helmet and Display Sighting System (IHADSS); among other abilities the pilot or gunner can slave the helicopter's 30 mm automatic M230 Chain Gun to his helmet, making the gun track head movements to point at where he looks. The M230E1 can be alternatively fixed to a locked forward firing position, or controlled via the Target Acquisition and Designation System (TADS). The AH-64's standard of performance for aerial gunnery is to achieve at least 1 hit for every 30 shots fired at a wheeled vehicle at a range of 800–1,200 m (870–1,300 yd).

The AH-64 is designed to endure front-line environments and to operate during the day or night and in adverse weather via its avionics and onboard sensor suites. These systems include the Target Acquisition and Designation System, Pilot Night Vision System (TADS/PNVS), passive infrared countermeasures, GPS, and the IHADSS. A newer system that is replacing TADS/PNVS is Arrowhead (MTADS); it is manufactured by Lockheed Martin, a contract was issued in February 2005 to begin equipping all U.S. Apaches.

The AH-64 is adaptable to numerous different roles within its context as Close Combat Attack (CCA), it has a customizable weapons loadout mounted on stub-wings for the role desired. In addition to the 30-mm M230E1 Chain Gun, the Apache carries a range of external stores on its stub-wing pylons, typically a mixture of AGM-114 Hellfire anti-tank missiles, and Hydra 70 general-purpose unguided 70 mm (2.76 in) rockets.

Starting in the late 1980s, the Stinger and AIM-9 Sidewinder air-to-air missiles and the AGM-122 Sidearm anti-radiation missile were evaluated for use upon the AH-64. The Stinger was initially selected over the AIM-9, but the U.S. Army is considering the Starstreak air-to-air missile instead. External fuel tanks can also be carried on the stub wings to increase range and mission time. The stub-wing pylons have mounting points which make maintenance easier; these mountings can be used to secure personnel to the wings for transport for emergencies.

General characteristics

- **Crew:** 2 (pilot, and co-pilot/gunner)
- **Length:** 58.17 ft (17.73 m) (with both rotors turning)
- **Rotor diameter:** 48 ft 0 in (14.63 m)
- **Height:** 12.7 ft (3.87 m)
- **Disc area:** 1,809.5 ft² (168.11 m²)
- **Empty weight:** 11,387 lb (5,165 kg)
- **Loaded weight:** 17,650 lb (8,000 kg)
- **Max. takeoff weight:** 23,000 lb (10,433 kg)
- **Powerplant:** 2 × General Electric T700-GE-701 and later upgraded to T700-GE-701C (1990–present) & T700-GE-701D (AH-64E) turboshafts, -701: 1,690 shp, −701C: 1,890 shp, −701D: 2,000 shp (-701: 1,260 kW, −701C: 1,409 kW, −701D: 1,490 kW) each
- **Fuselage length**: 49 ft 5 in (15.06 m)
- **Rotor systems**: 4 blade main rotor, 4 blade tail rotor in non-orthogonal alignment

Performance

- **Never exceed speed:** 197 knots (227 mph, 365 km/h)
- **Maximum speed:** 158 knots (182 mph, 293 km/h)
- **Cruise speed:** 143 knots (165 mph, 265 km/h)
- **Range:** 257 nmi (295 mi, 476 km) with Longbow radar mast
- **Combat radius:** 260 nmi (300 mi, 480 km)
- **Ferry range:** 1,024 nmi (1,180 mi, 1,900 km)
- **Service ceiling:** 21,000 ft (6,400 m) minimum loaded
- **Rate of climb:** 2,500 ft/min (12.7 m/s)
- **Disc loading:** 9.80 lb/ft² (47.9 kg/m²)
- **Power/mass:** 0.18 hp/lb (0.31 kW/kg)

Armament

- **Guns:** 1× 30 mm (1.18 in) M230 Chain Gun with 1,200 rounds as part of the Area Weapon Subsystem

- **Hardpoints:** Four pylon stations on the stub wings. Longbows also have a station on each wingtip for an AIM-92 ATAS twin missile pack.
- **Rockets:** Hydra 70 70 mm, and CRV7 70 mm air-to-ground rockets
- **Missiles:** Typically AGM-114 Hellfire variants; AIM-92 Stinger may also be carried.

Avionics

- Lockheed Martin / Northrop Grumman AN/APG-78 *Longbow* fire-control radar (Note: can only be mounted on the AH-64D)

Exhibit 3 - Aircraft Information

CH-46 Sea Knight

The **Boeing Vertol CH-46 Sea Knight** is a medium-lift tandem rotor transport helicopter. It is used by the United States Marine Corps (USMC) to provide all-weather, day-or-night assault transport of combat troops, supplies and equipment. Additional tasks include combat support, search and rescue (SAR), support for forward refueling and rearming points, CASEVAC and Tactical Recovery of Aircraft and Personnel (TRAP). The Sea Knight was also the U.S. Navy's standard medium-lift utility helicopter until it was phased out in favor of the MH-60S Knighthawk in the early 2000s.

Canada also operated the Sea Knight, designated as CH-113, and operated them in the SAR role until 2004. Other export customers include Japan, Sweden, and Saudi Arabia. The commercial version is the **BV 107-II**, commonly referred to simply as the "Vertol".

The CH-46 has tandem contrarotating rotors powered by two GE T58 turboshaft engines. The engines are mounted on each side of the rear rotor pedestal with a driveshaft to the forward rotor. The engines are coupled so either could power both rotors in an emergency. The rotors feature three blades and can be folded for on-ship operations. The CH-46 has fixed tricycle landing gear, with twin wheels on all three units. The gear configuration causes a nose-up stance to

facilitate cargo loading and unloading. The main gear are fitted in rear sponsons that also contain fuel tanks with a total capacity of 350 US gallons (1,438 L).

The CH-46 has a cargo bay with a rear loading ramp that could be removed or left open in flight for extended cargo or for parachute drops. An internal winch is mounted in the forward cabin and can be used to pull external cargo on pallets into the aircraft via the ramp and rollers. A belly sling hook (cargo hook) which is usually rated at 10,000 lb (4,500 kg). could be attached for carrying external cargo. Although the hook is rated at 10,000 lb (4,500 kg)., the limited power produced by the engines preclude the lifting of such weight. It usually has a crew of three, but can accommodate a larger crew depending on mission specifics. For example, a Search and Rescue variant will usually carry a crew of five (Pilot, Co-Pilot, Crew Chief, Swimmer, and Medic) to facilitate all aspects of such a mission. A pintle-mounted 0.50 in (12.7 mm) Browning machine gun is mounted on each side of the helicopter for self-defense. Service in southeast Asia resulted in the addition of armor with the guns.

General characteristics

- **Crew:** 5: 2 pilots, 1 crew chief, 1 aerial gunner/observer, 1 tail gunner
- **Capacity:**
    - 24 troops *or*
    - 15 stretchers and two attendants *or*
    - 2270 kg (5,000 lb)
- **Length:** 44 ft 10 in fuselage (13.66 m
- **Fuselage width:** 7 ft 3 in (2.2 m)
- **Rotor diameter:** 50 ft (15.24 m)
- **Height:** 16 ft 9 in (5.09 m)
- **Disc area:** 3,927 ft² (364.8 m²)
- **Empty weight:** 11,585 lb (5,255 kg)
- **Loaded weight:** 17,396 lb (7,891 kg)
- **Max. takeoff weight:** 24,300 lb (11,000 kg)
- **Powerplant:** 2 × General Electric T58-GE-16 turboshafts, 1,870 shp (1,400 kW) each

Performance

- **Maximum speed:** 166 mph (144 knots, 267 km/h)
- **Range:** 633 mi (550 nmi, 1,020 km)
- **Ferry range:** 690 mi (600 nmi, 1,110 km)
- **Service ceiling:** 17,000 ft (5,180 m)
- **Rate of climb:** 1,715 ft/min (8.71 m/s)
- **Disc loading:** 4.43 lb/ft² (21.6 kg/m²)
- **Power/mass:** 0.215 hp/lb (354 W/kg)

Armament

- **Guns:** 2× Door mounted GAU-15/A .50 BMG (12.7 x 99 mm) machine guns (optional), 1 Ramp mounted M240D 7.62 x 51 mm machine gun (optional)

Exhibit 3 - Aircraft Information

CH-47Chinook

The **Boeing CH-47 Chinook** is an American twin-engine, tandem rotor heavy-lift helicopter. Its primary roles are troop movement, artillery emplacement and battlefield resupply. It has a wide loading ramp at the rear of the fuselage and three external-cargo hooks. With a top speed of 170 knots (196 mph, 315 km/h) the helicopter is faster than contemporary utility and attack helicopters of the 1960s. The CH-47 is among the heaviest lifting Western helicopters. Its name is from the Native American Chinook people.

The Chinook was designed and initially produced by Boeing Vertol in the early 1960s; it is now produced by Boeing Rotorcraft Systems. It is one of the few aircraft of that era – along with the fixed-wing Lockheed C-130 Hercules cargo aircraft – that remain in production and front-line service, with over 1,179 built to date. The helicopter has been sold to 16 nations with the U.S. Army and the Royal Air Force its largest users.

In late 1956, the United States Department of the Army announced plans to replace the Sikorsky CH-37 Mojave, which was powered by piston engines, with a new, turbine-powered helicopter. Turbine engines were also a key design feature of the smaller UH-1 "Huey" utility helicopter.

Following a design competition, in September 1958, a joint Army–Air Force source selection board recommended that the Army procure the Vertol medium transport helicopter. However, funding for full-scale development was not then available, and the Army vacillated on its design requirements. Some in the Army aviation corps thought that the new helicopter should be a light tactical transport aimed at taking over the missions of the old piston-engined H-21 and H-34 helicopters, and consequently capable of carrying about fifteen troops (one squad). Another faction in the Army aviation corps thought that the new helicopter should be much larger to be able to airlift a large artillery piece, and have enough internal space to carry the new MGM-31 "Pershing" Missile System.

Vertol began work on a new tandem-rotor helicopter designated Vertol Model 107 or V-107 in 1957. In June 1958, the U.S. Army awarded a contract to Vertol for the aircraft under the YHC-1A designation. The YHC-1A had a capacity for 20 troops. Three were tested by the Army for deriving engineering and operational data. However, the YHC-1A was considered by most of the Army users to be too heavy for the assault role and too light for the transport role. The decision was made to procure a heavier transport helicopter and at the same time upgrade the UH-1 "Huey" as a tactical troop transport. The YHC-1A would be improved and adopted by the Marines as the CH-46 Sea Knight in 1962. The Army then ordered the larger Model 114 under the designation HC-1B. The pre-production Boeing Vertol YCH-1B made its initial hovering flight on 21 September 1961. In 1962 the HC-1B was redesignated the *CH-47A* under the 1962 United States Tri-Service aircraft designation system.

The CH-47 is powered by two turboshaft engines, mounted on each side of the helicopter's rear pilon and connected to the rotors by driveshafts. Initial models were fitted with Lycoming T-53 jet engines with a combined rating of 2,200 shaft horsepower. Subsequent versions of the Chinook were configured with improved Lycoming engines and later with General Electric turbines. The counter-rotating rotors eliminate the need for an anti-torque vertical rotor, allowing all power to be used for lift and thrust. The ability to adjust lift in either rotor makes it less sensitive to changes in the center of gravity, important for the cargo lifting role. If one engine fails, the other can drive both rotors. The "sizing" of the Chinook was directly related to the growth of the Huey and the Army's tacticians' insistence that initial air assaults be built around the squad. The Army pushed for both the Huey and the Chinook, and this focus was responsible for the acceleration of its air mobility effort.

General characteristics

- **Crew:** 3 (pilot, copilot, flight engineer)
- **Capacity:**
  - 33–55 troops *or*
  - 24 litters and 3 attendants *or*
  - 28,000 lb (12,700 kg) cargo
- **Length:** 98 ft 10 in (30.1 m)
- **Rotor diameter:** 60 ft 0 in (18.3 m)
- **Height:** 18 ft 11 in (5.7 m)
- **Disc area:** 5,600 ft^2 (2,800 ft^2 per rotor disc) (260 m^2)
- **Empty weight:** 23,400 lb (10,185 kg)
- **Loaded weight:** 26,680 lb (12,100 kg)

- **Max. takeoff weight:** 50,000 lb (22,680 kg)
- **Powerplant:** 2 × Lycoming T55-GA-714A turboshaft, 4,733 hp (3,631 kW) each

Performance

- **Maximum speed:** 170 knots (196 mph, 315 km/h)
- **Cruise speed:** 130 kt (149 mph, 240 km/h)
- **Range:** 400 nmi (450 mi, 741 km)
- **Combat radius:** 200 nmi (370.4 km)
- **Ferry range:** 1,216 nmi (1,400 mi, 2,252 km)
- **Service ceiling:** 18,500 ft (5,640 m)
- **Rate of climb:** 1,522 ft/min (7.73 m/s)
- **Disc loading:** 9.5 lb/ft^2 (47 kg/m^2)
- **Power/mass:** 0.28 hp/lb (460 W/kg)

Armament

- up to 3 pintle mounted medium machine guns (1 on loading ramp and 2 at shoulder windows), generally 7.62 mm (0.308 in) M240/FN MAG machine guns

Avionics

- Rockwell Collins Common Avionics Architecture System (CAAS) (MH-47G/CH-47F)

Exhibit 3 - Aircraft Information

CH-53E Super Stallion

The **Sikorsky CH-53E Super Stallion** is the largest and heaviest helicopter in the United States military. As the Sikorsky S-80 it was developed from the CH-53 Sea Stallion, mainly by adding a third engine, a seventh blade to the main rotor and canting the tail rotor 20 degrees. It was built by Sikorsky Aircraft for the United States Marine Corps. The less common **MH-53E Sea Dragon** fills the United States Navy's need for long range mine sweeping or Airborne Mine Countermeasures (AMCM) missions, and perform heavy-lift duties for the Navy. Under development is the CH-53K, which will be equipped with new engines, new composite rotor blades, and a wider cabin.

The CH-53 was the product of the U.S. Marines' "Heavy Helicopter Experimental" (HH(X)) competition begun in 1962. Sikorsky's S-65 was selected over Boeing Vertol's modified CH-47 Chinook version. The prototype YCH-53A first flew on 14 October 1964. The helicopter was designated "CH-53A Sea Stallion" and delivery of production helicopters began in 1966. The first CH-53As were powered by two General Electric T64-GE-6 turboshaft engines with 2,850 shp (2,125 kW) and had a maximum gross weight of 46,000 lb (20,865 kg) including 20,000 lb (9,072 kg) in payload.

Variants of the original CH-53A Sea Stallion include the RH-53A/D, HH-53B/C, CH-53D, CH-53G, and MH-53H/J/M. The RH-53A and RH-53D were used by the US Navy for mine sweeping. The CH-53D included a more powerful version of the General Electric T64 engine, used in all H-53 variants, and external fuel tanks. The CH-53G was a version of the CH-53D produced in West Germany for the German Army.

The US Air Force's HH-53B/C "Super Jolly Green Giant" were for special operations and combat rescue and were first deployed during the Vietnam War. The Air Force's MH-53H/J/M Pave Low helicopters were the last of the twin engined H-53s and were equipped with extensive avionics upgrades for all weather operation.

Although dimensionally similar, the three engine CH-53E Super Stallion or Sikorsky S-80 is a much more powerful aircraft than the original Sikorsky S-65 twin engined CH-53A Sea Stallion. The CH-53E also added a larger main rotor system with a seventh blade.

The CH-53E can transport up to 55 troops or 30,000 lb (13,610 kg) of cargo and can carry external slung loads up to 36,000 lb (16,330 kg). The Super Stallion has a cruise speed of 173 mph (278 km/h) and a range of 621 miles (1,000 km). The helicopter is fitted with a forward extendable in-flight refueling probe and it can also hoist hose refuel from a surface ship while in hover mode. It can carry three machine guns: one at the starboard side crew door, one at the port window, just behind the copilot, and one at the tail ramp. The CH-53E also has chaff-flare dispensers.

The MH-53E features enlarged side mounted fuel sponsons and is rigged for towing its mine sweeping "sled" from high above the dangerous naval mines. The Sea Dragon is equipped with mine countermeasures systems, including twin machine guns. Its digital flight-control system includes features specifically designed to help towing mine sweeping gear.

Upgrades to the CH-53E have included the Helicopter Night Vision System (HNVS), improved .50 BMG (12.7 mm) GAU-21/A and M3P machine guns, and AAQ-29A forward looking infrared (FLIR) imager.

The CH-53E and the MH-53E are the largest helicopters in the Western world, while the CH-53K now being developed will be even larger. They are fourth in the world to the Russian Mil Mi-26 and Mil V-12, which can lift more than 22 tons (20 tonnes) and 44 tons (40 tonnes), respectively and the Mi-26's predessessor Mil Mi-6, which has less payload (12 tonnes) but is bigger and has a higher MTOW at 42 tonnes.

General characteristics

- **Crew:** 5: 2 pilots, 1 crew chief/right gunner, 1 left gunner, 1 tail gunner (combat crew)
- **Capacity:** 37 troops (55 with centerline seats installed)
- **Payload:** internal: 30,000 lb or 13,600 kg (external: 32,000 lb or 14,500 kg)
- **Length:** 99 ft 1/2 in (30.2 m)
- **Rotor diameter:** 79 ft (24 m)
- **Height:** 27 ft 9 in (8.46 m)

- **Disc area:** 4,900 ft² (460 m²)
- **Empty weight:** 33,226 lb (15,071 kg)
- **Max. takeoff weight:** 73,500 lb (33,300 kg)
- **Powerplant:** 3 × General Electric T64-GE-416/416A turboshaft, 4,380 shp (3,270 kW) each
- **Rotor systems:** 7 blades on main rotor, 4 blades on anti-torque tail rotor

Performance

- **Maximum speed:** 170 knots (196 mph, 315 km/h)
- **Cruise speed:** 150 kt (173 mph, 278 km/h)
- **Range:** 540 nmi (621 mi, 1,000 km)
- **Ferry range:** 990 nmi (1,139 mi, 1,833 km)
- **Service ceiling:** 18,500 ft (5,640 m)
- **Rate of climb:** 2,500 ft/min (13 m/s)

Armament

- **Guns:**
    - 2× .50 BMG (12.7 x 99 mm) window-mounted GAU-15/A machine guns
    - 1× .50 BMG (12.7 x 99 mm) ramp mounted weapons system, GAU-21 (M3M mounted machine gun)
- **Other:** Chaff and flare dispensers

Exhibit 3 - Aircraft Information

MH-6 Little Bird

The **MH-6 Little Bird** (nicknamed the *Killer Egg*), and its attack variant **AH-6**, are light helicopters used for special operations in the United States Army. Originally based on a modified OH-6A, it was later based on the MD 500E, with a single five-bladed main rotor. The newest version, the **MH-6M**, is based on the MD 530F and has a single, six-bladed main rotor and four-bladed tail rotor.

The A/MH-6 was started in 1960, when the U.S. Army issued Technical Specification 153 for a Light Observation Helicopter (LOH) that could perform personnel transport, escort and attack missions, casualty evacuation, and observation. Twelve companies took part in the competition and Hughes Tool Company's Aircraft Division submitted the **Model 369**. Two designs, those submitted by Fairchild-Hiller and Bell, were selected as finalists by the Army-Navy design competition board, but the Army later included the helicopter from Hughes as well.

The first Model 369 prototype flew on 27 February 1963. Originally designated the **YHO-6A** under the Army's designation system, the aircraft was redesignated the **YOH-6A** under the Department of Defense's new joint system in 1962. Five prototypes were built, fitted with a 252 shp (188 kW) Allison T63-A-5A, and delivered to the U.S. Army at Fort Rucker, Alabama to compete against the other 10 prototype aircraft submitted by Bell and Fairchild-Hiller. In the end, Hughes won the competition and the Army awarded a contract for production in May 1965. The initial order was for 714 aircraft, but that was later increased to 1,300 with an option to buy another 114. Seventy helicopters were built in the first month.

This agile, unarmed helicopter is outfitted with outboard "benches" designed to ferry up to three commandos on each side. There is also a gunship variant, the AH-6. Painted black for nighttime operations, this small aircraft can conduct rapid insertions and extractions of special operations forces into areas its larger brother, the MH-60 Black Hawk, cannot.

General characteristics

- **Crew:** 2
- **Capacity:** up to 6 passengers for MH-6s
- **Length:** 32.6 ft (9.80 m)
- **Rotor diameter:** 27.4 ft (8.30 m)
- **Height:** 9.8 ft (3.0 m)
- **Empty weight:** 1,591 lb (722 kg)
- **Useful load:** 1,509 lb (684 kg)
- **Max. takeoff weight:** 3,100 lb (1,406 kg)
- **Powerplant:** 1 × One T63-A-5A or T63-A-700 turboshaft, 425 shp (317 kW) takeoff power (derated); 375 shp (280 kW) continuous power
- **Fuselage Length:** 24.6 ft (7.50 m)
- **Fuselage Width:** 4.6 ft (1.4 m)
- **Rotor systems:** 6 blades on main rotor, 4 blades on tail rotor
- **Useful fuel capacity:** 62 US gal (242 L) or 403 lb (183 kg)

Performance

- **Maximum speed:** 152 knots (175 mph, 282 km/h)
- **Cruise speed:** 135 knots (155 mph, 250 km/h)
- **Range:** 232 nmi (430 km, 267 mi) at 5,000 ft
- **Service ceiling:** 18,700 ft (5,700 m)
- **Rate of climb:** 2,061 ft/min (10.5 m/s)

Armament

- **Guns:**
  - 1× 30 mm (1.18 in) M230 Chain Gun; *or*
  - 2× 12.7 mm (.50 cal) GAU-19; *or*
  - 2× 7.62 mm (0.30 in) M134 Minigun
- **Rockets:**
  - 2× LAU-68D/A 7-tubes rocket pods firing 2.75 in (70 mm) Hydra 70 rocket projectiles

- **Missiles:**
    - Anti-tank guided missile: 2× AGM-114 Hellfire
    - Anti-air missile: 2× FIM-92 Stinger for self-defense

The armed variant is equipped with a lightweight universal mounting platform which can accommodate two M134 miniguns, two M260 7-shot Hydra 70 rocket pods. Alternately, the AH-6 can be armed with Hellfire anti-tank missiles, air-to-air Stingers, Mk-19 40 mm automatic grenade launchers, or .50 caliber machine guns

Exhibit 3 - Aircraft Information

MH-60G/HH-60G Pave Hawk

The **Sikorsky MH-60G/HH-60G Pave Hawk** is a twin turboshaft engine helicopter in service with the United States Air Force. It is a derivative of the UH-60 Black Hawk and incorporates the US Air Force PAVE electronic systems program. The HH-60/MH-60 is a member of the Sikorsky S-70 family.

The MH-60G Pave Hawk's primary mission is insertion and recovery of special operations personnel, while the HH-60G Pave Hawk's core mission is recovery of personnel under stressful conditions, including search and rescue. Both versions conduct day or night operations into hostile environments. Because of its versatility, the HH-60G may also perform peace-time operations. Such tasks include civil search and rescue, emergency aeromedical evacuation (MEDEVAC), disaster relief, international aid, counter-drug activities and NASA space shuttle support.

In 1981, the U.S. Air Force chose the UH-60A Black Hawk to replace its HH-3E Jolly Green Giant helicopters. After acquiring some UH-60s, the Air Force began upgrading each with an air refueling probe and additional fuel tanks in the cabin. The machine guns were changed from

0.308 in (7.62 mm) M60s to 0.50 in (12.7 mm) XM218s. These helicopters were referred to as "Credible Hawks" and entered service in 1987.

Afterward, the Credible Hawks and new UH-60As were upgraded and designated MH-60G Pave Hawk. These upgrades were to be done in a two step process. But funding only allowed 16 Credible Hawks to receive the second step equipment. These helicopters were allocated to special operations use. The remaining 82 Credible Hawks received the first step upgrade equipment and were used for combat search and rescue. In 1991, these search and rescue Pave Hawks were redesignated HH-60G.

The Pave Hawk is a highly-modified version of the Sikorsky UH-60 Black Hawk. It features an upgraded communications and navigation suite that includes an integrated inertial navigation/global positioning/Doppler navigation systems, satellite communications, secure voice, and Have Quick communications. The term PAVE stands for Precision Avionics Vectoring Equipment.

All HH-60Gs have an automatic flight control system, night vision goggles lighting and forward looking infrared system that greatly enhances night low-level operations. Additionally, some Pave Hawks have color weather radar and an engine/rotor blade anti-ice system that gives the HH-60G an all-weather capability. Pave Hawk mission equipment includes a retractable in-flight refueling probe, internal auxiliary fuel tanks, two crew-served (or pilot-controlled) 7.62 mm miniguns or .50-caliber machine guns and an 8,000 pound (3,600 kg) capacity cargo hook. To improve air transportability and shipboard operations, all HH-60Gs have folding rotor blades.

Pave Hawk combat enhancements include a radar warning receiver, infrared jammer and a flare/chaff countermeasure dispensing system. HH-60G rescue equipment includes a hoist capable of lifting a 600 pound (270 kg) load from a hover height of 200 feet (60 m), and a personnel locating system. A number of Pave Hawks are equipped with an over-the-horizon tactical data receiver that is capable of receiving near real-time mission update information.

General characteristics

- **Crew:** 4 (2 pilots, flight engineer, gunner)
- **Capacity:** max. crew 6, 8–12 troops, plus litters and/or other cargo
- **Length:** 64 ft 10 in (17.1 m)
- **Rotor diameter:** 53 ft 8 in (14.1 m)
- **Height:** 16 ft 8 in (5.1 m)
- **Empty weight:** 16,000 lb (7,260 kg)
- **Max. takeoff weight:** 22,000 lb (9,900 kg)
- **Powerplant:** 2 × two General Electric T700-GE-700/701C free-turbine turboshafts, 1,630 shp (1,220 kW) each

Performance

- **Maximum speed:** 195 knots (224 mph, 360 km/h)
- **Cruise speed:** 159 kt (184 mph, 294 km/h)

- **Range:** 373 mi (internal fuel), or 508 mi (with external tanks) (600 km, or 818 km)
- **Service ceiling:** 14,000 ft (4,267 m)

Armament

- 2x 7.62 mm (0.308 in) miniguns *or*
- 2x 0.50 in (12.7 mm) GAU-18/As

Onboard Systems

- INS/GPS/Doppler navigation
- SATCOM satellite communications
- Secure/anti-jam communications
- LARS (Lightweight Airborne Recovery System) range/steering radio to compatible survivor radios
- Automatic flight control
- NVG night vision goggle lighting
- FLIR forward looking infra-red radar
- Color weather radar
- Engine/rotor blade anti-ice system
- Retractable In-flight refueling probe
- Integral rescue hoist
- RWR combat enhancement
- IR infra-red jamming unit
- flare/chaff countermeasure dispensing system

Exhibit 3 - Aircraft Information

OH-58D Kiowa

The **Bell OH-58 Kiowa** is a family of single-engine, single-rotor, military helicopters used for observation, utility, and direct fire support. Bell Helicopter manufactured the OH-58 for the United States Army based on its Model 206A JetRanger helicopter. The OH-58 has been in continuous use by the U.S. Army since 1969.

The latest model, the *OH-58D Kiowa Warrior*, is primarily operated in an armed reconnaissance role in support of ground troops. The OH-58 has been exported to Austria, Canada, the Dominican Republic, Taiwan, and Saudi Arabia. It has also been produced under license in Australia.

On 14 October 1960, the United States Navy asked 25 helicopter manufacturers on behalf of the Army for proposals for a Light Observation Helicopter (LOH). Bell Helicopter entered the competition along with 12 other manufacturers, including Hiller Aircraft and Hughes Tool Co.,

Aircraft Division. Bell submitted the *D-250* design, which would be designated as the *YHO-4*. On 19 May 1961, Bell and Hiller were announced as winners of the design competition.

Light Observation Helicopter (LOH)

Bell developed the D-250 design into the *Model 206* aircraft, redesignated as *YOH-4A* in 1962, and produced five prototype aircraft for the Army's test and evaluation phase. The first prototype flew on 8 December 1962. The YOH-4A also became known as the *Ugly Duckling* in comparison to the other contending aircraft. Following a flyoff of the Bell, Hughes and Fairchild-Hiller prototypes, the Hughes OH-6 Cayuse was selected in May 1965.

When the YOH-4A was rejected by the Army, Bell went about solving the problem of marketing the aircraft. In addition to the image problem, the helicopter lacked cargo space and only provided cramped quarters for the planned three passengers in the back. The solution was a fuselage redesigned to be more sleek and aesthetic, adding 16 cubic feet (0.45 m^3) of cargo space in the process. The redesigned aircraft was designated as the *Model 206A*, and Bell President Edwin J. Ducayet named it the *JetRanger* denoting an evolution from the popular Model 47J *Ranger*.

In 1967, the Army reopened the LOH competition for bids because Hughes Tool Co. Aircraft Division could not meet the contractual production demands. Bell resubmitted for the program using the Bell 206A. Fairchild-Hiller failed to resubmit their bid with the YOH-5A, which they had successfully marketed as the FH-1100. In the end, Bell underbid Hughes to win the contract and the Bell 206A was designated as the OH-58A. Following the U.S. Army's naming convention for helicopters, the OH-58A was named Kiowa in honor of the Native American tribe.

Advanced Scout Helicopter

In the 1970s, the U.S. Army began evaluating the need to improve the capabilities of their scout aircraft. The OH-58A lacked the power for operations in areas that exposed the aircraft to high altitude and hot temperatures, areas where the ability to acquire targets was a critical deficiency in the tactical warfare capabilities of Army aviation.

The power shortcoming caused other issues as the Army anticipated the AH-64A's replacement of the venerable AH-1 in the Attack battalions of the Army. The Army began shopping the idea of an Aerial Scout Program to industry as a prototype exercise to stimulate the development of advanced technological capabilities for night vision and precision navigation equipment. The stated goals of the program included prototypes that would:

...possess an extended target acquisition range capability by means of a long-range stabilized optical subsystem for the observer, improved position location through use of a computerized navigation system, improved survivability by reducing aural, visual, radar, and infrared signatures, and an improved flight performance capability derived from a larger engine to provide compatibility with attack helicopters.

In early March 1974, the Army created a special task force at Fort Knox to develop the system requirements for the Aerial Scout Helicopter program, and in 1975 the task force had formulated the requirements for the Advanced Scout Helicopter (ASH) program. The requirements were formulated around an aircraft capable of performing in day, night, and adverse weather and compatible with all the advanced weapons systems planned for development and fielding into the 1980s. The program was approved by the System Acquisition Review Council and the Army prepared for competitive development to begin the next year. However, as the Army tried to get the program off the ground, Congress declined to provide funding for it in the fiscal year 1977 budget and the ASH Project Manager's Office (PM-ASH) was closed on 30 September 1976.

While no development occurred during the next few years, the program survived as a requirement without funding. On 30 November 1979, the decision was made to defer development of an advanced scout helicopter in favor of pursuing modification of existing airframes in the inventory as a near term scout helicopter (NTSH) option. The development of a mast-mounted sight would be the primary focus to improve the aircraft's ability to perform reconnaissance, surveillance, and target acquisition missions while remaining hidden behind trees and terrain. Both the UH-1 and the OH-58 were evaluated as NTSH candidates, but the UH-1 was dropped from consideration due to its larger size and ease of detection. The OH-58, on the other hand demonstrated a dramatic reduction in detectability with an MMS.

On 10 July 1980, the Army decided that the NTSH would be a competitive modification program based on developments in the commercial helicopter industry, particularly Hughes Helicopters development of the Hughes 500D which provided significant improvements over the OH-6.

Army Helicopter Improvement Program (AHIP)

The Army's decision to acquire the NTSH resulted in the "Army Helicopter Improvement Program (AHIP)". Both Bell Helicopter and Hughes Helicopters redesigned their scout aircraft to compete for the contract. Bell offered a more robust version of the OH-58 in their model 406 aircraft, and Hughes offered an upgraded version of the OH-6. On 21 September 1981, Bell Helicopter Textron was awarded a development contract. The first prototype flew on 6 October 1983, and the aircraft entered service in 1985 as the OH-58D.

Initially intended to be used in attack, cavalry and artillery roles, the Army only approved a low initial production level and confined the role of the OH-58D to field artillery observation. The Army also directed that a follow-on test be conducted to further evaluate the aircraft due to perceived deficiencies. On 1 April 1986, the Army formed a task force at Fort Rucker, Alabama, to remedy deficiencies in the AHIP. As a result of those deliberations, the Army had planned to discontinue the OH-58D in 1988 and focus on the LHX, but Congress approved $138 million for expanding the program, calling for the AHIP to operate with the Apache as a hunter/killer team; the AHIP would locate the targets, and the Apache would destroy them in a throwback to the traditional OH-58/AH-1 relationship.

The Secretary of the Army directed instead that the aircraft's armament systems be upgraded, based on experience with Task Force 118's performance operating armed OH-58D helicopters in the Persian Gulf in support of Operation Prime Chance, and that the aircraft be used primarily for

scouting and armed reconnaissance. The armed aircraft would be known as the OH-58D Kiowa Warrior, denoting its new armed configuration. Beginning with the production of the 202nd aircraft (s/n 89-0112) in May 1991, all remaining OH-58D aircraft were produced in the Kiowa Warrior configuration. In January 1992, Bell Helicopter received its first retrofit contract to convert all remaining OH-58D Kiowa helicopters to the Kiowa Warrior configuration.

General characteristics

- **Crew:** 2 pilots
- **Length:** 42 ft 2 in (12.85 m)
- **Main rotor diameter:** 35 ft 0 in (10.67 m)
- **Height:** 12 ft $10^{5}/_{8}$ in (3.93 m)
- **Main rotor area:** 14.83 ft^2 (1.38 m^2)
- **Empty weight:** 3,829 lb (1,737 kg)
- **Gross weight:** 5,500 lb (2,495 kg)
- **Powerplant:** 1 × Rolls-Royce T703-AD-700A or 250-C30R/3 turboshaft, 650 hp (485 kW) each

Performance

- **Maximum speed:** 149 mph (241 km/h)
- **Cruise speed:** 127 mph (204 km/h)
- **Range:** 345 miles (555 km)
- **Service ceiling:** 15,000 ft (4,575 m)

Armament

- AGM-114 Hellfire anti-tank missiles
- Hydra 70 rockets
- M296 or M3P .50 cal (12.7 mm) machine gun.
- AIM-92 Stinger air-to-air missiles (no longer used)

Exhibit 3 - Aircraft Information

UH-1N Twin Huey

The **Bell UH-1N Twin Huey** is a medium military helicopter that first flew in April, 1969. The UH-1N has a fifteen seat configuration, with one pilot and fourteen passengers. In cargo configuration the UH-1N has an internal capacity of 220 ft^3 (6.23 m^3). An external load of 5,000 lb (2,268 kg) can be carried by the UH-1N. The **CUH-1N** (later **CH-135**) Twin Huey was the original version, first ordered by the Canadian Forces.

Based on the stretched fuselage Bell 205, the Bell 212 was originally developed for the Canadian Forces (CF) under the designation **CUH-1N Twin Huey**. Later the CF adopted a new designation system and the aircraft was re-designated as the **CH-135 Twin Huey**. The CF approved the development of the aircraft on 1 May 1968 and purchased 50 aircraft, with deliveries commencing in May 1971.

The UH-1N's main rotor is powered by a PT6T-3/T400 Turbo Twin Pac made up of two Pratt & Whitney Canada PT6 turboshaft power turbines driving a single output shaft. They are capable of producing up to 1,342 kW (1,800 shp). Should one engine fail the remaining engine can

deliver 671 kW (900 shp) for 30 minutes or 571 kW (765 shp) enabling the UH-1N to maintain cruise performance at maximum weight.

The United States Marine Corps (USMC) modified a large number of their UH-1Ns with a Stability Control Augmentation System (SCAS) which provides servo inputs to the rotor head to help stabilize the aircraft during flight. This modification removed the gyroscopic "Stabilization Bar" on top of the main rotor head, instead relying on the computer system for stability.

General characteristics

- **Crew:** 4 (Pilot, copilot, crew chief, gunner)
- **Capacity:** 6-8 combat-equipped troops, or equivalent cargo
- **Length:** 41 ft 8 in (12.69 m)
- **Rotor diameter:** 48 ft 0 in (14.6 m)
- **Height:** 14 ft 5 in (4.4 m)
- **Disc area:** 1,808 ft² (168.0 m²)
- **Empty weight:** 6,000 lb (2,721.5 kg)
- **Loaded weight:** 10,500 lb (4,762.7 kg)
- **Useful load:** 4500 lb (2038.0 kg)
- **Max. takeoff weight:** 10,500 lb (4,762.7 kg)
- **Powerplant:** 2 × Pratt & Whitney Canada T400-CP-400 turboshaft, 900 shp (671 kW), (total 1,250 shp) each

Performance

- **Maximum speed:** 130 knots (135 mph, 220 km/h)
- **Cruise speed:** 110 knots (126 mph, 207.3 km/h)
- **Range:** 248 nmi (286 mi, 460 km)
- **Service ceiling:** 17,300 ft (5,273 m)
- **Rate of climb:** 1,755 ft/min (8.9 m/s)
- **Power/mass:** hp/lb (W/kg)

Armament

- 2.75-inch (70 mm) rocket pods,
- GAU-16 .50 Cal. machine gun,
- GAU-17 7.62mm minigun or M240 7.62mm lightweight machine gun

Exhibit 3 - Aircraft Information

UH-1Y Venom

The **Bell UH-1Y Venom** (also called **Super Huey**) is a twin-engine medium size utility helicopter, part of the United States Marine Corps' H-1 upgrade program. The helicopter is also called *Yankee* for its variant letter, Y.

The UH-1Y is currently in full-rate production to replace the USMC's aging fleet of UH-1N Twin Huey light utility helicopters first introduced in the early 1970s. The UH-1Y was to have been remanufactured from UH-1Ns, but in 2005 it was approved for the aircraft to be built as new.

In 1996, the United States Marine Corps launched the H-1 upgrade program by signing a contract with Bell Helicopter for upgrading 100 UH-1Ns into UH-1Ys and upgrading 180 AH-1Ws into AH-1Zs. The H-1 program created completely modernized attack and utility helicopters with considerable design commonality to reduce operating costs. The UH-1Y and AH-1Z share a common tail boom, engines, rotor system, drive train, avionics architecture, software, controls and displays for over 84% identical components.

The Y-model updates an airframe that has been central to the Marine Corps aviation in Iraq. The Huey has many mission requirements including command and control (C^2), escort, reconnaissance, troop transport, medical evacuation and close air support. Typically detachments of 2–4 Hueys have been deployed with detachments of 4–8 Cobras. The forward mounted weaponry of the Cobra combined with the door guns of the Huey provides a 240° field of fire.

Over the years new avionics and radios, in addition to modern door guns and safety upgrades, have greatly increased the UH-1N's empty weight. With a maximum speed of approximately 100 knots (190 km/h) and an inability to lift much more than its own crew, fuel and ammunition, the UH-1N, while useful, is limited in its utility.

The Y-model upgrades pilot avionics to a glass cockpit, adds further safety modifications and provides the UH-1 with a modern FLIR system. However, the biggest improvement is an increase in engine power. By replacing the engines and the two bladed rotor system with four composite blades the Y-model will return the Huey to the utility role for which it was designed. Originally the UH-1Y was to have been remanufactured from UH-1N airframes, but in April 2005 approval was granted to build them as new helicopters.

Bell delivered two UH-1Ys to the U.S. Marine Corps in February 2008. As of September 2009, the UH-1Y is in full-rate production, with the Marine Corps expected to have 21 by the end of the year. The Marine Corps plans to eventually buy 160 of the Y-models to replace their inventory of N-models, with aircraft deliveries to be completed by 2016.

The UH-1Y variant modernizes the UH-1 design. Its most noticeable upgrade over previous variants is a four-bladed, all-composite rotor system designed to withstand ballistics up to 23 mm. A 21-inch (530 mm) insert just forward of the main door has been installed for more capacity. The UH-1Y features upgraded engines and transmission, a digital cockpit with flat panel multifunctional displays, and an 84% parts commonality with the AH-1Z. Compared to the UH-1N, the Y-model has an almost 125% increased payload, almost 50% greater range, a reduction in vibration, and higher cruise speed. The UH-1Y can keep up with the other helicopters it is escorting. The UH-1Y will have more power to maneuver. Ground forces commanders riding in the Y-model will have radios, firepower and the range to match the transport helicopters carrying their troops.

The Lockheed Martin target sight system (TSS) incorporates a third-generation FLIR sensor. The TSS provides target sighting in day, night or adverse weather conditions. The system has various view modes and can track with FLIR or by TV. It is also used on the AH-1Z Viper and the KC-130J Harvest HAWK.

General characteristics

- **Crew:** One or two pilots, plus crew chief, other crew members as mission requires
- **Capacity:** 6,660 lb (3,020 kg) including up to 10 crashworthy passenger seats, 6 litters or equivalent cargo
- **Length:** 58 ft 4 in (17.78 m)
- **Rotor diameter:** 48 ft 10 in (14.88 m)

- **Height:** 14 ft 7 in (4.5 m)
- **Disc area:** 1,808 ft² (168.0 m²)
- **Empty weight:** 11,840 lb (5,370 kg)
- **Useful load:** 6,660 lb (3,020 kg)
- **Max. takeoff weight:** 18,500 lb (8,390 kg)
- **Powerplant:** 2 × General Electric T700-GE-401C turboshaft, 1,828 shp for 2.5 min; 1,546 shp continuous (1,360 kW for 2.5 min; 1,150 kW continuous) each

Performance

- **Never exceed speed:** 198 kn (227 mph, 366 km/h)
- **Maximum speed:** 164 knots (189 mph, 304 km/h) for 30 minutes
- **Cruise speed:** 158 kt, 182 mph, 293 km/h (long range cruise (LRC): 135 kn, 155 mph, 250 km/h)
- **Combat radius:** 130 nmi (150 mi, 241 km) with 2,182 lb, 990 kg payload
- **Endurance:** 3.3 hr
- **Service ceiling:** 20,000+ ft (6,100+ m)
- **Rate of climb:** 2,520 ft/min (12.8 m/s)

Armament

- 2 external stations for 70 mm (2.75 in) Hydra 70 rockets
- 2 pintle mounts for 7.62 mm M240D machine guns, .50 BMG GAU-16/A machine guns, or 7.62 mm GAU-17/A Gatling guns

Exhibit 3 - Aircraft Information

UH-60 Black Hawk

The **Sikorsky UH-60 Black Hawk** is a four-bladed, twin-engine, medium-lift utility helicopter manufactured by Sikorsky Aircraft. Sikorsky submitted the S-70 design for the United States Army's Utility Tactical Transport Aircraft System (UTTAS) competition in 1972. The Army designated the prototype as the *YUH-60A* and selected the Black Hawk as the winner of the program in 1976, after a fly-off competition with the Boeing Vertol YUH-61.

The UH-60A entered service with the U.S. Army in 1979, to replace the Bell UH-1 Iroquois as the Army's tactical transport helicopter. This was followed by the fielding of electronic warfare and special operations variants of the Black Hawk. Improved UH-60L and UH-60M utility variants have also been developed. Modified versions have also been developed for the U.S. Navy, Air Force, and Coast Guard. In addition to U.S. Army use, the UH-60 family has been exported to several nations. Black Hawks have served in combat during conflicts in Grenada, Panama, Iraq, Somalia, the Balkans, Afghanistan, and other areas in the Middle East.

In the late 1960s, the United States Army began forming requirements for a helicopter to replace the UH-1 Iroquois, and designated the program as the Utility Tactical Transport Aircraft System (UTTAS). The Army also initiated the development of a new, common turbine engine for its helicopters that would become the General Electric T700. Based on experience in Vietnam, the Army required significant performance, survivability and reliability improvements from both UTTAS and the new powerplant. The Army released its UTTAS request for proposals (RFP) in January 1972. The RFP also included air transport requirements. Transport aboard the C-130 limited the UTTAS cabin height and length.

The UTTAS requirements for improved reliability, survivability and lower life-cycle costs resulted in features such as dual-engines with improved hot and high altitude performance, and a modular design (reduced maintenance footprint); run-dry gearboxes; ballistically tolerant, redundant subsystems (hydraulic, electrical and flight controls); crashworthy crew (armored) and troop seats; dual-stage oleo main landing gear; ballistically tolerant, crashworthy main structure; quieter, more robust main and tail rotor systems; and a ballistically tolerant, crashworthy fuel system.

Four prototypes were constructed, with the first YUH-60A flying on 17 October 1974. Prior to delivery of the prototypes to the US Army, a preliminary evaluation was conducted in November 1975 to ensure the aircraft could be operated safely during all testing. Three of the prototypes were delivered to the Army in March 1976, for evaluation against the rival Boeing-Vertol design, the YUH-61A, and one was kept by Sikorsky for internal research. The Army selected the UH-60 for production in December 1976. Deliveries of the UH-60A to the Army began in October 1978 and the helicopter entered service in June 1979.

The UH-60 features four-blade main and tail rotors, and is powered by two General Electric T700 turboshaft engines. The main rotor is fully articulated and has elastomeric bearings in the rotor head. The tail rotor is canted and features a rigid crossbeam. The helicopter has a long, low profile shape to meet the Army's requirement for transporting aboard a C-130 Hercules, with some disassembly. It can carry 11 troops with equipment, lift 2,600 lb (1,170 kg) of cargo internally or 9,000 lb (4,050 kg) of cargo (for UH-60L/M) externally by sling.

The Black Hawk helicopter series can perform a wide array of missions, including the tactical transport of troops, electronic warfare, and aeromedical evacuation. A VIP version known as the VH-60N is used to transport important government officials (e.g., Congress, Executive departments) with the helicopter's call sign of "Marine One" when transporting the President of the United States. In air assault operations it can move a squad of 11 combat troops or reposition a 105 mm M119 howitzer with 30 rounds ammunition, and a four-man crew in a single lift. The Black Hawk is equipped with advanced avionics and electronics for increased survivability and capability, such as the Global Positioning System.

The UH-60 can be equipped with stub wings at top of fuselage to carry fuel tanks or various armaments. The initial stub wing system is called External Stores Support System (ESSS). It has two pylons on each wing to carry two 230 US gal (870 L) and two 450 US gal (1,700 L) tanks in total. The four fuel tanks and associated lines and valves form the external extended range fuel system (ERFS). U.S. Army UH-60s have had their ESSS modified into the crashworthy external fuel system (CEFS) configuration, replacing the older tanks with up to four total 200 US gal (760 L) crashworthy tanks along with self-sealing fuel lines. The ESSS can also carry 10,000 lb (4,500 kg) of armament such as rockets, missile and gun pods. The ESSS entered service in 1986. However it was found that with four fuel tanks it would obstruct the firing field of the door guns. To alleviate the issue, the external tank system (ETS) with unswept stub wings to carry two fuel tanks was developed.

The unit cost varies with the version due to the varying specifications, equipment and quantities. For example, the unit cost of the Army's UH-60L Black Hawk is $5.9 million while the unit cost of the Air Force HH-60G Pave Hawk is $10.2 million.

General characteristics

- **Crew:** 2 pilots (flight crew) with 2 crew chiefs/gunners
- **Capacity:** 2,640 lb (1,200 kg) of cargo internally, including 11 troops or 6 stretchers, or 8,000 lb (3,600 kg) (UH-60A) or 9,000 lb (4,100 kg) (UH-60L) of cargo externally
- **Length:** 64 ft 10 in (19.76 m)
- **Fuselage width:** 7 ft 9 in (2.36 m)
- **Rotor diameter:** 53 ft 8 in (16.36 m)
- **Height:** 16 ft 10 in (5.13 m)
- **Disc area:** 2,260 ft² (210 m²)
- **Empty weight:** 10,624 lb (4,819 kg)
- **Loaded weight:** 22,000 lb (9,980 kg)
- **Max. takeoff weight:** 23,500 lb (10,660 kg)
- **Powerplant:** 2 × General Electric T700-GE-701C turboshaft, 1,890 hp (1,410 kW) each

Performance

- **Never exceed speed:** 193 knots (222 mph, 357 km/h)
- **Maximum speed:** 159 kt (183 mph, 295 km/h)
- **Cruise speed:** 150 kt (173 mph, 278 km/h)
- **Combat radius:** 368 mi (320 nmi, 592 km)
- **Ferry range:** 1,380 mi (1,200 nmi, 2,220 km) with ESSS stub wings and external tanks
- **Service ceiling:** 19,000 ft (5,790 m)
- **Rate of climb:** 1,315 ft/min (4.5 m/s)
- **Disc loading:** 7.19 lb/ft² (35.4 kg/m²)
- **Power/mass:** 0.192 hp/lb (158 W/kg)

Armament

- **Guns:**
    - 2 × 7.62 mm (0.30 in) M240H machine guns or
    - 2 × 7.62 mm (0.30 in) M134 minigun or
    - 2 × .50 in (12.7 mm) GAU-19 gatling guns
- **Hardpoints:** 4, 2 per ESSS stub wings and provisions to carry combinations of:
    - **Rockets:** 70 mm (2.75 in) Hydra 70 rockets
    - **Missiles:** AGM-114 Hellfire laser guided missiles, AIM-92 Stinger air-to-air missiles
    - **Other:** 7.62 mm (0.30 in), 12.7 mm (0.50 in), 20 mm (0.787 in), or 30 mm (1.18 in) M230 gunpods
- **Bombs:** Can be equipped with VOLCANO minefield dispersal system.

Exhibit 3 - Aircraft Information

UH-72 Lakota

The **Eurocopter UH-72 Lakota** is a twin-engine helicopter with a single, four-bladed main rotor. The UH-72 is a militarized version of the Eurocopter EC145 and is built by American Eurocopter division of EADS North America. Initially marketed as the **UH-145**, the helicopter was selected as the winner of the United States Army's Light Utility Helicopter (LUH) program on 30 June 2006. In October 2006, American Eurocopter was awarded a production contract for 345 aircraft to replace aging UH-1H/V and OH-58A/C helicopters in the Army and Army National Guard fleets.

The US Army's *LHX* program began in the early 1980s, proposing two helicopter designs with a high percentage of commonality of dynamic components. One was a light utility version ("LHX-U") for assault and tactical movement of troops and supplies, the other was a light scout/attack version ("LHX-SCAT") to complement the growing development of the AH-64 Apache. As the program was developed, the light utility version was dropped and focus was placed on the light attack reconnaissance version, which eventually became the RAH-66 Comanche.

In 2004, the Department of Defense and the US Army made the decision to terminate the RAH-66 program. As part of the termination, the Army was allowed to keep the future years' funding programmed for the Comanche. To replace the capability that the Comanche was supposed to offer, the Army planned several programs, including three new aircraft. The Army Staff decided that these three aircraft, the Armed Reconnaissance Helicopter (ARH), the **Light Utility Helicopter (LUH)**, and the Future Cargo Aircraft (FCA) (later renamed Joint Cargo Aircraft, or JCA), were to be existing, in-production commercial aircraft modified for Army service.

The UH-72 is designed to take on a range of missions, from general support and medical evacuation (MEDEVAC) to personnel recovery and counter-narcotics operations. They are planned to replace the UH-1 and OH-58A/C, which are older light utility helicopters, and supplant other types in domestic use, primarily those in Army National Guard service. The UH-72 is being procured as a commercial off-the-shelf (COTS) product, which simplifies logistics support of the fleet. EADS NA has teamed with Sikorsky to provide Contractor Logistics Support (CLS) for the UH-72, through its Helicopter Support, Inc. (HSI)/Sikorsky Aerospace Maintenance. (SAM) subsidiaries.

In 2013, Congress questioned why the UH-72 had not been considered for a possible armed scout role. Army General Ray Odierno responded that the UH-72A was developed for homeland operations rather than for battlefield conditions. The UH-72 is typically employed by the U.S. Army National Guard as a utility helicopter in the U.S., which allowed UH-60 Black Hawks to deploy overseas. As of 2013, the utility version is not considered to be operationally deployable to a warzone; combat-capable versions are being evaluated for the Armed Aerial Scout program.

General characteristics

- **Crew:** 2 pilots
- **Capacity:** 8 troops or 2 stretchers and medical crew
- **Length:** 42 ft 7 in (13.03 m)
- **Rotor diameter:** 36 ft 1 in (11.00 m)
- **Height:** 11 ft 9 in (3.45 m)
- **Disc area:** 1,023 ft² (94.98 m²)
- **Empty weight:** 3,950 lb (1,792 kg)
- **Useful load:** 3,953 lb (1,793 kg)
- **Max. takeoff weight:** 7,903 lb (3,585 kg)
- **Powerplant:** 2 × Turbomeca Arriel 1E2 turboshafts, 738 shp (551 kW) each

Performance

- **Maximum speed:** 145 knots (167 mph, 269 km/h)
- **Cruise speed:** 133 knots (153 mph, 246 km/h)
- **Range:** 370 nmi (426 mi, 685 km)
- **Service ceiling:** 18,000 ft (5,791 m)
- **Rate of climb:** 1,600 ft/min (8.13 m/s)

DEPARTMENT OF THE ARMY
US ARMY INSTITUTE OF PUBLIC HEALTH
5158 BLACKHAWK ROAD
ABERDEEN PROVING GROUND, MD 21010-5403

MCHB-IP-EON

10 NOV 2011

MEMORANDUM FOR Environmental Division (IMWE-CAR-PWE/Mr. Wayne Thomas), NEPA and Cultural Management, Directorate of Public Works, 1626 O'Connell Blvd, Fort Carson, CO 80913

SUBJECT: Operational Noise Consultation, 52-EN-0FKB-12, Operational Noise Assessment, Heavy Combat Aviation Brigade Stationing, Fort Carson, CO, 06 October 2011

1. We are enclosing a copy of the consultation.

2. Please contact us if this consultation or any of our services did not meet your needs or expectations.

3. The point of contact is Ms. Kristy Broska or Ms. Catherine Stewart, Program Manager, Operational Noise, Army Institute of Public Health, at DSN 584-3829, Commercial (410) 436-3829, or email: kristy.broska@us.army.mil or catherine.stewart@us.army.mil.

FOR THE DIRECTOR:

William J. Bettin

WILLIAM J. BETTIN
LTC, MS
Portfolio Director, Environmental Health Engineering

Encl

CF:
AEC, (IMAE-TSP/Ms. Lindy McDowell)
AEC, (IMAE-TSP/Ms. Pamela Klinger)
PHCR-West (MCHB-AW-EH/Ms. Elisabeth Hardcastle)

DEPARTMENT OF THE ARMY
US ARMY INSTITUTE OF PUBLIC HEALTH
5158 BLACKHAWK ROAD
ABERDEEN PROVING GROUND, MD 21010-5403

MCHB-IP-EON

8 MAR 2012

MEMORANDUM FOR Environmental Division (IMWE-CAR-PWE/Mr. Wayne Thomas), NEPA and Cultural Management, Directorate of Public Works, 1626 O'Connell Blvd, Fort Carson, CO 80913

SUBJECT: Errata Operational Noise Consultation, 52-EN-0FKB-12, Operational Noise Assessment, Heavy Combat Aviation Brigade Stationing, Fort Carson, CO, 06 October 2011

1. Enclosed is page 12 with corrected information regarding aviation activity. Use corrected version as replacement for page 12 of Operational Noise Consultation, 52-EN-0FKB-12, Operational Noise Assessment, Heavy Combat Aviation Brigade Stationing dated 10 Nov 2011.

2. Please contact us if we can be of further assistance.

3. The point of contact is Ms. Kristy Broska or Ms. Catherine Stewart, Program Manager, Operational Noise, Army Institute of Public Health, at DSN 584-3829, Commercial (410) 436-3829, or email: kristy.broska@us.army.mil or catherine.stewart@us.army.mil.

FOR THE DIRECTOR:

William J. Bettin

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USAPHC
U.S. ARMY PUBLIC HEALTH COMMAND
5158 Blackhawk Road, Aberdeen Proving Ground, Maryland 21010-5403

OPERATIONAL NOISE CONSULTATION
NO. 52-EN-0FKB-12
OPERATIONAL NOISE ASSESSMENT
HEAVY COMBAT AVIATION
BRIGADE STATIONING
FORT CARSON, CO
06 OCTOBER 2011

Preventive Medicine Survey: 40-5f1

DEPARTMENT OF THE ARMY
US ARMY INSTITUTE OF PUBLIC HEALTH
5158 BLACKHAWK ROAD
ABERDEEN PROVING GROUND, MD 21010-5403

MCHB-IP-EON

EXECUTIVE SUMMARY
OPERATIONAL NOISE CONSULTATION
NO. 52-EN-0FKB-12
OPERATIONAL NOISE ASSESSMENT
HEAVY COMBAT AVIATION BRIGADE STATIONING
FORT CARSON, CO
06 OCTOBER 2011

1. PURPOSE. To provide an assessment of the noise impacts from the Heavy Combat Aviation Brigade (CAB) stationing at Fort Carson, CO.

2. FINDINGS.

a. Aviation Activity. Based on Army Regulation 200-1, the baseline and projected annual average noise levels attributable to the aviation activity is compatible with surrounding land use. Though the annual average noise levels are compatible, there is potential for individual overflights to cause annoyance and possibly generate noise complaints.

b. Weapon Activity.

(1) The large caliber weapon activity attributed to the projected CAB activity was acoustically insignificant and did not change the large caliber noise contours.

(2) For the baseline and projected large caliber weapon activity, the on-post Zone II encompasses most of the Wilderness Road Complex (WRC). Limiting or relocating the artillery firing occurring in Training 07 would lessen the large caliber weapon noise levels in the WRC.

(3) As small caliber noise contours are based on peak noise levels, the addition of the CAB activity does not change the noise contours.

3. RECOMMENDATIONS. Incorporate this noise assessment into the National Environmental Policy Act documentation for the proposed CAB stationing.

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OPERATIONAL NOISE CONSULTATION
NO. 52-EN-0FKB-12
OPERATIONAL NOISE ASSESSMENT
HEAVY COMBAT AVIATION BRIGADE STATIONING
FORT CARSON, CO
06 OCTOBER 2011

1. REFERENCES. A list of the references used in this consultation is in Appendix A. A glossary of terms and abbreviations used are in Appendix B. Appendix C contains the regulatory requirements.

2. AUTHORITY. The Army Environmental Command, San Antonio, TX funded this consultation to support Operational Noise Programs at multiple sites.

3. PURPOSE. To provide an assessment of the noise impacts from the Heavy Combat Aviation Brigade (CAB) stationing at Fort Carson, CO. The CAB activity would include aviation flights, small arms firing, and aerial gunnery activity.

4. BACKGROUND.

a. In March 2011, the Army announced its decision to activate a new CAB and stand it up at Fort Carson, resulting in a total growth in Army forces and equipment of approximately 2,700 Soldiers and 113 helicopters. Implementation of the stationing decision will include construction of new facilities at Fort Carson, as well as CAB training operations at Fort Carson and Piñon Canyon Maneuver Site (PCMS). This decision is documented in the *Record of Decision for the Realignment, Growth, and Stationing of Army Aviation Assets*, signed by the Assistant Deputy Chief of Staff, G-3/5/7, on March 25, 2011.

b. Noise impacts related to the proposed CAB activity were previously addressed in:

- February 2011 *Final Programmatic Environmental Impact Statement (PEIS) for the Realignment, Growth, and Stationing of Army Aviation Assets*.
- February 2009 *Final Environmental Impact Statement (FEIS) for Implementation of Fort Carson Grow the Army Stationing Decisions.*

c. The proposed action includes construction of CAB facilities at the Wilderness Road Complex (WRC) located west of Butts Army Airfield (BAAF). The CAB complex would include headquarters, barracks, company operations, classrooms, and vehicle maintenance facilities.

5. NOISE ASSESSMENT PROCEDURES.

a. Aviation Activity.

(1) The noise simulation program used to assess annual aircraft noise is NoiseMap/Baseops (U.S. Air Force 2009). The NoiseMap/Baseops program requires operations data including type of aircraft, altitude, flight tracks, and number of operations. Aviation noise is assessed using A-weighted Yearly Day-Night average Levels (A-YDNL). For land use planning, the A-YDNL is averaged over a year and therefore includes days of heavy, light and no flight schedules.

(2) The noise simulation program used to assess individual aircraft noise is SelCalc (U.S. Air Force 2005). The SelCalc program is a subset of the NoiseMap/Baseops program.

b. Demolition and Large Caliber Weapons. The noise simulation program used to assess demolition and large caliber weapons (20mm and greater) is the Blast Noise Impact Assessment (BNOISE2) program (U.S. Army 2009). The BNOISE2 model requires operations data concerning the types of weapons fired from each range or firing point (including demolitions), the number and types of ammunition fired from each weapon, the location of targets for each range or firing point and the amount of propellant used to reach the target. Existing range utilization records along with reasonable assumptions were used as BNOISE2 inputs. The assessment period used to create the Fort Carson C-weighted Day-Night average sound Level (CDNL) contours was 250 days. The CDNL noise metric is used for demolition and large caliber weapons to capture the low-frequency energy produced from such activities. The CDNL is an annual average noise dose from range operations and is intended for long-term land use planning.

c. Small Caliber Weapons. The noise simulation program used to assess small caliber weapons (.50 caliber and below) noise is the Small Arms Range Noise Assessment Model (SARNAM) (U.S. Army 2003). The SARNAM program requires operations data concerning types of weapons and range layout. The SARNAM calculation algorithms assume weather conditions or wind direction that favors sound propagation. Small caliber weapon noise is addressed utilizing peak levels and therefore has no assessment period.

6. REGULATORY REQUIREMENTS.

a. Army Regulation (AR) 200-1 partitions noise into zones, each representing an area of increasing decibel level. The AR lists housing, schools, and medical facilities as examples of noise-sensitive land uses (U.S. Army 2007). The program defines four Noise Zones:

- Noise-sensitive land uses are not recommended in *Zone III*.
- Although local conditions such as availability of developable land or cost may require noise-sensitive land uses in *Zone II*, this type of land use is strongly discouraged on the installation and in surrounding communities. All viable alternatives should be considered to limit development in *Zone II* to non-sensitive activities such as industry, manufacturing, transportation and agriculture.
- Noise-sensitive land uses are generally acceptable within the *Zone I*. However, though an area may only receive *Zone I* levels, military operations may be loud enough to be heard - or even judged loud on occasion. *Zone I* is not one of the contours shown on the map; rather it is the entire area outside of the Zone II contour.
- The *Land Use Planning Zone (LUPZ)* is a subdivision of Zone I. The *LUPZ* is 5 dB lower than the Zone II. Within this area, noise-sensitive land uses are generally acceptable. However, communities and individuals often have different views regarding what level of noise is acceptable or desirable. To address this, some local governments have implemented land use planning measures out beyond the Zone II limits. Additionally, implementing planning controls within the *LUPZ* can develop a buffer to avert the possibility of future noise conflicts.

b. The following table summarizes each zone and its appropriate weighting by type of operation;

TABLE 1. NOISE ZONE DECIBEL LEVELS. (AR 200-1)

Noise Zone	**Aviation (ADNL)**	**Small Arms (PK15(met))**	**Large Arms, Demolitions, Etc. (CDNL)**
Land Use Planning Zone (LUPZ)	60-65	N/A	57 – 62
Zone I	<65	<87	<62
Zone II	65-75	87 – 104	62 – 70
Zone III	>75	>104	>70

7. AIRFIELD AVIATION ACTIVITY.

a. EXISTING ACTIVITY.

(1) From Oct 10 to Sep 11, BAAF airfield reported 103,199 operations (Table 2). The tower count includes aircraft assigned to Fort Carson as well as visiting units. The number and type of aircraft operations varies from day to day and month to month. The average daily movement on the airfield was 283. The number of movements is based upon aircraft that utilized the airfield, not aircraft just passing through the BAAF airspace or aircraft under flight following conditions.

TABLE 2. BAAF TOWER COUNT.

Month	FY11 Tower Count
Oct 2010	5,876
Nov 2010	4,507
Dec 2010	6,580
Jan 2011	9,101
Feb 2011	10,147
Mar 2011	9,941
Apr 2011	11,784
May 2011	11,878
Jun 2011	9,623
Jul 2011	8,929
Aug 2011	10,794
Sep 2011	4,039
TOTAL	**103,199**

(2) BAAF is utilized primarily by rotary aircraft. The number of daily operations (take offs or landings) varies throughout the year according to Fort Carson or visiting unit training requirements. During peak training periods, the number of operations at the airfield can be as high as 300 operations daily.

(3) The traffic control tower logs do not separate activity by type or model of aircraft, nor do the logs indicate the time of day or flight route of the aircraft. For the purpose of noise modeling, 80% of military flights were estimated to occur during the daytime (0700-2200). Airfield personnel estimated that 50% of activity was AH-64, 35% UH-60, 5% CH47, 5% UH-1, and 5% other aircraft. Other aircraft include OH-58; Bell 407; civilian medical rotary aircraft; and occasional U.S. Air Forces Academy pilot training with small fixed wing aircraft.

(4) Table 3 lists the existing average yearly activity by aircraft type. Table 4 lists the existing average daily aviation activity. The numbers were rounded to prevent fractional numbers of flights.

TABLE 3. BASELINE ANNUAL AVIATION ACTIVITY.

	Baseline Annual Operations (FY11)
AH-64	51,600
UH-60	36,120
CH-47	5,160
UH-1	5,160
Other aircraft	5,160
TOTAL	**103,199**

Note: An operation is defined as either an arrival or a departure or a closed traffic pattern.

TABLE 4. BASELINE AVERAGE DAILY AVIATION ACTIVITY.

	Daytime Operations (0700 – 2200 hours)	**Nighttime Operations (2200 – 0700 hours)**
AH-64	113	28
UH-60	79	20
CH-47	11	3
UH-1	11	3
Other aircraft	11	3
TOTAL	**226**	**57**

Note: An operation is defined as either an arrival or a departure or a closed traffic pattern.

b. PROJECTED ACTIVITY.

(1) The CAB to be stationed at Fort Carson would consist of approximately 113 helicopters (48 AH-64D, 12 CH-47, 38 UH-60, 15 UH-60/HH-60). To maintain proficiency, a specific number of flight hours are required to be logged by applicable Soldiers and units. Flight hours are based upon a model that includes all aviation

training required to meet individual aviator qualification training, aircrew training, and collective training at the flying company and battalion level. The required flight hours for a Heavy CAB are noted in Table 5. Actual average flying hours by CAB Soldiers in and around Fort Carson and PCMS are expected to be lower as some CAB units would typically be deployed.

TABLE 5. HEAVY CAB CRITICAL FLYING HOURS, FULL SPECTRUM OPERATIONS TRAINING STRATEGY. (U.S.Army 2011a)

Combat Aviation Brigade Critical Flying Hours, Full Spectrum Operations Training Strategy				
Unit (aircraft)	**Training Year**			**Average**
	Year 1	**Year 2**	**Year 3**	
AHB (UH-60)	4,422	6,017	5,726	**5,388**
ARB (AH-64D)	8,718	11,568	10,972	**10,419**
GSAB-CAC (UH-60)	1,343	1,831	1,739	**1,638**
GSAB-Hvy Hel Co (CH-47)	1,940	2,651	2,518	**2,370**
GSAB-MEDEVAC (15 UH-60)	2,524	3,551	3,352	**3,142**
Total	**18,947**	**25,618**	**24,307**	**22,957**

(2) The projected annual number of flights is based on three flight hours per aircraft type for the average flight hours, Table 5. A projected schedule of three flight hours per mission is consistent with the activity at other installations that have a CAB. The projected average daily activity is 41 flights, Table 6. The addition of the CAB would increase the average number of daily flights from 283 to 324. It was assumed 80% of flights occurred between 0700 – 2200 hours.

TABLE 6. PROJECTED ANNUAL CAB AVIATION ACTIVITY.

Aircraft	**Average Flight Hours**	**Projected Annual Number of Flights***
UH-60	7,026	2,342
AH-64D	10,419	3,473
CH-47	2,370	790
UH-60/HH-60	3,142	1,047
Total	**22,957**	**7,652**

NOTE: One flight consists of a departure and an arrival.

TABLE 7. PROJECTED AVERAGE DAILY CAB AVIATION ACTIVITY.

	Daytime Operations (0700 – 2200 hours)	**Nighttime Operations (2200 – 0700 hours)**
AH-64	10	2
UH-60	15	4
CH-47	4	1
UH-60/HH-60	4	1
TOTAL	**33**	**8**

Note: An operation is defined as either an arrival or a departure or a closed traffic pattern.

8. AIRFIELD NOISE MODELING RESULTS.

a. Figure 1 contains the noise contours for the existing operations at BAAF (based on Table 3). The Noise Zones remain relatively localized to the airfield and do not extend beyond Fort Carson's boundary. On-post, the operations generate a LUPZ (60-65 dB A-YDNL) which extends along 04/22 approach and departure track into an industrial portion of the WRC. The Zone II (65 – 75 dB A-YDNL) remains localized to the airfield and small arms range area.

Appendix D contains an explanation of the changes between the PEIS and FEIS airfield contours and the contours in this consultation.

b. Figure 2 contains the noise contours for the existing operations plus the projected CAB operations at BAAF (based on Tables 3 & 6). The additional CAB activity does not significantly change the airfield noise contours. The Noise Zones still remain within Fort Carson's boundary. On-post, the operations generate a slightly larger LUPZ (60-65 dB A-YDNL) along the 04/22 approach and departure track into the WRC. Additionally, a large portion of the LUPZ extends into the small arms range area.

c. Based on AR 200-1, the existing and projected annual average noise levels attributable to the BAAF activity is compatible with surrounding land use, both on and off-post. Though the Noise Zones indicate that annual average noise levels are compatible with the surrounding environment, there is potential for individual overflights to cause annoyance and possibly generate noise complaints.

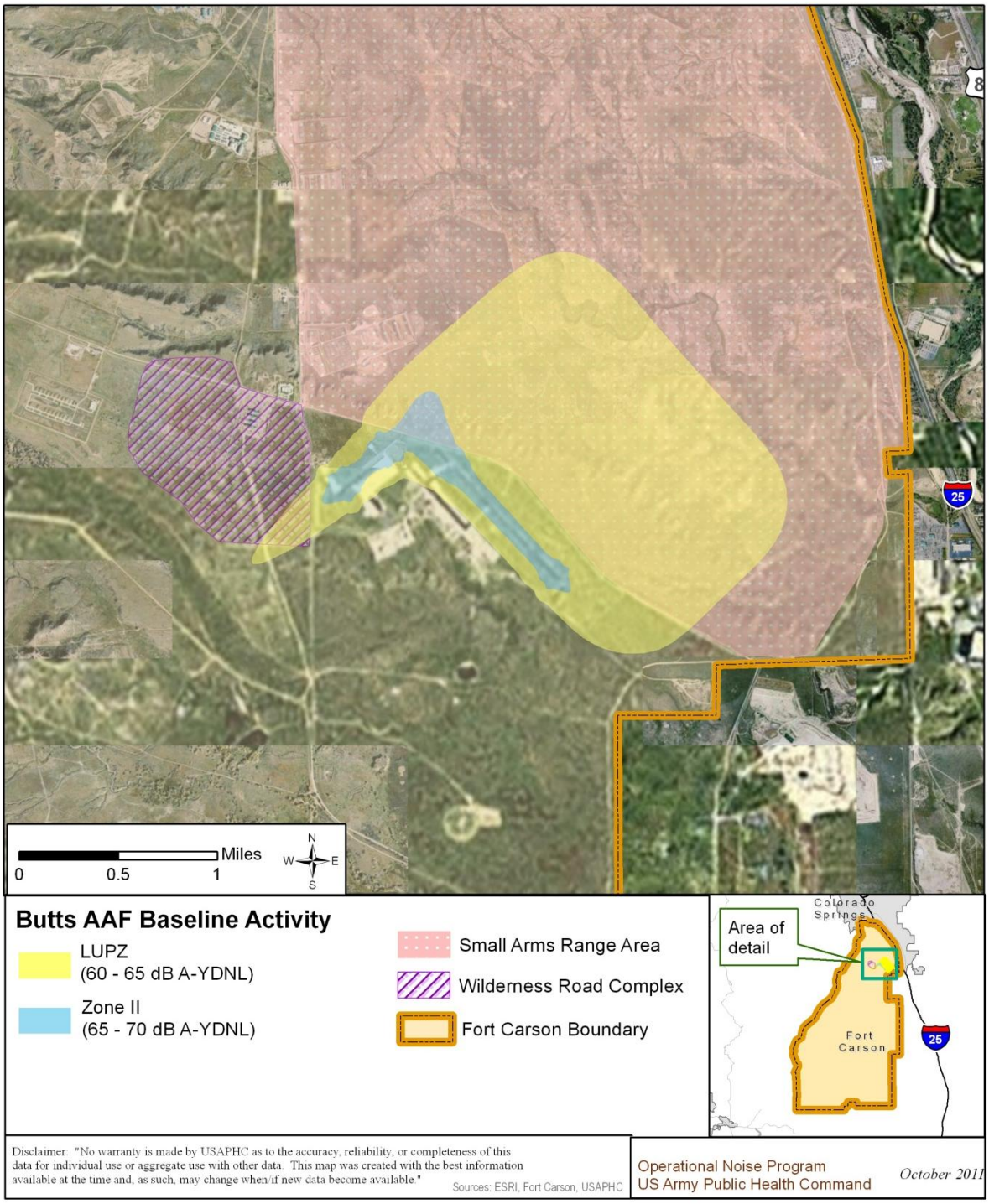

FIGURE 1. BAAF BASELINE ANNUAL AVERAGE NOISE CONTOURS.

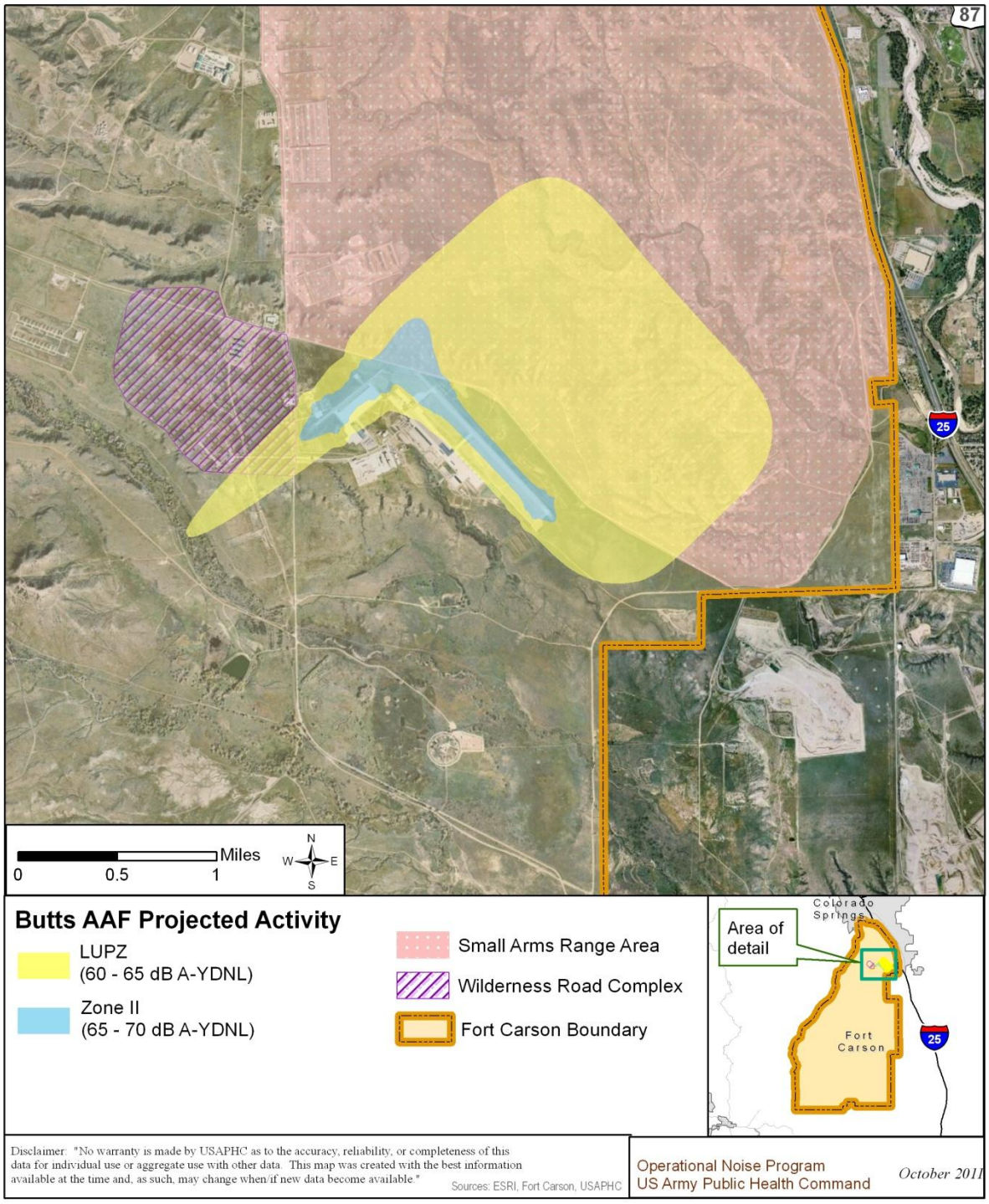

FIGURE 2. BAAF PROJECTED ANNUAL AVERAGE NOISE CONTOURS.

9. OVERFLIGHT NOISE ASSESSMENT.

a. Although the existing and projected annual average noise levels attributable to the BAAF activity is compatible with surrounding land use, both on and off-post, the helicopter overflights would generate levels that some individuals might find disruptive and/or annoying.

b. ANNOYANCE POTENTIAL.

(1) Scandinavian Studies (Rylander 1974 and Rylander 1988) have found that a good predictor of annoyance at airfields with 50 to 200 operations per day is the maximum level of the 3 loudest events. The maximum noise levels for the primary aircraft at BAAF are listed in Table 8. These maximum levels are compared with the levels listed in Table 9 to determine the percent of the population that would consider itself highly annoyed. Table 10 indicates the percent of the population that would consider itself highly annoyed correlated with maximum noise levels for specific aircraft overflights.

TABLE 8. MAXIMUM NOISE LEVELS OF AIRCRAFT.

Slant Distance (feet)	**Maximum Level, dBA**				
	AH-64	CH-47	OH-58	UH-60	UH-1
200	92	92	87	88	91
500	83	84	79	80	83
1,000	77	78	72	73	76
1,500	73	74	68	69	73
2,000	70	71	65	66	70
2,500	67	68	62	63	68

TABLE 9. PERCENTAGE OF POPULATION HIGHLY ANNOYED FROM AIRCRAFT NOISE. (Rylander 1974)

Maximum, dBA	Highly Annoyed
90	35%
85	28%
80	20%
75	13%
70	5%

TABLE 10. OVER FLIGHT ANNOYANCE POTENTIAL[1].

Source	Ground Track Distance[2]	dBA Maximum[3]	Population Highly Annoyed[4]
AH-64 – 1000' AGL	0'	77	16%
	1320' (1/4 mile)	71	7%
	1760' (1/3 mile)	69	4%
	2640' (1/2 mile)	65	<1%
AH-64 – 2000' AGL	0'	70	5%
	1320' (1/4 mile)	68	2%
CH-47 – 1000' AGL	0'	77	16%
	1320' (1/4 mile)	72	8%
	1760' (1/3 mile)	70	5%
	2640' (1/2 mile)	66	<1%
CH-47 – 2000' AGL	0'	64	<1%
	1320' (1/4 mile)	62	<1%
OH-58 – 1000' AGL	0'	72	8%
	1320' (1/4 mile)	67	1%
	1760' (1/3 mile)	64	<1%
UH-60 – 1000' AGL	0'	73	10%
	1320' (1/4 mile)	68	2%
	1760' (1/3 mile)	65	<1%
UH-1– 1000' AGL	0'	76	14%
	1320' (1/4 mile)	71	7%

[1] Percent annoyance shown is based upon 50 to 200 overflights per day. (Rylander 1974)
[2] Distance between receiver and the point on Earth at which the aircraft is directly overhead.
[3] Obtained via SelCalc Program (U.S. Air Force 2005)
[4] Calculated percentage based upon regression using the known values in Table 9.

(2) Fort Carson Regulation 95-1 prescribes specific noise abatement requirements for aviation personnel, including minimum off-post altitudes, minimum slant range distances from sensitive areas and restricted areas. Helicopters routinely fly from Fort Carson to PCMS, though not all aircraft will fly the same pattern or route. However, all aircraft will comply with the local flying rules per Fort Carson 95-1 and AR 95-1, as well as all FAA guidelines under 14 CFR 91.155 for visual flight rules and AC 91-36D VFR operations for noise-sensitive areas. All aircraft will avoid over-flight of heavily inhabited areas and endangered species designated areas unless directed to do so in the performance of their mission. For Fort Carson and Colorado Springs, this means all rotary-wing aircraft will maintain a minimum of 1,000 feet (304.8 m) Above Ground Level (AGL), and 0.25 mile (0.4 km) standoff outside Fort Carson while flying

through the mountain passes until clear of inhabited areas (weather permitting), unless they are operating in a designated low-level or Nap-of-the-Earth (NOE) training route.[1]

(3) Annoyance Potential Summary. Based on Table 10 and the noise abatement procedures, generally less than 2% of the population would consider itself highly

This original page 12 replaced with errata (on next page) per 09 Mar 2012 memo.

c. Helicopters routinely fly from Fort Carson to PCMS. The area between Fort Carson and PCMS does not have established air corridors. The only restriction is that aircraft must maintain a minimum altitude of 700 feet AGL unless they are operating in a designated low-level or NOE training route. The flights between Fort Carson and PCMS were addressed in a 2008 Noise Consultation (U.S. Army 2008). The key points are summarized below:

- There is one low-level flight training route, Route Hawk, between Fort Carson and PCMS that is used for NOE training. While utilizing Route Hawk, aircraft avoid all houses, buildings, people, livestock, and moving vehicles by a minimum slant range of ½ nautical miles (0.43 statute miles). Fort Carson may lower the typical altitude flown in Route Hawk from 100 feet AGL to 50 feet AGL.

- While in Route Hawk, maintaining a ½ nautical mile slant distance from buildings, people, livestock, and moving vehicles, the annoyance risk should remain low even if the allowed minimum flight altitude is lowered from 100 to 50 feet AGL within the route.

- Helicopters flying from Fort Carson to PCMS, outside of Route Hawk, should maintain a slant distance 1,760 feet (0.29 nautical miles/0.3 statute miles) from buildings, people, livestock, and moving vehicles to reduce the potential for annoyance.

d. The helicopter flights occurring off-post (transitioning to PCMS or other training areas, utilizing Route Hawk) would not generate a Zone II levels. The altitudes vary depending upon the mission and the location of the overflight in relation to the surrounding environment (i.e., buildings, livestock, populated areas).

(1) The following explains how DNL is calculated. The A-weighted Sound Exposure Level (ASEL) of an AH-64 at 1,000 feet AGL is 85.3 decibels (dBA).

[1] Final CAB PEIS_2010

through the mountain passes until clear of inhabited areas (weather permitting), unless they are operating in a designated low-level or Nap-of-the-Earth (NOE) training route.[1]

(3) Annoyance Potential Summary. Based on Table 10 and the noise abatement procedures, generally less than 2% of the population would consider itself highly annoyed from the OH-58 and UH-60 helicopter overflights above 1,000 feet AGL and approximately 8% of the population would consider itself highly annoyed from the AH-64, CH-47, and UH-1 overflights at 1,000 feet AGL.

c. Helicopters routinely fly from Fort Carson to PCMS. The area between Fort Carson and PCMS does not have established air corridors. Aircraft must maintain a minimum altitude of 500 feet AGL off-post unless they are flying per an exception listed in Fort Carson Regulation 95-1. Exceptions include, among others, maintaining visual flight rules due to weather conditions, meeting specific mission requirements such as search and rescue, and operating in a designated low-level training route. The flights between Fort Carson and PCMS were addressed in a 2008 Noise Consultation (U.S. Army 2008). The key points are summarized below:

- There is one low-level flight training route, Route Hawk, between Fort Carson and PCMS. While utilizing Route Hawk, aircraft avoid all houses, buildings, people, livestock, and moving vehicles by a minimum slant range of ½ nautical miles (0.43 statute miles).

- While in Route Hawk, maintaining a ½ nautical mile slant distance from buildings, people, livestock, and moving vehicles, the annoyance risk should remain low.

- Helicopters flying from Fort Carson to PCMS, outside of Route Hawk, should maintain a slant distance 1,760 feet (0.29 nautical miles/0.3 statute miles) from buildings, people, livestock, and moving vehicles to reduce the potential for annoyance.

d. The helicopter flights occurring off-post (transitioning to PCMS or other training areas, utilizing Route Hawk) would not generate a Zone II levels. The altitudes vary depending upon the mission and the location of the overflight in relation to the surrounding environment (i.e., buildings, livestock, and populated areas).

[1] Final CAB PEIS_2010

The SEL is sound normalized to one second. If there is only one flight per day, the A-weighted average sound Level (ADNL) can be calculated by subtracting a constant representing 10 times the logarithm of the 86,400 seconds in a 24 hour day, which is 49.4 dB. So, for one AH-64 flyover at 1,000 feet (85.3 dB ASEL), the ADNL would be 35.9 dB ADNL. The ADNL increases 3 dB for every doubling of operations, so the ADNL for 2 flights would be 38.9 dB ADNL, 4 flights per day would equal 41.9 dB ADNL, and 8 flights per day would equal 44.9 dB ADNL. By continuing these calculations, it would take 256 AH-64 flights occurring over *one location* within a 24-hour period to achieve a 59.9 dB ADNL.

(2) Table 11 lists the DNL for various attitudes for the most common helicopters at Fort Carson.

TABLE 11. PROJECTED HELICOPTER ADNL.

	ADNL							
NUMBER OF SORTIES	**AH-64 100' AGL**	**AH-64 500' AGL**	**AH-64 1000' AGL**	**CH-47 500' AGL**	**CH-47 1000' AGL**	**UH-60 100' AGL**	**UH-60 500' AGL**	**UH-60 1000' AGL**
1	51.1	40.7	35.9	43	38.4	48.3	38.4	33.1
2	54.1	43.7	38.9	46	41.4	51.3	41.4	36.1
4	57.1	46.7	41.9	49	44.4	54.3	44.4	39.1
8	60.1	49.7	44.9	52	47.4	57.3	47.4	42.1
16	63.1	52.7	47.9	55	50.4	60.3	50.4	45.1
32	66.1	55.7	50.9	58	53.4	63.3	53.4	48.1
64	69.1	58.7	53.9	61	50.4	66.3	56.4	51.1

(3) Based upon the existing and projected operational parameters, the number of aircraft and the large amount of airspace available, it is unlikely that noise levels would ever reach 60 dB ADNL for any area off-post subject to overflights (other than directly under the flight path to the airfield).

e. The annoyance potential information provided is primarily for off-post information. The annoyance potential may not be applicable to the WRC and other on-post noise-sensitive areas as the studies were based on the civilian community response.

10. WEAPON NOISE ASSESSMENT. Live-fire training of CAB units is primarily small arms weapons (rifles with 5.56mm munitions; 9mm pistols; 7.62mm and .50 caliber machine guns). The AH-64 Apache longbow helicopter, fires the 30mm gun, 2.75-inch rockets and Hellfire guided missiles as part of live-fire training activities.

a. Small Caliber Ranges.

(1) All Soldiers qualify with their individual weapon (rifle or pistol) at least twice annually. The ranges required include a 25-Meter Zero, Modified Record Fire, Combat Pistol Qualification Course, and the Multi-purpose Machine Gun Range. Training would take place on existing ranges at either Fort Carson or PCMS.

(2) Per AR 200-1 (U.S. Army 2007), small arms operations were analyzed using PK15(met). The analysis depicts the predicted peak levels for individual rounds (metric term is PK15(met)). Since the contours are based on peak levels rather than a cumulative or average level, the size of the contours will not change if the number of rounds fired increases or decreases. Appendix E contains the operations data used to model the small caliber noise contours.

(3) Fort Carson. The small caliber weapons noise contours at the Fort Carson small arms impact area are shown in Figure 3. The Zone II [PK15(met) 87 dB] extends beyond the eastern boundary less than 700 meters, entering the city of Fountain. The Zone III [PK15(met) 104 dB] extends slightly beyond the eastern boundary into the undeveloped are between the Fort Carson boundary and Interstate 25. On-post the Zone II extends into a small area of the WRC. Based on the current WRC design, there is one noise-sensitive structure within the Zone II area (an Operational Readiness Training Complex barrack).

(4) PCMS. Due to the distance of the ranges from the installation boundary and any noise-sensitive land uses, only Ranges 1, 3, and 7 were addressed. The noise contours for these small arms operations are shown in Figure 4. The Zone II [PK15(met) 87 dB] extends beyond the western boundary less than 650 meters. The Zone III [PK15(met) 104 dB] does not extend beyond the installation boundary.

(5) The addition of the CAB activity does not change the small caliber noise contours.

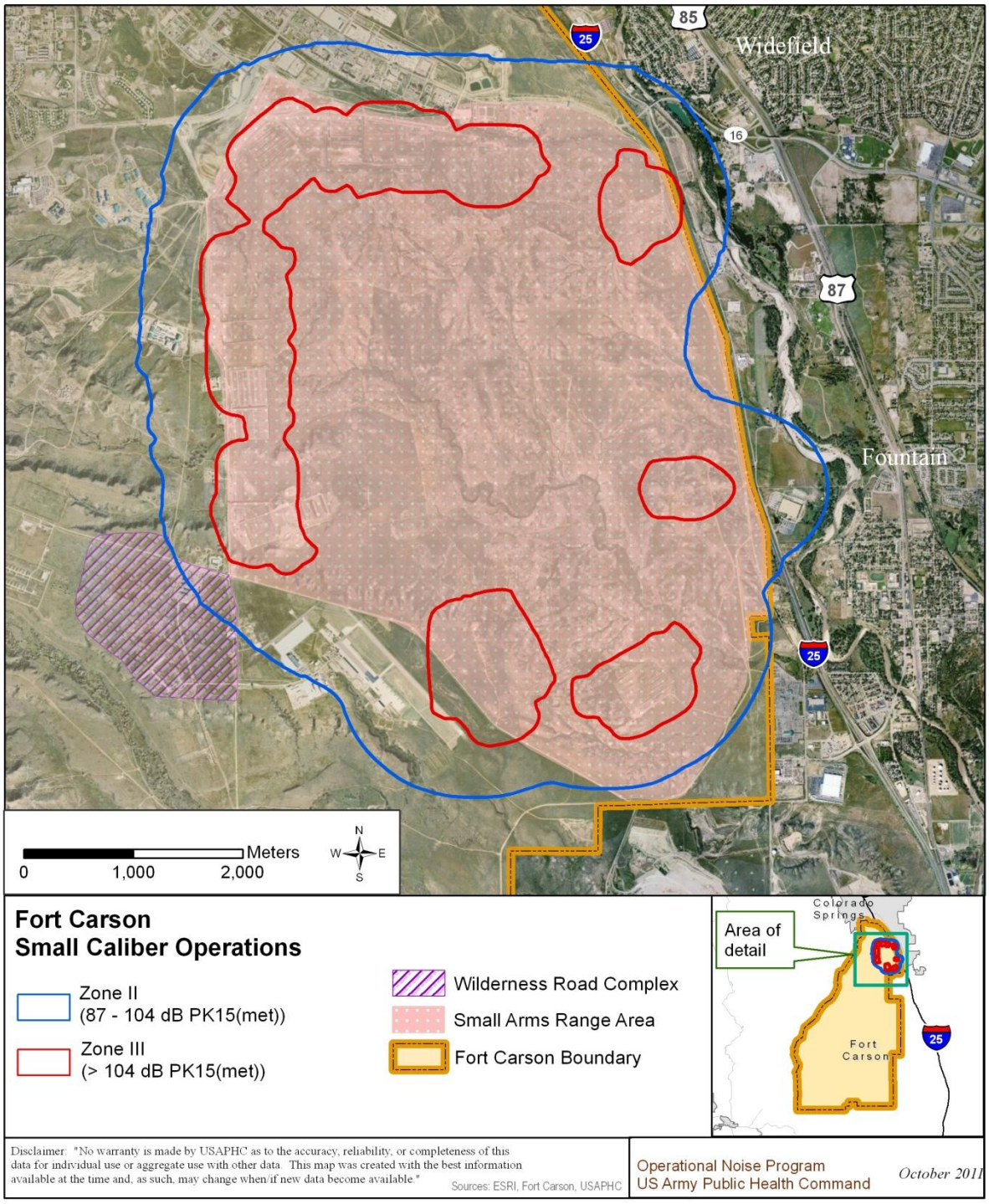

FIGURE 3. FORT CARSON SMALL CALIBER NOISE CONTOURS.

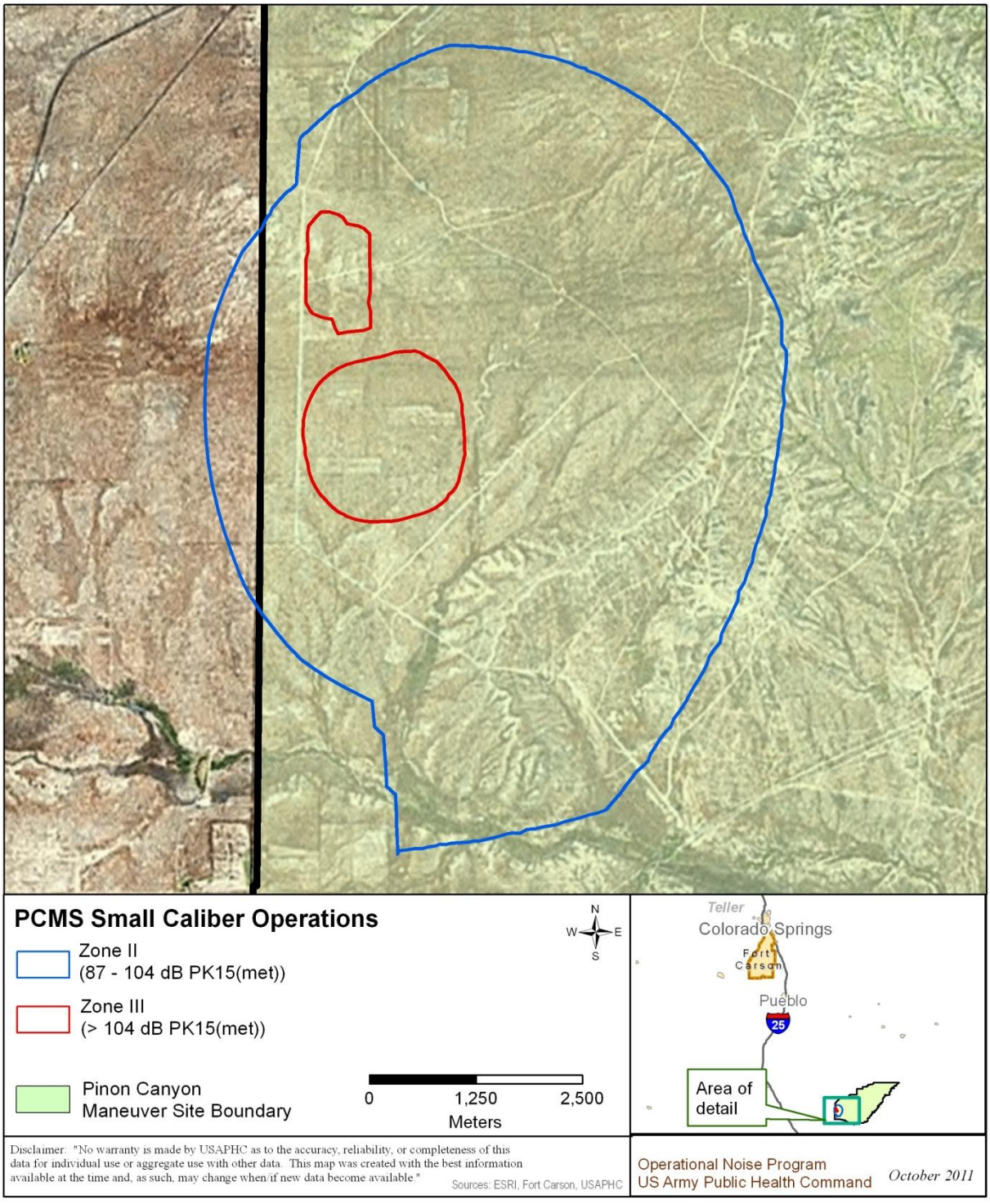

FIGURE 4. PCMS SMALL CALIBER NOISE CONTOURS.

b. Large Caliber Weapon Ranges.

(1) The CAB training would include aerial gunnery, integrated aviation, and ground maneuver qualification ranges. Training would take place on existing ranges at Fort Carson; such as the Multi-Purpose Range Complex, Aerial Gunnery Range, Combined Arms Collective Training Facility and/or Urban Operations Training Range. The projected weapon activity includes 2.75-inch rockets, Hellfire guided missiles, and 30mm Gun.

(2) Table 12 lists the standard ammunition requirements for an AH-64 attack battalion as shown in DA PAM 350-38, Standards in Training Commission (STRAC) (U.S. Army 2010). As a Heavy CAB consists of two attack battalions, the values in the table were doubled when analyzed. Appendix E contains the operations data used to model the demolition and large caliber noise contours.

TABLE 12. ATTACK BATTALION STRAC REQUIREMENTS.

Weapon/Ammunition	Annual Number of Rounds per Aviation Battalion
2.75-inch Rocket, Inert	2,736
Hellfire, Inert	144
30mm Gun, Inert	24,720

NOTE: Inert is defined as any round that does not explode upon impact (i.e. smoke, TP, illum).

(3) Figure 5 depicts the demolition and large caliber weapons noise contours for Fort Carson. The LUPZ (57 CDNL) extends beyond the eastern boundary beyond Interstate 25, encompassing El Rancho, Midway Ranches, and the best part of the city of Fountain. The LUPZ extends into an undeveloped area to the south and beyond the western boundary encompassing Turkey Canyon Ranch. Zone II (62 CDNL) extends into El Rancho and Midway Ranches; and slightly into the Turkey Canyon Ranch. Zone III (70 CDNL) extends slightly into undeveloped areas of Fountain, El Rancho, and Turkey Canyon Creek. On-post Zone II encompasses most of the WRC. Limiting or relocating the artillery firing occurring in Training 07 would lessen the large caliber weapon noise levels in the WRC.

(4) The existing operations at Fort Carson are in excess of 532,000 events annually. The 55,200 rounds attributed to the projected CAB activity were acoustically insignificant; therefore the addition of the CAB activity does not change the demolition and large caliber noise contours, Figure 6.

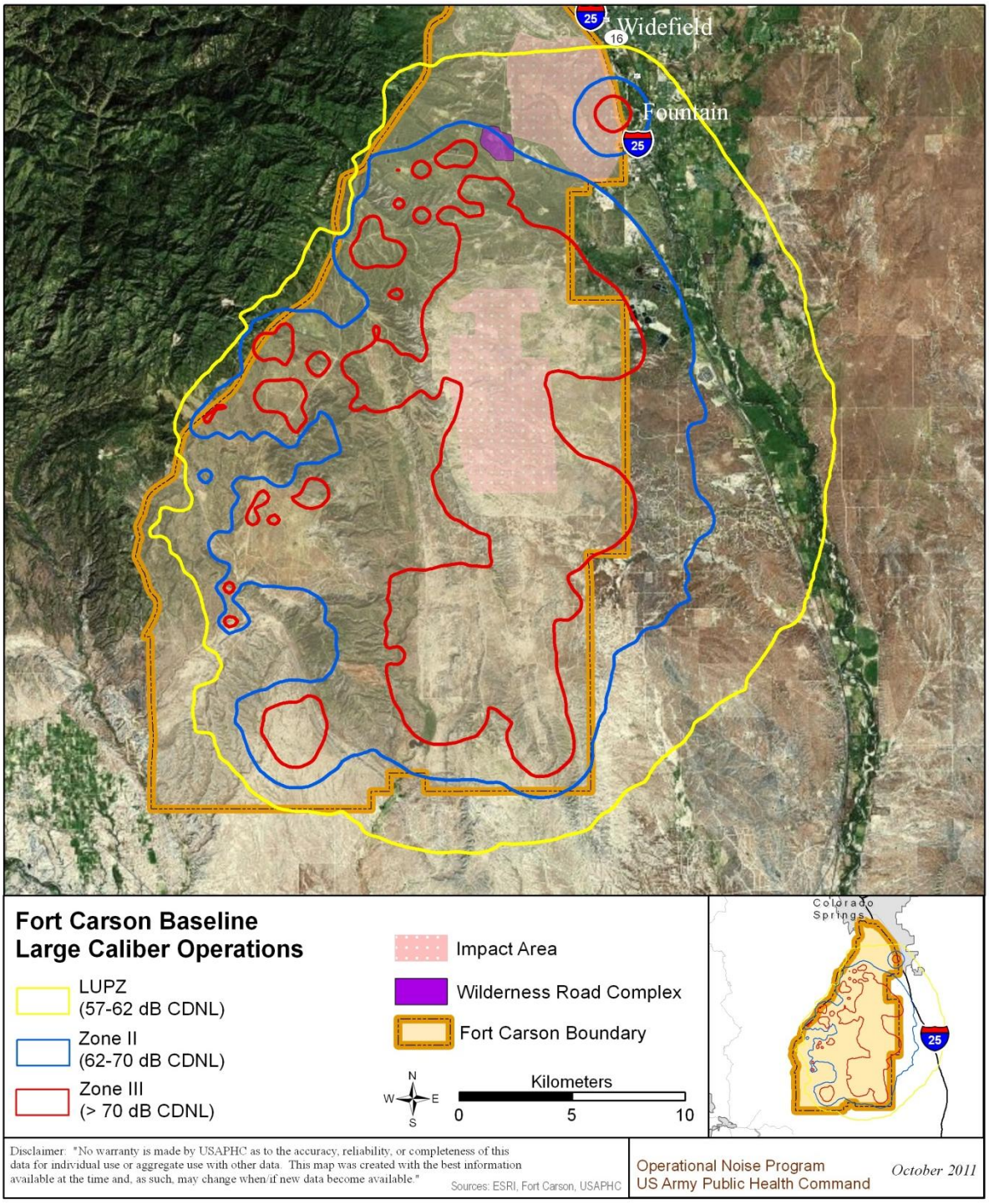

FIGURE 5. FORT CARSON BASELINE DEMOLITION AND LARGE CALIBER NOISE CONTOURS.

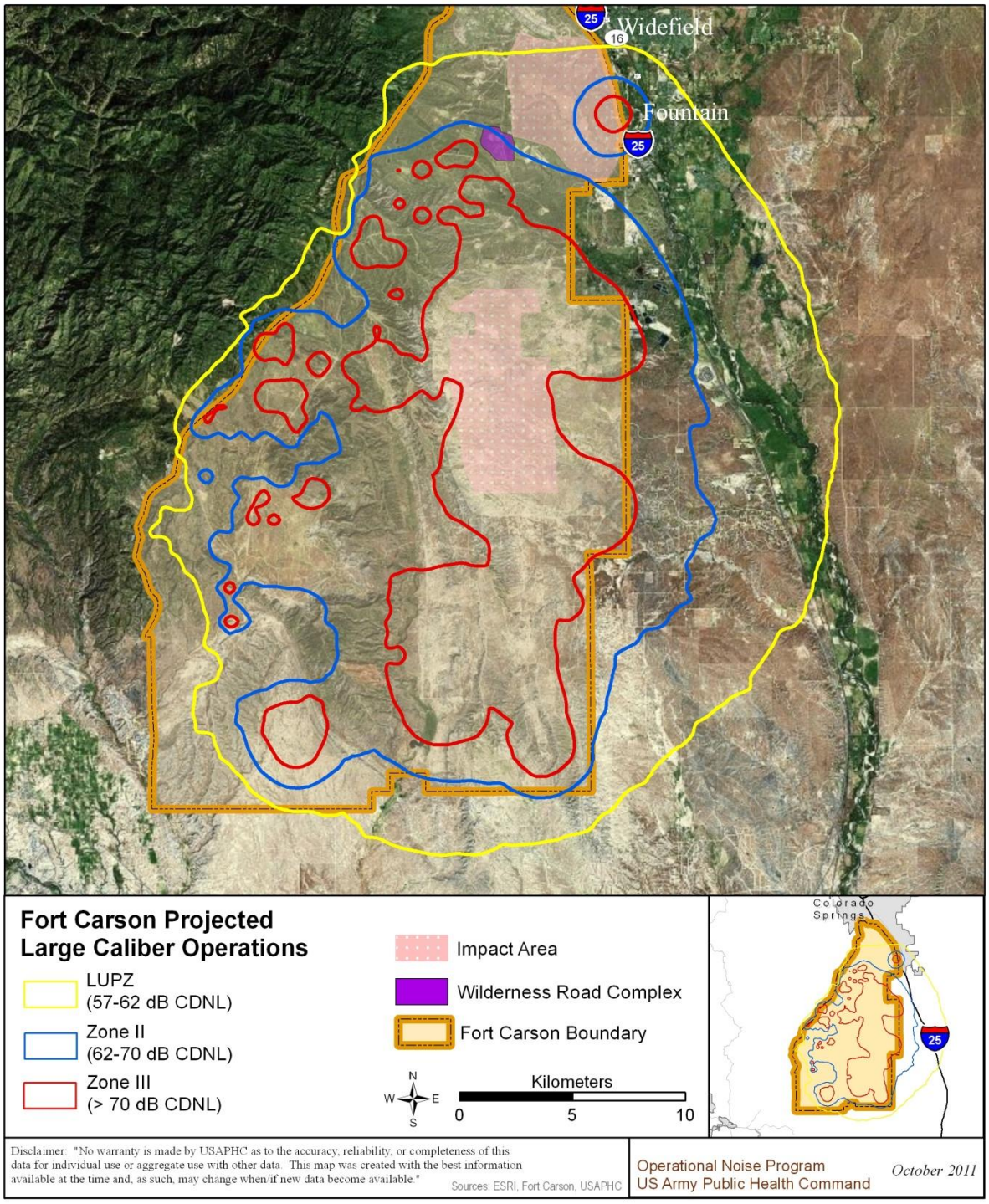

FIGURE 6. FORT CARSON PROJECTED DEMOLITION AND LARGE CALIBER NOISE CONTOURS.

11. CONCLUSIONS AND RECOMMENDATIONS.

a. Aviation Activity.

(1) The existing and projected annual average noise levels attributable to the BAAF activity is compatible with surrounding land use, both on and off-post. Though the Noise Zones indicate that annual average noise levels are compatible with the surrounding environment, there is potential for individual overflights to cause annoyance and possibly generate noise complaints.

(2) Measures are in place to mitigate the effects of aircraft noise at Fort Carson. However, there is always the possibility that an individual overflight could lead to a complaint. Fort Carson should continue implementing fly-neighborly programs that adjust aircraft training times and routes to lower the impact on the community to the greatest extent possible given mission requirements.

b. Weapon Activity.

(1) The existing operations at Fort Carson are in excess of 532,000 events annually. The 55,200 rounds attributed to the projected CAB activity were acoustically insignificant. The addition of the CAB activity does not change the demolition and large caliber noise contours.

(2) As small caliber weapons are evaluated on peak levels, the additional activity of the CAB does not change the noise contours.

c. Wilderness Road Complex.

(1) The Zone II from demolition and large caliber weapon activity encompasses most of the WRC. Limiting or relocating the artillery firing occurring in Training 07 would lessen the large caliber weapon DNL in the WRC.

(2) Though the WRC is located in an area where BAAF noise levels are compatible with residential land use, there is potential for an individual overflight to cause annoyance.

(3) In the WRC, incorporating Noise Level Reduction methods in building construction would not be effective for large caliber noise mitigation, but may be effective in mitigating aviation activity noise.

(4) When/if the preliminary plan for a child development center and/or chapel north of Wilderness Road become further defined, Fort Carson should analyze the projects in accordance with National Environmental Policy Act.

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APPENDIX A

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APPENDIX B

GLOSSARY OF TERMS, ACRONYMS & ABBREVIATIONS

B-1. GLOSSARY OF TERMS.

Above Ground Level – distance of the aircraft above the ground.

A-weighted Sound Level – the ear does not respond equally to sounds of all frequencies, but is less efficient at low and high frequencies than it is at medium or speech range frequencies. Thus, to obtain a single number representing the sound pressure level of a noise containing a wide range of frequencies in a manner approximating the response of the ear, it is necessary to reduce, or weight, the effects of the low and high frequencies with respect to the medium frequencies. Thus, the low and high frequencies are de-emphasized with the A-weighting. The A-scale sound level is a quantity, in decibels, read from a standard sound-level meter with A-weighting circuitry. The A-scale weighting discriminates against the lower frequencies according to a relationship approximating the auditory sensitivity of the human ear. The A-scale sound level measures approximately the relative “noisiness” or “annoyance” of many common sounds.

Average Sound Level – the mean-squared sound exposure level of all events occurring in a stated time interval, plus ten times the common logarithm of the quotient formed by the number of events in the time interval, divided by the duration of the time interval in seconds.

C-weighted Sound Level – a quantity, in decibels, read from a standard sound level meter with C-weighting circuitry. The C-scale incorporates slight de-emphasis of the low and high portion of the audible frequency spectrum.

Day-Night Average Sound Level (DNL) – the 24-hour average frequency-weighted sound level, in decibels, from midnight to midnight, obtained after addition of 10 decibels to sound levels in the night from midnight up to 7 a.m. and from 10 p.m. to midnight (0000 up to 0700 and 2200 up to 2400 hours).

Decibels (dB) – a logarithmic sound pressure unit of measure.

Ground Track Distance – the distance between the receiver and the point on the Earth at which the aircraft is directly overhead.

Noise – any sound without value.

PK15(met) – the maximum value of the instantaneous sound pressure for each unique sound source, and applying the 15 percentile rule accounting for meteorological variation.

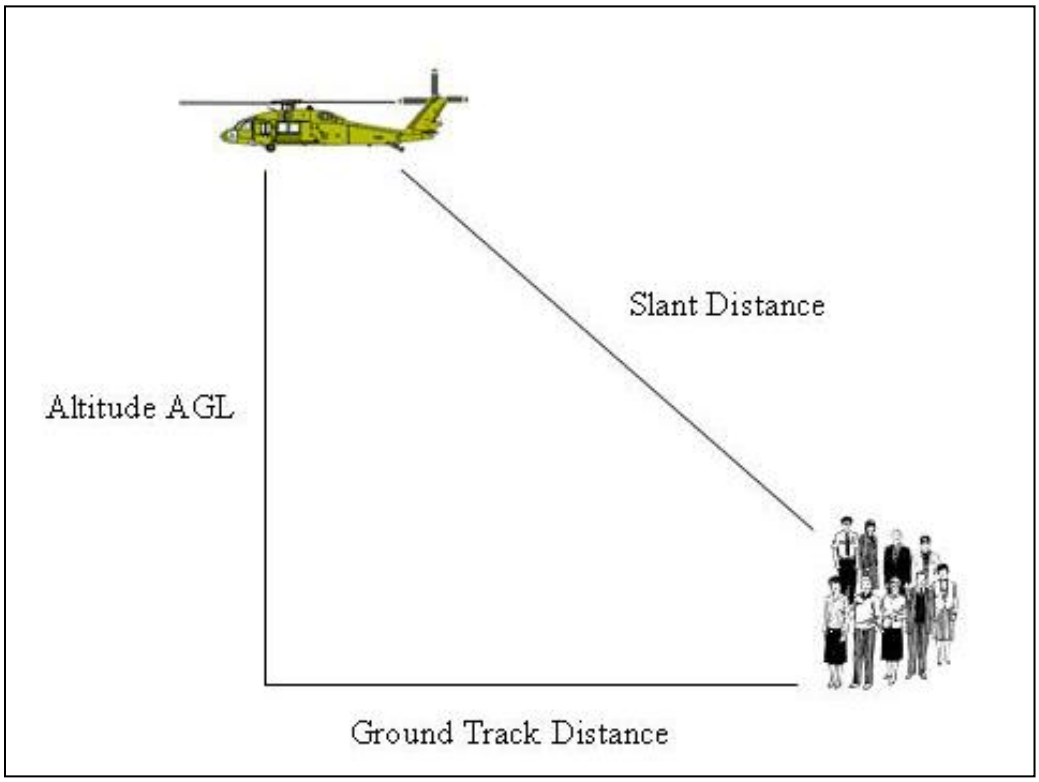
Slant Distance – the line of sight distance between the receiver and the aircraft. The slant distance is the hypotenuse of the triangle represented by the altitude AGL of the aircraft and the distance between the receiver and the aircraft's ground track distance.

B-2. GLOSSARY OF ACRONYMS AND ABBREVIATIONS.

A-YDNL	A-weight Yearly Day-Night average Level
AGL	Above Ground Level
ASEL	A-weighted Sound Exposure Level
BAAF	Butts Army Airfield
BNOISE2	Blast Noise Impact Assessment
CAB	Combat Aviation Brigade
CDNL	C-weighted Day Night average Level
dB	Decibels
dBA	Decibels, A-weighted
LUPZ	Land Use Planning Zone
MAX	Maximum sound level
NEPA	National Environmental Policy Act
PK15(met)	Unweighted Peak, 15% Metric
SARNAM	Small Arms Range Noise Assessment Model
WRC	Wilderness Road Complex

ANNEX B

GRAPHICAL DESCRIPTION OF AIRCRAFT TERMINOLOGY



APPENDIX C

U.S. ARMY NOISE ZONE DESCRIPTIONS

C-1. REFERENCE. The U.S. Army, 2007, Army Regulation 200-1, Environmental Protection and Enhancement, Chapter 14 Operational Noise.

C-2. For a detailed explanation of Noise Zone Descriptions and Land Use Guidelines see Army Regulation 200-1, Chapter 14 (U.S. Army 2007).

C-3. Day Night Level (DNL). DNL is used to describe the cumulative or total noise exposure during a prescribed time period (aviation 365 days; demolition and large caliber weapons 250 days for active Army). DNL is the energy average noise level calculated with a 10 decibel penalty for operations occurring between 2200 and 0700. The 10-decibel penalty considers that people are more sensitive to noise during these hours. Additionally, sounds may seem louder since background noise levels are generally lower at night. *Note: as DNL is averaged over a prescribed time period the contours include days of no, light, and heavy training schedules.*

C-4. PK15(met) Noise Contour Description. PK15(met) is the peak sound level, factoring in the statistical variations caused by weather, that is likely to be exceeded only 15 percent of the time (i.e., 85 percent certainty that sound will be within this range). This “85 percent solution” gives the installation and the community a means to consider the areas impacted by training noise without putting stipulations on land that would only receive high sound levels under infrequent weather conditions that greatly favor sound propagation. PK15(met) does not take the duration or the number of events into consideration, so the size of the contours will remain the same regardless of the number of events.

C-5. The AR lists housing, schools, and medical facilities as examples of noise-sensitive land uses (U.S. Army 2007). The program defines four Noise Zones:

- Noise-sensitive land uses are not recommended in *Zone III*.
- Although local conditions such as availability of developable land or cost may require noise-sensitive land uses in *Zone II*, this type of land use is strongly discouraged on the installation and in surrounding communities. All viable alternatives should be considered to limit development in *Zone II* to non-sensitive activities such as industry, manufacturing, transportation and agriculture.
- Noise-sensitive land uses are generally acceptable within the *Zone I*. However, though an area may only receive *Zone I* levels, military operations may be loud enough to be heard- or even judged loud on occasion. *Zone I* is not one of the contours shown on the map; rather it is the entire area outside of the *Zone II* contour.
- A *Land Use Planning Zone (LUPZ)* is a subdivision of Zone I. The *LUPZ* is 5 dB lower than the Zone II. Within this area, noise-sensitive land uses are generally acceptable. However, communities and individuals often have different views regarding what level of noise is acceptable or desirable. To address this, some local governments have implemented land use planning measures out beyond the Zone II limits. Additionally, implementing planning controls within the *LUPZ* can develop a buffer to avert the possibility of future noise conflicts.

C-6. See Table C for land use guidelines.

TABLE C. NOISE ZONE DECIBEL LEVELS (AR 200-1).

Noise Zone	**Aviation (ADNL)**	**Small Arms (PK15(met))**	**Large Arms, Demolitions, Etc. (CDNL)**
Land Use Planning Zone (LUPZ)	60-65	N/A	57 – 62
Zone I	<65	<87	<62
Zone II	65-75	87 – 104	62 – 70
Zone III	>75	>104	>70

APPENDIX D

AIRFIELD NOISE CONTOUR COMPARISON

D-1. REFERENCES.

a. Fort Carson, 2009. Final Environmental Impact Statement (FEIS) for Implementation of Fort Carson Grow the Army Stationing Decisions, February 2009.

b. U.S. Army, 2008, U.S. Army Center for Health Promotion and Preventive Medicine, Addendum to Operational Noise Consultation 52-ON-046N-06, Operational Noise Contours for Fort Carson, CO, April 2006. Dated 16 October 2008.

c. U.S. Army, 2011. Final Programmatic Environmental Impact Statement (PEIS) for the Realignment, Growth and Stationing of Army Aviation Assets, February 2011.

D-2. PREVIOUS AIRFIELD CONTOUR.

a. The airfield contours presented in the FEIS and PEIS are shown in Figure D. These contours were originally developed in 1999 based on 64,884 flights over 180 days (actual operating days) and the majority of the activity (rotary-wing) utilizing Runway 04/22. Table D indicates the flight activity.

TABLE D. BUTTS ARMY AIRFIELD OPERATIONS (1999).

Aircraft Type	**Number of Flights**	**Average Number of Flights per Day** (based on 180 operating days)
AH-1	15,290	85
AH-64	17,066	95
C-130	230	1
CH-47	160	<1
DHC-6	30	<1
OH-58	16,505	<1
T-41	53	92
UH-1	135	<1
UH-60	15,415	86

b. Based on the 1999 contours, Zone III (>75 ADNL) did not extend beyond the installation boundary or into any noise sensitive land uses on Fort Carson. The Zone II (65-75 ADNL) and the LUPZ (60 – 65 ADNL) extended beyond the western boundary. However, these apparent "off-post" contours were artifacts resulting from entering the exact prescribed flight tracks into the NOISEMAP computer program. The computer program treated each aircraft as passing over the exact same points so the sound energy was treated as if concentrated along a line. In reality, aircraft fan out in different directions along the western boundary and many of the aircraft turn back into Fort Carson before they pass over the boundary.

c. During intervening years, the original inputs were reviewed to determine if enough variables had changed to warrant a reanalysis. During the 2007 calendar year, there were 28,725 operations. Since the low number of operations was due to deployments, the 1999 contours were kept as baseline to represent normal non-deployment operational levels.

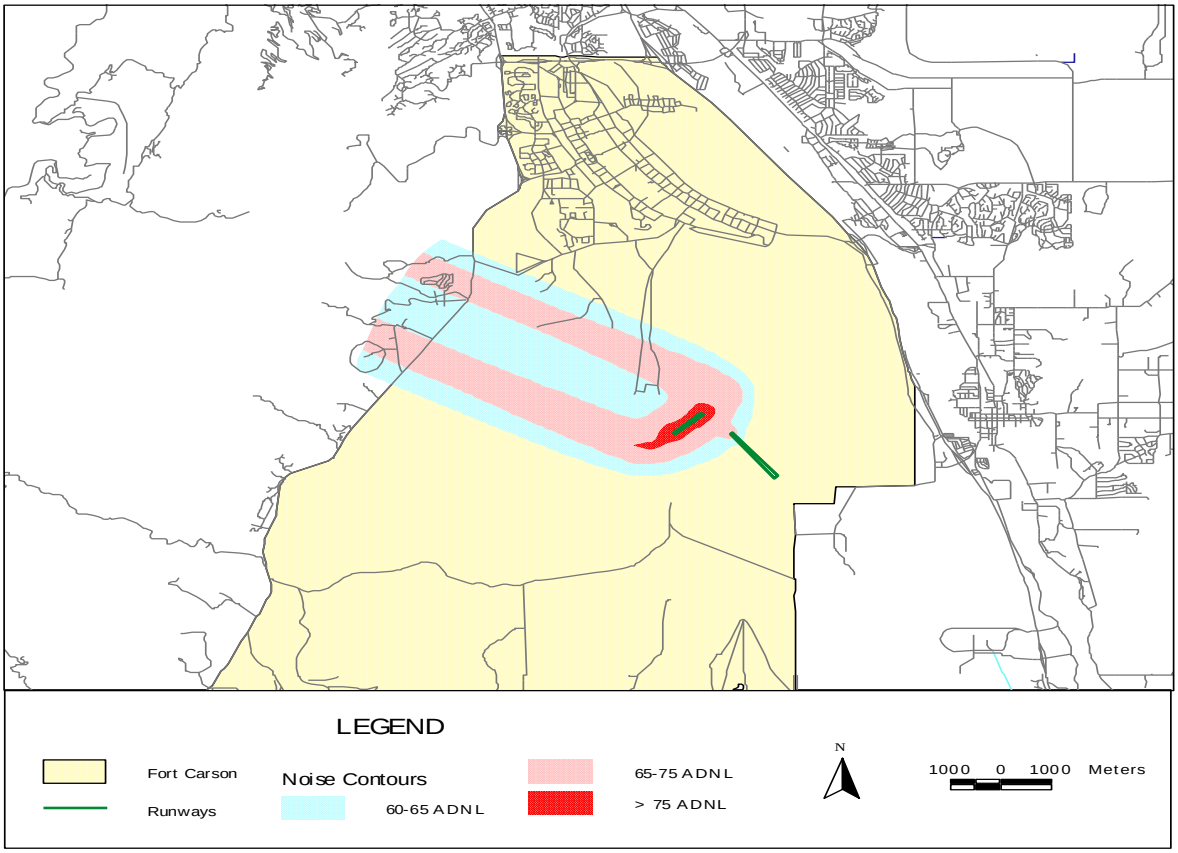


FIGURE D. BUTTS AAF AIRFIELD CONTOURS.

D-3. CURRENT AIRFIELD CONTOURS. Due to several factors, a new modeling analysis was completed for this consultation. Changes to modeling parameters included:

- Based on Fiscal Year 2011 operations, the number of flights increased to 103,199.
- Per Federal Aviation Administration and Army policy, contours are based on a Yearly Day-Night average Noise Level.
- Increased flight corridor altitudes.
- Changes in frequency of use for approach/ departure and closed-pattern routes.
- Changes in aircraft.

APPENDIX E

WEAPON EXPENDITURE

FORT CARSON SMALL CALIBER RANGE OPERATIONS

	PISTOL, 9 MM, LIVE	RIFLE, 5.56 MM, LIVE	MACHINE GUN, 7.62 MM, LIVE	SHOTGUN, 12 GAUGE, NONLETHAL
RANGE 3 - MILITARY POLICE QUALIFICATION COURSE	X			
RANGE 5 - COMBAT PISTOL QUALIFICATION COURSE	X			
RANGE 7A - KNOWN DISTANCE RANGE		X	X	
RANGE 9 - SF MUTLIPLE USE RANGE		X	X	
RANGE 13A - ZERO RANGE		X		
RANGE 15 - MACHINE GUN ZERO RANGE			X	
RANGE 29 - CLOSE QUARTERS COMBAT RANGE		X		
RANGE 37 - SCALED MORTAR RANGE				X
RANGE 43 - SF MULTIPLE USE RANGE		X		
RANGE 45 - KNOW DISTANCE RANGE			X	
RANGE 49 - AUTOMATED RECORD FIRE RANGE		X		
RANGE 51 - ZERO RANGE		X		
RANGE 55 - AUTOMATED FIELD FIRE RANGE		X		
RANGE 57 - AUTOMATED RECORD FIRE RANGE		X		
RANGE 63 - ZERO RANGE		X		
RANGE 65 - ZERO RANGE		X		
RANGE 69 - AUTOMATED RECORD FIRE		X		

PINON CANYON MANEUVER SITE SMALL CALIBER RANGE OPERATIONS

	PISTOL, 9 MM, LIVE	RIFLE, 5.56 MM, LIVE	MACHINE GUN, 7.62 MM, LIVE	MACHINE GUN, .50 CAL, LIVE
RANGE 1 - COMBAT PISTOL QUALIFICATION COURSE	X			
RANGE 3 - AUTOMATED RECORD FIRE		X		
RANGE 7 - MULTI PURPOSE MACHINE GUN		X	X	X

APPENDIX F
FORT CARSON DEMOLITION AND LARGE CALIBER WEAPON EXPENDITURE

		BASELINE ACTIVITY		PROJECTED ACTIVITY	
Firing Location	**Weapon and Ammunition Type**	**DayShots 0700-2200**	**NightShots 2200-0700**	**DayShots 0700-2200**	**NightShots 2200-0700**
Hellfire North	Hellfire Missile, HE	145	35	145	35
	Hellfire Missile, Inert	0	0	144	0
Hellfire South	Hellfire Missile, HE	145	35	145	35
	Hellfire Missile, Inert	0	0	144	0
Mortar Point 02	120mm Mortar, HE	250	13	250	13
	120mm Mortar Inert	1173	62	1173	62
	60mm Mortar, HE	95	5	95	5
	60mm Mortar, Inert	472	25	472	25
	81mm Mortar, HE	78	4	78	4
	81mm Mortar, Inert	212	3	212	3
Mortar Point 03	120mm Mortar, HE	250	14	250	14
	120mm Mortar, Inert	1173	62	1173	62
	60mm Mortar, HE	95	5	95	5
	60mm Mortar, Inert	472	25	472	25
	81mm Mortar, HE	24	1	24	1
	81mm Mortar, Inert	66	2	66	2
Mortar Point 16	120mm Mortar, HE	249	13	249	13
	120mm Mortar, Inert	1172	61	1172	61
	60mm Mortar, HE	107	5	107	5
	60mm Mortar, Inert	471	24	471	24
	81mm Mortar, HE	51	3	51	3
	81mm Mortar, Inert	136	2	136	2
Mortar Point 17	120mm Mortar, HE	250	13	250	13
	120mm Mortar, Inert	1173	62	1173	62
	60mm Mortar, HE	95	5	95	5
	60mm Mortar, Inert	471	25	471	25
	81mm Mortar, HE	261	14	261	14
	81mm Mortar, Inert	706	11	706	11
Mortar Point 20	120mm Mortar, HE	249	13	249	13
	120mm Mortar, Inert	1172	61	1172	61
	60mm Mortar, HE	539	14	539	14
	60mm Mortar, Inert	471	24	471	24
	81mm Mortar, HE	336	18	336	18
	81mm Mortar, Inert	907	14	907	14

		BASELINE ACTIVITY		PROJECTED ACTIVITY	
Firing Location	Weapon and Ammunition Type	DayShots 0700-2200	NightShots 2200-0700	DayShots 0700-2200	NightShots 2200-0700
Mortar Point 24	120mm Mortar, HE	250	13	250	13
	120mm Mortar, Inert	1173	62	1173	62
	60mm Mortar, HE	95	5	95	5
	60mm Mortar, Inert	471	25	471	25
	81mm Mortar, HE	833	44	833	44
	81mm Mortar, Inert	2253	33	2253	33
Mortar Point 25	120mm Mortar, HE	250	13	250	13
	120mm Mortar, Inert	1172	62	1172	62
	60mm Mortar, HE	95	5	95	5
	60mm Mortar, Inert	471	25	471	25
	81mm Mortar, HE	192	10	192	10
	81mm Mortar, Inert	520	7	520	7
Range 35B	Hand Grenade, M67, HE	10500	0	10500	0
Range 103	40mm Grenade, HE	46482	2446	46482	2446
Range 105	120mm Tank, Inert	1261	0	1261	0
	25mm Gun, Inert	11588	0	11588	0
Range 109	120mm Tank, Inert	277	119	277	119
	25mm Gun, Inert	42745	10686	42745	10686
Range 111 DMPTR	120mm Tank, Inert	3164	1185	3164	1185
	25mm Gun, Inert	21779	11237	21779	11237
	2.75" Rocket, Inert	0	0	1824	0
	30mm Gun, Inert	0	0	16480	0
Range 115A	40mm Grenade HE	9986	526	9986	526
Range 121A	Bangalore	36	0	36	0
	Crater Charge 40 lbs	214	0	214	0
	Demolition, C4 1.25 lbs	23594	0	23594	0
	Demolition, PETN 2 lbs	21	0	21	0
	Demolition, TNT 1 lb	1257	0	1257	0
	Demolition, TNT 1/4 lb	1163	0	1163	0
	M15 Mine	125	0	125	0
	M181A1 Mine	252	0	252	0
	M19 Mine	121	0	121	0
	M21 Mine	207	0	207	0
	Shape Charge 40 lbs	428	0	428	0
Range 123	20mm Gun, Inert	6602	0	6602	0
	25mm Gun, Inert	183	0	183	0
	30mm Gun, Inert	95450	0	95450	0
Range 125	TOW Missile, Inert	115	0	115	0
Range 127 IPBC	25mm Gun, Inert	24395	6099	24395	6099

Note: Inert is defined as any round that does not create noise upon impact.
Projected increase is highlighted.

		BASELINE ACTIVITY		PROJECTED ACTIVITY	
Firing Location	Weapon and Ammunition Type	DayShots 0700-2200	NightShots 2200-0700	DayShots 0700-2200	NightShots 2200-0700
Range 139	AT4 Rocket, Inert	735	0	735	0
	LAW Rocket, Inert	231	0	231	0
Range 141	155mm Howitzer, HE	18	0	18	0
	155mm Howitzer, Inert	1	0	1	0
	Dragon Rocket, Inert	44	0	44	0
Range 143 DMPRC	120mm Tank, Inert	9303	3252	9303	3252
	25mm Gun, Inert	75847	27779	75847	27779
	TOW Missile, Inert	421	0	421	0
	2.75" Rocket, Inert	0	0	1824	0
	30mm Gun, Inert	0	0	16480	0
Range 145	120mm Tank, Inert	952	389	952	389
	25mm Gun, Inert	21779	11237	21779	11237
Range 149	Stinger Missile, HE	72	0	72	0
Range 151	20mm Gun, Inert	228	0	228	0
	25mm Gun, Inert	101	0	101	0
Range 155 CALFEX	120mm Tank, Inert	842	0	842	0
	25mm Gun, Inert	6271	0	6271	0
	155mm Howitzer, HE	203	50	203	50
	155mm Howitzer, Inert	761	299	761	299
	2.75" Rocket, Inert	0	0	1824	0
	30mm Gun, Inert	0	0	16480	0
Range 155E	120mm Mortar, HE	608	32	608	32
	120mm Mortar, Inert	722	70	722	70
	60mm Mortar, HE	319	17	319	17
	60mm Mortar, Inert	67	3	67	3
	81mm Mortar, HE	611	32	611	32
	81mm Mortar, Inert	285	15	285	15
	Demolition, C4 1.25 lbs	1151	0	1151	0
	Crater Charge, 40 lbs	29	0	29	0
	Shape Charge, 40 lbs	20	0	20	0
Training Area 07	155mm Howitzer, HE	1026	237	1026	237
	155mm Howitzer, Inert	15	266	15	266
Training Area 09	155mm Howitzer, HE	86	21	86	21
	155mm Howitzer, Inert	1	1	1	1
Training Area 10	155mm Howitzer, HE	370	100	370	100
	155mm Howitzer, Inert	7	46	7	46
Training Area 11	155mm Howitzer, HE	425	106	425	106
	155mm Howitzer, Inert	7	178	7	178
Training Area 12	155mm Howitzer, HE	433	104	433	104
	155mm Howitzer, Inert	6	23	6	23

Note: Inert is defined as any round that does not create noise upon impact.
Projected increase is highlighted.

		BASELINE ACTIVITY		PROJECTED ACTIVITY	
Firing Location	Weapon and Ammunition Type	DayShots 0700-2200	NightShots 2200-0700	DayShots 0700-2200	NightShots 2200-0700
Training Area 14	155mm Howitzer, HE	71	18	71	18
	155mm Howitzer, Inert	1	22	1	22
Training Area 16	155mm Howitzer, HE	144	36	144	36
	155mm Howitzer, Inert	2	22	2	22
Training Area 17	155mm Howitzer, HE	1404	351	1404	351
	155mm Howitzer, Inert	22	397	22	397
Training Area 18	155mm Howitzer, HE	213	52	213	52
	155mm Howitzer, Inert	3	57	3	57
Training Area 20	155mm Howitzer, HE	420	105	420	105
	155mm Howitzer, Inert	6	103	6	103
Training Area 21	155mm Howitzer, HE	748	187	748	187
	155mm Howitzer, Inert	12	103	12	103
Training Area 24	155mm Howitzer, HE	1343	337	1343	337
	155mm Howitzer, Inert	21	675	21	675
Training Area 25	155mm Howitzer, HE	75	19	75	19
	155mm Howitzer, Inert	1	18	1	18
Training Area 27	155mm Howitzer, HE	33	9	33	9
	155mm Howitzer, Inert	1	8	1	8
Training Area 28	155mm Howitzer, HE	37	10	37	10
	155mm Howitzer, Inert	1	1	1	1
Training Area 30	155mm Howitzer, HE	63	15	63	15
	155mm Howitzer, Inert	1	46	1	46
Training Area 31	155mm Howitzer, HE	62	15	62	15
	155mm Howitzer, Inert	1	19	1	19
Training Area 40	155mm Howitzer, HE	64	16	64	16
	155mm Howitzer, Inert	1	1	1	1
Training Area 41	155mm Howitzer, HE	60	15	60	15
	155mm Howitzer, Inert	1	1	1	1

Note: Inert is defined as any round that does not create noise upon impact.
Projected increase is highlighted.

4TH COMBAT AVIATION BRIGADE
IRON EAGLES
PRE ACCIDENT & SEVERE WEATHER PLAN

The following incidents / events require activation of this Pre Accident Plan:

- Aircraft down with suspected damage - over speed, over torque, over temp, hot start, engine failure, and bird strike.
- Aircraft down with known damage – Aircraft engine fire, stroked landing gear, blown tire, cracked canopy, landing on a post, and blade strike.
- Aircraft accident that resulted in injuries.
- Any accident or incident that resulted in damage to civilian property.
- Smoke and or fumes in the cockpit.
- Any forced landings of an aircraft.
- Any event that might draw local media attention.
- Flight control malfunction resulting in a PL.
- Any armament shot outside the range area, or inadvertent firing of any weapon system.
- Armed aircraft recovering to any airfield.
- When any fire or hazmat (fuel, Hydraulic fluid) leak is present.
- Confirmed or suspected fuel or hydraulic contamination.

The BDE PAO or their representative is the SOLE release authority for information related to accidents or incidents

NOTE: ANY CHANGES TO THIS DOCUMENT WILL BE BROUGHT TO THE ATTENTION OF THE BRIGADE SAFETY OFFICER

VERSION 16.2

Primary Crash Alarm

Notify only <u>one</u> of the following agencies to activate the Primary Crash Alarm if not already complete.

BAAF Base Operations M - TH 0700L-2300L, F 0700L-2200L CLD Sat, Sun, Holidays (719) 526-3935 (Primary) (719) 526-3936 (Alternate)
BAAF Air Traffic Control Tower M - TH 0700L-2300L, F 0700L-2200L CLD Sat, Sun, Holidays 719-526-5117
Installation Operations Center 24 hours 719-526-3400/5500
Ft Carson Range Control 24 hours 719-526-5698/4355
Any Civilian ATC Facility 1-800-992-7433 (1-800-WX-BRIEF)
AVIATION / GROUND off airfield *911

***<u>Note:</u> A 911 call placed from a cell phone will connect to Colorado Springs Emergency Dispatch. Tell the dispatcher you are calling from Ft. Carson.**

Dialing Instructions from a Fort Carson Phone:

To dial on Post Phone Number:	Dial the 7 digit number.
To dial an off post local number:	Dial **99** then the 7 digit number
To dial a long distance number:	Dial **971** + 3 Digit Area Code + 7 Digit Number

Secondary Crash Alarm

Must contact 4th CAB SDO, BOC and owning Battalion

4th CAB SDO/SDNCO Alternate Avn Primary Ground (719) 524-2057/2748
BRIGADE OPERATIONS CENTER (719) 526-9319

6-17 ARS FLT OPS: (719) 526-0325 **Staff Duty:** (719) 526-6175
2-4 GSAB FLT OPS: (719) 526-4758 **Staff Duty:** (719) 526-5313
3-4 ASB FLT OPS: (719) 524-1254 **Staff Duty:**
4-4 ARB FLT OPS: (719) 526-8094 **Staff Duty:**
404 ASB FLT OPS: **Staff Duty: (**719) 526-5313

When notified of an accident, precautionary landing (PL), or simulated crash drill, write down the following information:

1. Type and Number of Aircraft or Vehicle(s) -

_____

2. Name(s) and Number of Personnel Involved in Accident and Extent of Injuries

_____

_____

_____

_____

3. Circle the nature of emergency:

Aircraft – Ground - Exercise

Crash / Precautionary Landing / Personal Injury / Fire

Brief Description of Damage

_____

4. Location of accident (Grid or Geographic location):_____
5. Pilot's Intentions (If still in Flight):

_____

6. Tail Number/Bumper/License Plate Number:_____
7. Armament onboard? YES or NO

   Amount/Type (if known)_____
8. Sensitive Items? YES or NO

   Amount/Type (if known):

_____

Supplemental Information:

9. HAZMAT Spill Involved? YES or NO

   Amount/Type (if known):_____
10. Accident Site Accessible by Ground Vehicles? YES or NO
11. Unit (if known):

_____

12. Information of individual reporting the incident:

Call Sign or Name:_____

Person'sLocation:_____

Method of Contact: Radio – Telephone –In Person –

Other:_____

Phone # or Alternate Freq:

_____

13. Name, Rank, Duty Position and contact of individual recording this report:

_____

TEAR OUT

START DA FORM 1594 ON NEXT PAGE / START NOTIFICATION OF COMMAND

EXAMPLE NOTIFICATION ROSTER - DELETE THESE INSTRUCTIONS IN RED AFTER UPDATING MUST CALL NUMBERS. BOLD NUMBERS

BATTALION PRE-ACCIDENT PLAN NOTIFICATION ROSTER

MUST CALL NUMBERS IN BOLD AND OWNING COMPANY COMMANDER

POINT OF CONTACT	WORK	HOME/BB	CELL
Battalion Commander	**524-####**	**719-###-####**	**719-###-####**
Battalion Safety Officer	**524-####**	**719-###-####**	**719-###-####**
Brigade Safety Officer	**524-####**	**719-###-####**	**719-###-####**
Battalion CSM	524-####	719-###-####	719-###-####
Executive Officer	524-####	719-###-####	719-###-####
S3 / Operations	524-####	719-###-####	719-###-####
S1 / Personnel	524-####	719-###-####	719-###-####
Flight Surgeon	524-####	719-###-####	719-###-####
Flight Ops Officer	524-####	719-###-####	719-###-####
Battalion Stands Officer	524-####	719-###-####	719-###-####
BAMO	524-####	719-###-####	719-###-####
BN PC Officer	524-####	719-###-####	719-###-####
AMSO	524-####	719-###-####	719-###-####
Battalion Safety NCO	524-####	719-###-####	719-###-####
Battalion Chaplin	524-####	719-###-####	719-###-####
COMPANY COMMANDERS			
A Company Commander	524-####	719-###-####	719-###-####
A Company ASO	524-####	719-###-####	719-###-####
B Company Commander	524-####	719-###-####	719-###-###
Company ASO	524-####	719-###-####	719-###-###
C Company Commander	524-####	719-###-####	719-###-####
Company ASO	524-####	719-###-####	719-###-####
D Company Commander	524-####	719-###-####	719-###-####
D Company ASO	524-####	719-###-####	719-###-####
E Company Commander	524-####	719-###-####	719-###-####
E Company ASO	524-####	719-###-####	719-###-####
F Company Commander	524-####	719-###-####	719-###-####
F Company ASO	524-####	719-###-####	719-###-####
HHC Commander	524-####	719-###-####	719-###-####
HHC ADSO	524-####	719-###-####	719-###-####

All key personnel will assemble at the **Brigade Operations Center at Brigade Headquarters** immediately upon notification of a crashed aircraft.

4TH COMBAT AVIATION BRIGADE PRE-ACCIDENT PLAN

1. PURPOSE: To establish the Brigade "Pre-Accident" Plan in the event of an aircraft mishap, serious Army Motor Vehicle (AMV) accident, critical injury or death of a soldier, or certain serious incidents meeting Command Critical Information Requirements (CCIR). Any errors or required changes to this plan should be brought to the attention of the Brigade Safety Officer as soon as possible.

2. GENERAL: This plan sets forth basic preparatory measures to quickly notify crash rescue/ medical services, and accurately receive and disseminate mishap data to key the chain of command, brigade staff/special staff, and appropriate agencies. The three major considerations are to minimize injuries or loss of life, minimize government and civilian property damage, and prevent the loss of accident investigation evidence.

3. PRIMARY CRASH ALARM: The Primary Crash Alarm participants consist of those individuals or organizations that are responsible for the immediate response to life threatening situations. (See BAAF Safety & Pre-accident Plan)

4. SECONDARY CRASH ALARM: The secondary crash alarm applies to activities, which provide follow-on post accident support. (See BAAF Safety & Pre-accident Plan)

5. GENERAL DUTIES and RESPONSIBILITIES:

a. Staff Duty Officer/NCO/Flight Operations is responsible for initiating the Pre-Accident Plan upon receiving notification of the following incidents:

(1) Aircraft/Army motor vehicle accident
(2) Aviation Emergency (in flight, landing)
(3) Precautionary Landing (outside of U.S. Military Installation)
(4) Any damage to an aircraft
(5) Death or critical injury to Brigade personnel
(6) Hazardous material spill
(7) Any reportable incident indicated in the CCIR.

b. Initial Crash Report Data: Use Minimum Accident Report Instructions - page 5. Obtaining critical information from the person making the initial report of the crash is essential. However, do not delay activating the Primary Crash Alarm, if the accident has not been reported or Pre-Accident plan if all critical information is not available. The following pages outline procedures and required information to help establish the location and nature of the incident.

c. The Staff Duty Officer/NCO is responsible for maintaining a copy of this plan in the Staff Duty Office and insuring all duty personnel are properly briefed.

d. The Safety Office will review this plan and ensure telephone numbers are updated monthly.

e. Individuals/sections designated within this plan will brief their personnel on duties and responsibilities. Units will maintain an up-to-date plan augmented with unit specific personnel and phone numbers.

f. Accident **DO's and DO NOT**

DO:

1. Allow civil medical personnel to treat and transport the injured.
2. Allow local military police and civil authorities to assist with or provide security.
3. Direct questions from civil authorities and the local populace to the senior military person present.
4. Secure if possible, without danger or disturbing the wreckage, classified or sensitive documents and equipment.

DO NOT:

1. Abandon the telephone which received the initial call, unless relieved by the BDE/BN CDR, XO, or S-3.
2. Discuss the accident with anyone except key personnel identified within this Pre-Accident Plan.
3. Interfere with crash rescue or medical personnel merely to provide security or to question witnesses. Life saving is the first priority.
4. Interfere with, or refuse to cooperate with, the military police or local authorities.
5. Move the injured, unless a fire is present or other immediate danger.
6. Approach a burning aircraft except to save a life.
7. Disturb the wreckage, except to save a life or treat the injured.
8. Give phone numbers to anyone except emergency personnel or key personnel.

6. For an **AIRCRAFT ACCIDENT / INCIDENT** notify Butts Army Airfield operations at the numbers listed below and confirm the accident has been reported and the BAAF and/or Installation Pre-Accident Plan has been initiated. If the accident has not been reported, give them the information above. They will activate the Primary Crash Alarm and contact emergency services, if required, and dispatch them to the accident site. When BAAF Operations is closed, immediately contact Fort Carson Emergency Dispatch: **911.**

a. Butts Army Airfield: (719) 526-3935/3936

7. For **GROUND ACCIDENTS REQUIRING EMERGENCY SERVICES,** contact Fort Carson Emergency Dispatch: **911**. They are the central dispatch for Emergency Medical Services (Fire/Ambulance/Police) for Fort Carson. Additional contact numbers for Fort Carson:

a. Robinson Medical Clinic (719) 526-7764 (Admin – Not Emergency)
b. Fire Chief (719) 526-5566 (Admin – Not Emergency)
c. Military Police (719) 526-2699
d. Evans Emergency Room (719) 526-7111 (Admin)
e. Hospital Operation Center (719) 524-4242/4244

8. Upon completion of the notification sequence above, the Bde SDO/SDNCO will ensure the duty log is updated with personnel/times contacted. Minimize use of primary SDO phone line to keep it open for incoming calls.

9. The following pages give additional information and specific responsibilities of Brigade and Battalion personnel after initial notification is accomplished.

SPECIFIC DUTIES and RESPONSIBILITIES:

A. <u>STAFF DUTY OFFICER / STAFF DUTY NCO will</u>:

(1) Obtain Critical Information (page 3)
(2) Ensure "**Primary Crash Alarm**" has been activated for aircraft emergencies and accidents. If mishap occurred away from Fort Carson/BAAF call 911.
(3) Begin Notification Sequence.
(4) Provide telephone coverage until released by the Brigade XO, S-3. or S-3 SGM.
(5) Plot the mishap site on the map located in the S-3.

Aircraft Accidents: All information regarding missing/downed aircraft will be passed through the Operations Officer (S-3). All information is treated as confidential and released only on a need to know basis. In the event of injuries or deaths, all information relating to names and numbers of personnel involved will be treated with complete confidentiality.

Ground Accidents: Information concerning a ground accident will be passed as in the Brigade Notification Sequence. Guidance for depth of contact information will be obtained from the Brigade XO.

B. <u>OWNING MISHAP UNIT</u>:

Contact the following individuals, and provide them the essential information:

(a) Appropriate Key Personnel and Agencies, if required. (Include notification of Aviation Brigade personnel)
(b) Battalion Commander/XO
(c) Applicable Company Commander
(d) Battalion S3
(e) Battalion Safety Officer/NCO
(f) Applicable Company Safety Officer/NCO
(g) Battalion Aircraft Maintenance Officer, if aircraft accident occurs.
(h) Battalion Flight Surgeon.
(i) Battalion Flight Operations, if aircraft accident occurs.
(j) Motor Maintenance Officer/NCO, if Army motor vehicle (AMV) accident occurs.
(k) Battalion Chaplain, if serious injuries or fatalities occur.

C. **<u>The BRIGADE XO will:</u>**

(1) Determine composition and ensure notification of the Brigade Staff.
(2) Direct the actions of the Brigade Staff.
(3) Continually update the Brigade Commander on the overall status of the mishap.
(4) Supervise the activation and execution of this plan to its completion.
(5) Monitor all reports to higher and coordinate actions with subordinates.

D. <u>The BRIGADE COMMANDER will:</u>

(1) Ensure a **Command Critical Information Requirements (CCIR)** report is sent to **Division EOC.**
(2) Ensure the **Brigade Safety Officer** is notified.
(3) Notify the **Division Command Group, if required.**
(4) Notify the **Brigade Chaplain** to assist with the notification of spouses/relatives, if necessary.
(5) Control the accident site until the President of the Accident Investigation Board arrives. Ensure aircrew members/soldiers are promptly evacuated to medical facilities physical examinations/evaluations.
(6) Issue a “gag order” as required.
(7) IAW FORSCOM Regulations and higher command directives ensure an immediate "Stand Down" of the unit for any Class A accident or other serious incident. This will allow for an internal review to preclude further occurrence. The "Stand Down" has no specific period; its purpose is to ensure presentation to all unit members of those facts known about the accident, and to provide time for checking all facts pertaining to the accident.

E. **<u>The BRIGADE S-3 will:</u>**

(1) Coordinate all post-mishap actions.
(2) Task subordinate unit assets for a security force (E6 or higher in charge) at the accident site. Security force should plan to stay at least six (6) days at the site. Security force will require food, water, shelter and two (2) radios and/or cell phones. The unit involved in the mishap will provide the security force, or the Brigade S-3 may task other subordinate units for these requirements if the unit involved is unable to do so.
(3) Monitor requests from the crash site for special or additional equipment needed.
(4) Request **EOD support** if any type of ordinance are known to be on board the aircraft/vehicle involved in the mishap.
(5) Request through Butts Base Operations to submit a NOTAM in order to establish a restricted operations zone (ROZ) over the mishap site of 2NM and 2,000 feet AGL.
(6) Coordinate with other units for aviation support as necessary.

(7) Upon the order of the Brigade Commander, complete the following notifications:

Div EOC
Division Commander, if directed.
ADC-S
PAO
Installation Safety

F. <u>The BRIGADE SAFETY OFFICER/NCO will:</u>

(1) Ensure notification of the Brigade Commander.
(2) Ensure notification of the next higher safety officer
(3) BPT Proceed to the crash site and assist the battalion safety personnel.
(4) Ensure notification of CRC IAW AR 385-10 and DA PAM 385-40, as directed.
(5) Contact CID if required.
(6) Contact the **Division Safety Office** (503-0093/0096) to request orders be published for the Accident Investigation Board.

G. <u>The BATTALION SAFETY OFFICER/NCO will:</u>

(1) Ensure notification of the Commander.
(2) Ensure notification of the next higher safety officer and provide the following information:
(a) Date and time of accident.
(b) Name, rank, and unit of individuals involved.
(c) Location / Grid.
(d) Extent of injuries / Number of fatalities.
(e) Location of victims at time of report.
(f) Vehicle/aircraft/equipment type and identification number.
(g) Description and circumstances of the accident.
(h) Remarks.

(3) Complete the appropriate "Worksheet for Telephonic Notification" (DA Form 7305 or DA Form 7306) and secure it for the Brigade Safety Officer after all emergency notification actions are completed.
(4) Proceed to the crash site. Take charge of the wreckage IAW DA PAM 385-40.
(a) Check for explosive/flammable materials.
(b) Ensure evacuation of individuals involved for their post-accident medical examination, if applicable. Note: This is normally not an immediate action step unless injuries are involved or biochemical testing is required.
(c) Cordon off the area with engineer or yellow caution tape.
(d) Coordinate with CID for the requirements of any criminal investigation.
(e) Ensure a controlled entry/tracking system is established and enforced.
(f) Brief the Military Police / Guards on their responsibilities.
(g) Obtain the names and addresses of witnesses.
(h) Secure the logbooks, weight and balance files, and PPCs, if possible.
(i) Supervise the photographing of the wreckage.

(j) Ascertain the accident classification based on the "Estimated Cost of Damage" (ECOD), provided by the Aircraft Maintenance Officer or Motor Officer/NCO, and injury cost from the medical activity.

(k) Prepare the “Accident Investigation Information/Equipment Requirements Checklist for Aircraft Accident Reports" IAW Appendix G of DA PAM 385-40, if applicable.

(5) Investigate the accident IAW DA PAM 385-40, AR 385-10, FORSCOM Regulations, and higher Command directives.

(6) Act as an advisor / POC to the Accident Investigation Board.

(7) Keep the Commander and next higher Safety Officer informed.

(8) Review the Accident Reports for the Commander, before forwarding them to the reviewing authority, giving particular attention to cause determination and preventive measures, designed to prevent other accidents.

H. <u>The Battalion Standardization Officer Will:</u> Ensure involved crewmember’s flight records (IATF) are secured and delivered to the Brigade XO.

I. <u>The BAMO/BMO will:</u>

(1) Ensure the availability of, and dispatch to the assembly point, qualified personnel to assist the Accident Investigation Board.

(2) Appoint someone to collect oil and fuel samples for analysis as necessary to aid in determining the cause of the accident, and report to the assembly point or crash site immediately.

(3) Assist the Accident Investigation Board in the recovery and identification of wreckage and the determination of operating conditions of various parts.

(4) Assist the Accident Investigation Board with the reconstruction of the aircraft/vehicle from wrecked parts.

(5) Provide the Accident Investigation Board / Safety Officer with an "Estimated Cost of Damage" (ECOD) IAW TB 43-0002-3, as soon as possible.

(6) Provide the maintenance history of the wrecked aircraft or vehicle, to the Accident Investigation Board / Safety Officer.

J. <u>The BATTALION Flight Surgeon will:</u>

(1) Prepare to go to the mishap site, DiRaimondo Clinic or ED. Collect Mishap box from DiRaimondo clinic that contains supplies needed for toxicology collection.

(2) Coordinate with hospital for medical care of mishap personnel. Be prepared to coordinate and or request further assistance from other military or civilian hospitals upon request from the on-scene commander or senior medical official at the crash site.

(3) Secure all health and dental records of all crewmembers involved in the mishap. On request of the President of the Accident Board, turn the records over to the Board President/Board Flight Surgeon or point of contact.

(4) Upon request, serve as a member of the Accident Investigation Board.

(5) Ensure the following specimens are collected on all crewmembers involved in the mishap. Maintain the chain of custody and ensure that the Division of Forensic Toxicology, Dover AFB, conducts laboratory analysis. See Division of Forensic Toxicology Annex for further instructions.

Note:
Attach the accident case number to all samples submitted (yymmddtime). All crew members/soldiers involved in Class A through C mishaps will undergo blood and urine testing (Class D or E, Commander's discretion).

(6) Coordinate any requirements of local authorities for injured or fatalities in the mishap so they may be expedition usly handled.
(7) Coordinate with Mortuary Affairs for the removal of fatalities as needed.
(8) Coordinate with local coroner or Medical examiner if off post

K. The BRIGADE S-1 will:

(1) Ensure casualty notification IAW AR 600-8-1 and 4th ID procedures.
(2) Coordinate personnel administration functions to include the requirements and services of the **Chaplain, Mortuary, Claims Officer and Staff Judge Advocate Officer** as required.
(3) Coordinate work space and typing support for the accident investigation board, use of DSN phone lines, FAX and computer support.
(4) Initiate Serious Incident Report as required by AR 385-10. Coordinate with subordinate S-1 on all working requirements.
(5) Coordinate to obtain files for all crewmembers/soldiers involved in the mishap. Ensure casualty reports are filed as required.
(6) Notify the **Brigade Flight Surgeon** or appropriate medical facility to sequester health/dental records involved in the mishap and release them only to the Brigade ASO, Accident Investigation Board, or Flight Surgeon.
(7) Initiate the request for orders for the Collateral Investigation Board.
(8) Assist the Commander of the unit sustaining the mishap in the preparation of the next of kin notifications. Make determination for casualty notification team formation.
(9) Contact the **Command Staff Judge Advocate** if:

a. The accident /mishap occurs outside of a military site.
b. Civilians are involved.
c. When claims against the US government are expected.

(10) Update duty positions and phone numbers for SDO/TOC personnel, as required.

L. The BRIGADE S-2 will:

(1) Determine the presence of any classified documents, material or equipment on the mishap aircraft/vehicle and conduct or arrange for its security and/or recovery.
(2) Coordinate with Military Police and local authorities.
(3) Coordinate courier orders when required.
(4) Provide 1: 50,000 scale maps with the best route to get to the accident site.
(5) Provide 1: 50,000 scale maps to the Accident Investigation and Collateral Investigation Boards.
(6) Coordinate with Weather Agencies to obtain copies of the involved flight crew's weather brief, and the current observations and weather forecasts in effect for the accident site.

M. <u>The BATTALION COMMANDER will:</u>

(1) Notify the Brigade Commander.

(2) Ensure notification of the Battalion Safety Officer.

(3) At the discretion of the Brigade Commander, be responsible for the overall control and coordination concerned with the accident, until the President of the Accident Investigation Board arrives.

(4) Ensure involved individuals have biochemical testing completed, for all class A, B, and C accidents. Testing for Class D and E accidents is at the commander's discretion. If the Commander cannot rule out the possibility of a mishap being class C or higher, biochemical testing will be accomplished.

(5) Issue a “gag order” as required.

(6) Ensure the proper safeguarding of accident information.

(7) Be prepared to notify and accompany the Chaplain, to assist with the notification of survivors.

(8) Coordinate for evacuation of the wreckage, after the President of the Accident Investigation Board has released it from the accident scene.

(9) Initiate a collateral investigation, if required IAW AR 15-6 and AR 385-10.

(10) IAW FORSCOM Regulations and higher command directives ensure an immediate "Stand Down" of the unit for any Class A accident or other serious incident. This will allow for an internal review to preclude further occurrence. The "Stand Down" has no specific period; its purpose is to ensure presentation to all unit members of those facts known about the accident, and to provide time for checking all facts germane to the accident.

N. <u>The BATTALION S-3 will:</u>

(1) Identify the last fuel source and coordinate its closing until it is checked for contamination, if appropriate.

(2) Coordinate to ensure dispatch of an adequate guard force immediately for the security of the mishap site. An adequate force is situation dependent. They must be able to man an entry control point, prevent personnel from entering within 50 meters of the main wreckage, and maintain a continuous roving guard/s for areas with remote wreckage. More information is located in the Aviation Brigade Safety SOP.

(3) Schedule a "Post Mishap Flight Evaluation" for aircrews involved in Class A, B, or C aircraft accidents, IAW FORSCOM Regulations, and appropriate ATM's. Note: This is normally not an immediate action step.

(4) Ensure individuals involved in a Class A, B, or C aircraft accident have their flight records sequestered.

(5) Coordinate for transportation to and from the mishap site for members of the Accident Investigation Board.

(6) Coordinate to ensure personnel and equipment are available for whatever capacities or duties the Accident Investigation Board or Safety Officer requires.

O. The BATTALION CHAPLAIN will:

(1) Be prepared to accompany and assist the Commander with the notification and counseling of survivors, after a fatality.

(2) Assist the Commander with counseling injured personnel and family members, as necessary or requested.

P. The BATTALION FLIGHT OPERATIONS PERSONNEL will:

(1) Activate the "Primary Crash Alarm" if required, for serious aircraft accidents only. This is accomplished through Base Operations.

(2) Quarantine Crewmembers records in CAFR's. Flight operations OIC/NCOIC will initiate closeouts.

(3) Collect Flight/Risk brief sheets and reading cards of Crewmembers involved.

(4) Hand-carry all applicable flight documentation and deliver to the Brigade Executive Officer

(5) Close-out flight records, as requested by the President of the Board, of involved aircrew members.

Q. The BATTALION HAZARDOUS MATERIALS OFFICER will:

(1) Report to any accident site which involves any hazardous materials or chemical leaks / spills, as directed.

(2) Conduct whatever duties are necessary to protect personnel and the environment.

(3) Complete the appropriate "Hazardous Materials" or "Environmental Protection" incident reports.

R. The Battalion ALSO will: Deliver applicable ALSE Maintenance Records for vests and survival gear are quarantined. If ALSE is recovered from the mishap site, quarantine the equipment. Deliver to the Brigade XO for investigation purposes when directed.

S. The CRASH SITE GUARDS will:

(1) Protect all military and civil property in the vicinity of the accident site.

(2) Prohibit the removal of deceased persons until approved by military authorities.

(3) Prohibit moving of any wreckage, except to facilitate removal of injured, until released by the President of the Accident Investigation Board, or unless an emergency exists. If it is necessary to move any wreckage, inform the Investigation Board about the moved parts and shown their original location. Pass on information on position and posture of removed injured personnel to the investigators. These facts are helpful in determining accident cause factors. Additionally, use of this information can lead to future changes for minimizing or eliminating similar injuries.

(4) Admit only authorized personnel onto the crash site. Investigation personnel should have an escort given out by the Base Operations, President of the Accident Investigation Board, or Safety Officer.

(5) Prevent the handling or disturbance of wreckage, theft or any parts, or the compromising of other evidence (such as gouges or marks on the ground) made by the

crashed vehicle or aircraft. Guards must not tamper with any wreckage.

(6) Keep bystanders outside a radius of 50 meters from the main wreckage.

(7) Prohibit ALL smoking in and around the accident site.

(8) Do not allow the news media to take pictures, unless they are accompanied by a representative from the PAO. Guards should refer any questions to the President of the Accident Investigation Board or Public Affairs Office, and will not answer any questions themselves. There is no authorization for free-lance photographers.

T. PERSONNEL INVOLVED IN THE ACCIDENT/INCIDENT will:

(1) Refrain from eating or drinking anything prior to examination by a medical officer. If it becomes necessary for consumption of food, liquid, or medication, prior to the medical examination, inform the Medical Officer of the material consumed.

(2) Report to the nearest Medical Center (Flight Surgeon for aircrew members) ASAP, MANDATORY FOR ALL Class A-C accidents/incidents (and when directed by the Commander for Class D and E) for a post-mishap medical evaluation.

(3) Provide information requested by the accident investigator or safety officer. Individuals will not depart the accident site, except for medical attention, unless released by the accident investigators or safety officer. If there is hospitalization of any involved individuals, contact those individuals when they are well enough to answer questions.

(4) Ensure to report all accidents to the company commander and safety officer/NCO.

U. ALL AVIATORS WILL:

(1) Make a "Precautionary Landing" when a significant reduction in aircraft performance or handling characteristics occurs, or whenever the aircraft suffers any known or suspected damage. Aviators will also make a precautionary landing when encountering deteriorating weather, or other factors, that make it uncertain that further flight is advisable. When the PIC exercises his prerogative to accomplish a precautionary landing in a non-hostile environment: the aircraft will not be moved from the landing site until maintenance personnel determine the cause of the condition requiring the landing, and the aircraft has been released for further flight. The only exception is a landing due to weather.

(2) Immediately report any aviation mishaps to Flight OPS. Serious incidents (Suspected Class C or above) will also be reported to BAAF Base OPS and 4CAB SDO or CUOPS.

4th Combat Aviation Brigade's Severe Weather Protection Plan

1. Dissemination of Weather Watches, Warning, and Advisories:

a. 4th CAB will receive notifications of all Weather Watches, Warnings and Advisories from Fort Carson Operation Center (FCOC).

(1) During normal hours 4th CAB S3 CUOPS will notify battalion TOCs of weather warning conditions. Battalion TOCs will inform their respective flight operations.

(2) After duty hours the 4th CAB SDO/SDNCO will notify the BN SDO/SDNCO of weather warning conditions. The battalion SDO/SDNCO will then notify their respective chain of command.

2. Severe Weather Protections Procedures:

a. GROUND OPERATIONS: Commanders will determine precautions to take during tactical ground operations (restrict road movements, recover personnel to shelters etc.). Chief of Staff, 4th Infantry Division is delegated the authority to excuse civilian and military personnel from reporting to work or to release them early. Commanders and First Sergeants will determine non-essential and essential key personnel required to perform their duties during periods of inclement weather. The following chart lists the four types of road conditions that apply to Fort Carson, as well as their restrictions.

Road-Condition Status Characteristics (Road Conditions can be determined by calling 526-0096)						
Road Conditions	Road Surface	Snow	Ice	Snow Depth	Visibility	Temperature
GREEN	Dry	None or blowing powder	None	None	More than 50 meters	Above 35◦F
AMBER	Wet	Packed Slush	Patches Black Ice Slush	Less than 3 Inches	Between 20 and 50 meters	Between 30◦F and 35◦F
RED	Flooded	Drifting	Extremely Icy	Exceeds 4 inches	Near zero	Between 10◦F And 30◦F

GREEN: Low/Minimal risk driving conditions. Roads are clear and dry. Road movement has no restrictions and vehicles may operate IAW normal safety precautions. No special equipment is required. Normal dispatch procedures apply.

AMBER: Medium Risk, cautionary driving conditions. Roads are wet, have snow, or icy areas. Normal dispatch procedures apply; ensure drivers take precautionary measures to help avoid accidents. **Road Conditions AMBER requires all military and civilian vehicles to have snow tires, all-weather radial tires, snow chains, or is a 4-wheel/all-wheel drive design.**

RED: High Risk, hazardous driving conditions. Roads are covered with ice or hard packed snow. Heavy precipitation and/or high winds are limiting visibility. No unnecessary travel. Tire chains are recommended for all series of vehicles if the vehicle is authorized tire chains per the appropriate vehicle operator's manual. Dispatches must be authorized and signed by the commander/director. Road movement is restricted to minimum essential traffic to preclude accidents and to allow maximum road/ground clearing operations. Vehicles automatically dispatched include MP vehicles, Security & Access Control Division vehicles, Fire Department vehicles, Evans Army Community Hospital (EACH) ambulances, Range Control vehicles, safety vehicles, government recovery vehicles, and government vehicles operated by contractors performing mission essential duties. Vehicles dispatched when required for emergency services include vehicles from the Quality Assurance Ammunition Surveillance Inspection Section, DPW support services and environmental response vehicles, and ration pick-up/delivery vehicles. Battalion/squadron executive officers or higher must authorize on post dispatches for military vehicles not engaged in services specified in this sub-paragraph. The approval of a major subordinate unit commander or the GC is required for off post dispatching of all government vehicles when road condition RED is in effect. Exceptions are granted for contractors operating government vehicles needing to conduct official duties at Turkey Creek Ranch or Camp Red Devil.

b. Aviation Operations: The following actions will be performed upon receipt of a severe weather warning, watch, or advisory.

Weather Warnings	
Criteria	**Protective Actions**
Tornadoes **(RED)**	**Suspend all operations and Personnel take immediate protective cover if Tornados are imminent.** Grounds all aircraft. Cancel all missions, initiate aircraft recall procedures or land ASAP, hangar aircraft using standard procedures. Inspect flight line, secure loose equipment; check aircraft mooring and blade tie-downs lead time permitting.
Winds 50 knots or greater or Hail 3/4 Inch Diameter or greater **(Orange)**	Grounds all aircraft. Cancel all missions, Initiate aircraft recall procedures or land ASAP, hangar aircraft using standard procedures. Inspect flight line, secure loose equipment, check aircraft mooring and blade tie-downs. Commanders will consider taking additional protective measures for winds > 50 knots (see paragraph 10).
Freezing Rain **(Brown)**	Grounds all aircraft. Recall aircraft time, time permitting. Commanders assess risk of other operations
Winds greater than 35 knots but less than 50 knots or Hail greater than 1/2 Inch Diameter but less than 3/4 Inch **(Yellow)**	Cancel Missions at Battalion Commander discretion. Inspect flight line, secure loose equipment, check aircraft mooring and blade tie-downs
Lightning within 5 Nautical Miles	Stop refueling and outdoor operations. Aircraft avoid the warning area
Blizzard Conditions	Commanders assess risk of operations
Sandstorm	Commanders assess risk of operations

UPON RECEIPT OF A WEATHER WATCH, WEATHER WARNING, AREA WEATHER ADVISORY, CONDITION OF READINESS, OR EVACUATION ORDER:

3. Responsibilities:

a. Brigade TOC/S3 CUOPS: will initiate the Severe Weather plan when a weather warning, watch or advisory is received; by first notifying Battalion TOCs who will notify respective Flight Operations, this can be done telephonically or via DCO chat. After duty hours maintain 4th CAB SDO will initiate the Severe Weather plan by contacting Brigade S3 CUOPs who will notify Battalion TOCs to establish EOC until Severe Weather plan is activated and complete. SDO/SDNCO and keep track of the weather's progress, direction, speed, and expected time of arrival. They will keep all personnel informed of the weather's progress.

b. Flight Operations:

(1) Notify all aircraft by announcing all weather advisories, watches and warnings over Operations frequency.

(2) For RED, ORANGE, or BROWN Weather Warnings; Recall or ground all aircraft for parking, mooring, or hangaring. Broadcast the weather warnings every 15 minutes for as long as the warning is in effect or until all aircraft are safe on the ground. Pilots in Command retain the final authority for the flight route and appropriate landing location to avoid severe weather.

(3) For a YELLOW or LIGHTNING weather warning; broadcast the weather warnings every 15 minutes for as long as the warning is in effect and relay Battalion Commander's guidance when received.

(4) Police call parking area for any loose debris. (i.e. chocks, fire extinguishers, boarding ramps, toolboxes, FOD containers, and work platforms).

(5) Ensure dumpster lids and doors are closed.

(6) Verify checks have been conducted on backup power sources to ensure efficient operation and availability of required fuel and oil.

c. Battalion Commander: Is responsible for developing a hasty and deliberate hangar-loading plan to maximize aircraft and ground support equipment protection. **Commander 404th ASB will assist companies to prepare aircraft (i.e. blade folding, stabilator removal) for hangar loading if required to maximize hangar space.** Direct the activation of the severe weather plan actions. Provide command guidance to aircrews through flight operations for YELLOW weather warnings. Keep the Brigade EOC informed of the progress of the hangaring operation.

d. Forward Support Company Commander's: Responsible for initiating actions and leading protection efforts deemed necessary for protection of wheeled vehicles, generators, and associated ground support equipment. Conducting checks on backup power sources to ensure efficient operation and availability of required fuel and oil.

e. Company Commanders: Responsible for ensuring aircraft are hangared according to diagram for dense pack of building 9604 and 9633, in the event all aircraft cannot be hangared, ensure that all protective covers are installed and aircraft are moored IAW TM 1-1500-250-23. Flight companies will hangar as many aircraft as possible in their allotted battalion hangar space before the end of the last work day of the week; use of available hangar space will not impact maintenance operations but will be used to protect aircraft. Do NOT "tight pack" aircraft by overlapping rotor blades unless directed by the Battalion Commander. "Tight packing" and blade removal will only be conducted when the risk of damage from weather out weighs the risk of ground handing mishaps and sufficient time and personnel are available to deliberately execute the "tight pack". Extreme caution will be used when overlapping blades.

f. Battalion S3: Responsible for coordinating with BAAF Operations for extra hangar space on Fort Carson and/or plan for the execution of an evacuation plan.

g. Butts Army Airfield Base Operation RECALL PROCEDURES: Butts Radio and BAAF Tower disseminate all weather watches or warnings on VHF, UHF, and FM. When wind speeds are or are expected to exceed 50 knots, take the following actions:

(1) All aircraft return immediately to BAAF. PCs ensure their aircraft is hangared or tied down and moored properly.

(2) Should weather conditions not permit return to BAAF, proceed to the nearest safe haven (i.e. Pueblo, Peterson Air Force Base, Tri County, etc.).

(3) Aircraft at Pinon Canyon Maneuver Site (PCMS) land and utilize vehicles and natural barriers to protect the aircraft.

(4) Aircraft should remain over night at airports that can provide tie-down (mooring) or hangar space when traveling cross-country.

h. All Commanders and Leaders:

(1) Coordinate and assist in the safe movement and securing of aircraft.

(2) Ensure unit personnel are familiar with the Severe Weather Plan.

(3) Promote understanding of the plan by training personnel in the execution of the plan.

(4) Comply with directives for mooring and use of windbreaks when aircraft cannot be put into the hangar.

(5) Ensure aircraft outside the hangar for maintenance or run-up are immediately shut down, secured, and prepared for hangaring.

(6) Ensure the horizontal stabilator of UH-60 and AH-64 aircraft are set to the neutral position (zero degrees).

(7) Ensure all loose equipment/items that may become blowing projectiles in high winds are secured.

i. Individual Aviators: Be familiar with weather warning conditions and actions in accordance with this plan. Upon receipt of a weather warning from BAAF, ATIS, or other source, contact CAB or unit Flight Operations for specific guidance to either; continue the mission, return BAAF or other suitable landing area, or land without delay.

j. Upon receipt of a severe weather watch or advisory, units may continue to train at the commander's discretion. Commanders must be able to initiate a recall and secure their units equipment should the weather advisory/watch be upgraded to a weather warning.

k. Upon receipt of a weather warning for lightning or when lightning is observed within 5 miles, commanders will take necessary actions to protect personnel and equipment. All aircraft

fueling and outdoor operations will cease when lightning is observed within 5 miles. A lightning warning will not by itself inhibit other aircraft flight operations out side of the warning area.

l. The priority for hangaring aircraft is AH-64, UH-60 then CH-47. **Battalion commanders will determine hangar priority for their aircraft using their available hangar space. Hangar Space in 9630 not used for phase maintenance will be used by Battalions unable to hangar all their aircraft. Priority will remain AH-64E, AH-64D, UH-60 and CH-47.** Except to accomplish a high priority mission aircraft already hangared for maintenance should not be removed from the hangar for mission aircraft.

m. When non convective winds are forecast to exceed 50 knots, Commanders will consider taking additional protective measures to include using shelter or artificial windbreaks, i.e., large trucks, When used, the trucks must be positioned up wind and far enough from aircraft so that if over turned they will not impact aircraft. Removal of all loose objects from parking areas and canvas must be removed. Prefabricated window covers will be used to protect windows and interiors if available. Checks will be conducted on backup power sources to ensure availability of fuel and oil for operations.

n. Weekends and holidays: Lead times for weather warnings normally do not exceed one hour. When the possibility of severe weather exists, hangar aircraft on the last duty day of the week. Ensure aircraft not hangared are readily protected upon notification of severe weather.

o. Tactical Environments: All actions required by this plan will also apply to tactical situations to the greatest extent possible. Aircraft should be recovered to an area where they can be safely hangared whenever possible. If this is not possible, every attempt will be made to protect aircraft and personnel with whatever assets available (e.g. wind blocks, field mooring kits, relocation to sheltered areas, etc.)

p. Commanders will take reasonable precautions in mooring aircraft that remain overnight (RON) away from installation airfields. In areas where tie downs are not available, commanders should consider flying aircraft to hangar or ramp tie down areas. When possible, aircraft should land at airports that can provide tie down or hangar space when traveling cross-country. Aircraft should always carry tie-downs and chains when flying cross-country or evacuating from home station.

q, Planning and Evacuation Airfields: Due to pre-dominate weather phenomena throughout the Fort Carson area, an evacuation plan to a safe haven airport is not feasible. Historical weather data indicate weather patterns within the four quadrants surrounding Fort Carson are similar; therefore, affording no additional protection at local airports. However, if lead time permits Pueblo Airport can provide protective hangar space as depicted in Diagram 2.

4. Definitions

a. Weather Advisory.

(1) A weather advisory is a special notice provided to supported customers that alerts them to weather conditions that could affect their operations. A weather advisory can be either an Observed Weather Advisory (OWA) when a customer does not require advance notification of a

particular weather phenomenon, or a Forecast Weather Advisory (FWA) when a customer requires advance notification of an impending condition with sufficient time to allow protective actions to be taken. The coverage of an advisory will depend on the extent of the weather phenomenon and will be indicated in the text of the advisory.

(2) At Fort Carson, weather advisories (OWA or FWA, observed or forecast) are valid for the area encircled by a 50 nautical mile (NM) radius from BAAF. Terminal weather advisories are valid for areas enclosed by circles of 5 NM radiuses from BAAF. Weather advisories do not normally restrict aircraft from flight operations. Advisories are used to alert supported agencies that weather conditions are occurring which could affect their operations. Weather phenomena detailed in the weather advisory may not be evident in the entire advisory area.

b. Weather Watch.

(1) A weather watch is a special notice provided to supported customers that alerts them to the potential for weather conditions of such intensity as to pose a hazard to life or property for which the customer must take protective action (e.g., tornadoes, thunderstorms with winds greater than 50 knots/and or hail greater than or equal to ½ inches, lightning within 5 nautical miles, winter storms, blizzard conditions). Coverage will depend on the extent of the weather phenomenon and will be indicated in the text of the watch.

(2) Severe Weather Watches are issued by the duty forecaster for the entire Fort Carson reservation. Watches do not necessarily mean that a warning will follow.

c. Weather Warning. A weather warning is a special notice provided to supported customers that alerts them to weather conditions (occurring or imminent) of such intensity as to pose a hazard to life or property and for which immediate protective action must be taken. Warnings will cover distinct areas.

d. The Fort Carson Weather Detachment activates the Severe Weather Plan when winds are forecast to be equal to or greater than 45 knots, hail size equal to or greater than 3/4 inches, or in the event of tornadoes or hurricanes.

e. Winds. High winds are predominant throughout the year. High winds are classified as:

“C” (Charlie) – 35-45 knots.
“D” (Delta) – 45-65 knots.
“E” (Echo) – above 65 knots.