Air Force
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GeoBase: One Air Force, One Base, One Map

photo by Mr. Keith Fred

From the Top

Leading the way into a new year...

Happy New Year!! Sallie and I hope you had the merriest and safest of holiday seasons as we move into 2006. Winter is definitely in full swing now, and I encourage everyone to be prepared for the cold weather. Let's start the new year by reaffirming our focus on safety and our Wingman culture. Looking out for each other extends beyond the annual Wingman Day. We need to keep the Wingman mindset all year long. Safe work environments and habits are vital to our continued productivity and success at home and while deployed.

In this new year, you will find a new name among our MAJCOM Civil Engineers. Col Bill Albro recently assumed the reins of the Air National Guard Civil Engineers from Col Jan Stritzinger, who has moved over to the Office of the Assistant Secretary of Defense for Reserve Affairs. ANG engineers play an increasingly integral role in the total force. Alongside Active Duty and Air Force Reserve, the Guard "Citizen-Airmen" continue to contribute maximum effort in overseas deployments for the Global War on Terrorism, while also supporting stateside natural disaster response. I welcome Col Albro to the team during this transformational period, and I look forward to our continued partnership.

A special section of this issue contains updates on our GeoBase Program. CE has always done the heavy lifting for Air Force mapping, surveying and geodesy. Now, other mission areas—Safety, Security Forces, Communications, Arms Control, Operations, Logistics—are "getting the picture," using the GeoBase program to expand into new geo-enabled capabilities. GeoBase answers their needs from a foundation built by the Air Force's installation mapping and visualization workhorses—the Civil Engineers.

On a final note, Mother Nature provided significant challenges in 2005, and our engineers responded admirably. In the aftermath of Hurricanes Katrina and Rita, over 1,300 CEs from the Guard, Reserve, and Active force supported federal recovery operations. Within 12 hours of Katrina's departure from the Gulf Coast, RED HORSE, Prime BEEF and CEMIRT, along with AFCEE and AFCESA contractors, were on-scene at Keesler AFB providing recovery support. Our Air Force team directly supported a huge humanitarian effort throughout the region—water, food, blankets, clothing and medical support "hubbed" from Keesler. Prime BEEF men and women established base camps at New Orleans IAP and Gulfport, Miss., to bed down 1,650 personnel. It was a tremendous effort, one that is often ignored in the "news" we see published these days; however, I commend everyone's dedication to recover the affected communities and start the rebuilding process.

As we launch into 2006, we are also meeting the challenges of BRAC, Future Total Force, Quadrennial Defense Review, Homeland Defense and continued deployments head-on. Our Civil Engineer community will continue to lead the way to enable the Air Force of tomorrow.

Sallie and I wish you and your families a safe and prosperous New Year!

L. Dean Fox
Major General, USAF
The Air Force Civil Engineer

Air Force Civil Engineer

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On the cover:
The U.S. Air Force operates globally, and priorities can change in seconds. Critical missions rely on accurate maps and related information that are easily and immediately accessible.
(graphic from Mountain High Maps' Globe Shots)

Command Focus Air National Guard

Ms. Teresa Hood
Editor

The Air National Guard (ANG) is a force driven by duality. Constitutionally established with a dual mission, the Guard is at once both a federal and a state military resource. A Guard unit's one mission is to protect the people and property of its state or territory. But the Guard also has a federal mission as a component of the total United States military force and can be mobilized or called to federal service by the president.

For the civil engineers at the Air National Guard Readiness Center (ANGRC), Andrews AFB, Md., this unique "two-in-one" mission means they do things a little differently than the CEs at other Air Force major commands.

"We have no direct command authority over the units," said Col William Albro, the ANG Civil Engineer. "They answer through state channels to their governor and, in almost every case, they're under the direct command of the Adjutant General of their state. But here at the ANGRC, we answer to the National Guard Bureau and come under the federal portion of the dual mission."

The Air National Guard was officially established as part of the National Guard in 1947. Although they're under state jurisdiction, ANG units train to federal standards. "Our responsibilities here at headquarters are policy and resources—establishing and interpreting policy and the advocation for and allocation of resources," said Col Albro. "It can get confusing sometimes, but it also creates a very powerful synergy. The federal government provides the resources for training and equipment, but the byproduct is a fully prepared force for a state response."

There are ANG units in every state, the District of Columbia, and three territories (Guam, the Virgin Islands, and Puerto Rico). The ANG has about 106,000 personnel in 88 flying wings and 579 support units; almost a third (31%) are full-time members who have the responsibility for training and for stewardship of facilities and equipment. Almost all full-time personnel are dual-status military technicians (federal civilians who are Guard members and drill with their unit), or members of the Active Guard and Reserve (AGR). The ANG also hires a limited number of state employees.

"We have an average of 10 full-time federal employees who work in civil engineering at each base; it varies from 8 to 12 depending on the mission type," said Col Albro. "The base civil engineer is one of the full-time people. We also have about 20 state employees at each location—the 'wrench-turners' if you will. So a workforce of 30 people steward the approximately 350,000 sq. ft. of facilities we have at every Guard base."

Because of the small full-time workforces at ANG bases, many of the normal base-level responsibilities are contracted locally or move upward to the CEs at headquarters. Mr. David Van Gasbeck, Chief of the ANGRC's Environmental Division, said, "Our bases have the same compliance concerns as all Air Force bases, but they don't have an environmental flight. They just have an environmental manager—one of the full-timers—so we've been forced to be innovative. We've been doing ESOHCAMP—Environmental Safety and Occupational Health Compliance Assessment and Management Program—and performance-based contracting for 10 or more years now."

Another base support resource for ANG CEs is the Civil Engineer Technical Services Center in Minot, N.D., staffed by 44 engineers and technicians. "They work on barriers, fire alarms, POL, and other things," said Mr. Ben Lawless, Chief of ANGRC's Engineering Division. "Basically, they're traveling troubleshooters who handle the type of work that our individual bases may not have the expertise to do."

Because of their state affiliation, the U.S. Property and Fiscal Officer for each state generally acts as the design and construction agent for the Air National Guard. According to Mr. Lawless, the ANG's military construction averages about $200M per year, and sustainment, restoration and modernization about $175-200M.

The Guard's dual-purpose design also means that funding comes from two sources: federal and state. "For civil engineering, it's about a 75:25 funding split—the state contributes about 25% of costs, for such things as utilities and state employees' salaries," said Col Albro.

"For MILCON, just like other MAJCOMs, we have a percentage of the total Air Force plant replacement value and we get our sustainment money from the facilities sustainment model," said Lt Col Kevin Mattoch, Programming Officer. "However, we tend to get congressional inserts because we have bases in every state and our units are considered part of the communities."

CE forces account for about 10% of the total ANG force. "We have 9,500 personnel that we track in our unit program and about 900 CEs that are 'owned by others,'" said Col Albro. "We have 86 Prime BEEF teams and six RED HORSE teams. Only the Virgin Islands doesn't have a CE unit."

Because of their dual mission, Guard units can play a significant role in a state's homeland defense strategies. "From an engineering standpoint, as a worldwide mobile force, we already have the capabilities to help local communities and states deal with both natural and man-made incidents," said Col Anthony Maida, the ANGRC's Chief of Readiness. "Our role is almost embedded in our culture because the Guard is in the community."

But the Guard is also part of another community—the total U.S. military force—and it has AEF responsibilities to meet as well. "The units are in different buckets; when a bucket is up we go to those states to ask for volunteers," said Col Maida. "We're doing our share on having a lead role at certain locations, such as Baghdad Airport. So far we've had no problems meeting our 120-day rotations in volunteer status."

To make sure that unit CEs meet the Guard's goal of being "ready, reliable and relevant," the ANGRC staff focuses heavily on providing the resources for training. ANG CE established and maintains Regional Training Sites and a Regional Equipment Operator Training Site at five locations across the country (see article, p. 6). "Since we can't have expensive equipment at every location, we let them come to the equipment," said Col Albro.

"Guard members have a very short window for training—39 days. Each of our units has a full-time technician who oversees training and makes sure that the time is used efficiently," said Col Maida. "We also use deployments for training as opportunities for hands-on, on-the-job training."

The dual responsibilities may start at the top, but ultimately they come down to the individual Guard members. For 70% of them, the Air National Guard is their second job.

"How do we balance it? Well, we find a way," said Col Albro. "When our nation calls for the AEF, we'll be there. And when our local communities call we'll be there—it's our job. It all comes back to that great synergy."

Ed. note: Since this article was written, Col Anthony Maida has retired. Lt Col John Elwood is now the ANGRC's Chief of Readiness.

Col William P. Albro has been The Civil Engineer for the Air National Guard Readiness Center since July 2005. He was commissioned in 1979 in the U.S. Army Corps of Engineers after graduation from the Virginia Military Institute with a B.S. in Civil Engineering. In 1985, he began working full-time with the 192nd CES. Col Albro has held a number of staff and command positions in the Air National Guard. From the ANGRC at Andrews AFB, Md., he is responsible for the stewardship of policy and program resources to support over 12,500 CE and Services personnel in 93 units, as well as the acquisition and operation of $12.6B in ANG facilities.

Guard Provides Hands-On Training

Ms. Teresa Hood
Editor

In teaching contingency skills, nothing beats practical, hands-on experience, and the civil engineers at the Headquarters Air National Guard Readiness Center know it. But the ANGRC often faced a "high-demand/low density" people-to-equipment situation: over 90 ANG Prime BEEF and RED HORSE teams spread throughout the United States, often at very small bases. So they established Regional Training Sites (RTSs) and a Regional Equipment Operator Training Site (REOTS).

"The regional sites are one of the means we have to provide our people with the contingency wartime training they need to have today." said Lt Col John Elwood, the ANGRC's Chief of Readiness. "At the RTSs and REOTS, we have the equipment we can't afford to have—nor should we—at every ANG location. And we tried to position the sites so that most units can get there with minimum time and effort."

The training sites were started about 10 years ago, the brainchild of CMSgt Johnny Evans, now retired and working as a civilian in the ANGRC's Readiness Directorate. Today, there are five RTSs at centralized locations across the United States: Fargo, N.D. (119th FW); Baden, N.C. (145th AW); Ft. Smith, Ark. (188th FW); March ARB, Calif. (163rd ARW); and Ft. Indiantown Gap, Pa. (201st RHF), where the REOTS is collocated. Although the sites were established to provide training to Guard CEs, they are often used by Active Duty and Reserve as well.

"We're constantly evaluating and updating as new equipment comes in and Air Force requirements change," said MSgt Jesse Birchfield, ANG Civil Engineer Training Manager.

At an RTS, CE teams learn airfield damage repair and train on mission-essential equipment, including mobile aircraft arresting systems, reverse osmosis water purification units and emergency airfield lighting systems (see sidebar for complete listing). The sites also have firefighter training facilities.

The REOTS is located on 20,000 acres at Ft. Indiantown Gap. The REOTS graduates 640 students each year, training CEs on four main pieces of equipment: grader, bulldozer, excavator, and front-end loader. There's a 1:1 student-to-equipment ratio and 88% of the course time is dedicated to hands-on training.

"The REOTS is for heavy equipment operators only," said CMSgt Troy Taylor, ANG Civil Engineer Career Field Manager. "According to AFI 10-210, Guard and Reserve operators must attend the REOTS every three years. Active Duty is not required to send its operators but they do, because it's good

Neither hail nor snow nor dark of night stops the heavy equipment training at Ft. Indiantown Gap.
(U.S. Air Force photo)

The ANG knows there's no substitute for getting your hands on the equipment during training.
(U.S. Air Force photo)

training and they get valuable hands-on 'stick time.'"

Although the ANGRC manages the sites, local units handle day-to-day operations. "Like all the other sites, we have three full-time technicians—utilities, power pro, and electrical," said SMSgt Scott Terry, a RTS instructor at Fargo, N.D. "We also have a cadre of about seven traditional Guard CEs to provide maintenance and training support."

Classroom time is part of all courses at the sites, but the major focus is hands-on, proficiency training. The student-teacher ratio is intentionally kept low to maximize individual instruction time. "The personnel are just as important as the equipment," said MSgt Paul Swenson, ANG Prime BEEF and RED HORSE Superintendent. "It's a mandatory requirement that they be certified instructors as well as great craftsmen."

Units often combine two of their weekends to get training at one of the sites. They can attend regularly scheduled classes or set up their own training according to their particular needs. "Units contact the sites directly to request training," said MSgt Birchfield. "If there's a need for particular instruction—HVAC, for example—staff at the site will try to make sure it's available when they need it."

"We know everyone's plate is full, and with their time constraints CE units may think it's difficult to get to one of the sites," said CMSgt Taylor. "But we know it's worth it—the regional training sites offer very valuable hands-on experience to our units and our CEs."

Available Training/Equipment

Regional Training Sites	***Regional Equipment Operator Training Site***
Airfield Damage Repair	Grader
Mobile Power Plant	Bulldozer
Mobile Aircraft Arresting System	Excavator
Emergency Airfield Lighting System	Front-end loader (4-cu. yd. capacity)
Reverse Osmosis Water Purification Unit	
Power Poles Set	
Wartime Operations Training	
Field Training Requirements	
Global Positioning Systems	
Expeditionary GeoBase	
15-ton Mobile Crane Operations	

GeoBase

GeoBase has become increasingly important as an operational and strategic decision-making tool. In this special section of Air Force Civil Engineer, *the major commands and other users describe how they put this power to use.*

Mapping the Future

Col Hal Tinsley
AF/ILEX

The past four years of "GeoBase" have resulted in numerous new geospatial capabilities for the warfighting, operational support, and infrastructure domains of the Air Force enterprise. GeoBase was built on grass-roots investment in geographic information systems (GIS) spanning decades in some commands. But its success comes from being integrated into the Air Force culture and readily available to all Airmen through cost-effective development, management and investment to achieve "One Installation…One Map." GeoIntegration Offices (GIOs) now exist at all 10 major command headquarters as well as at eight field operating agencies and direct reporting units, with support being extended forward to Central Command Air Forces, Air Force Special Operations Command and the numbered Air Forces through GeoReach cells.

All main operating bases now have standard Common Installation Pictures (CIPs) augmented by functionally specific mission data sets (MDSs) that will be standardized over the next two years. In December 2005, other CIPs came online through the enterprise Installation Mapping and Visualization Web viewer being built into the Global Combat Support System enclave; MDS access will soon follow. Today, Air Force Portal users can view live maps for Air Combat Command and U.S. Air Forces in Europe installations from anywhere in the world.

GeoBase is built on the shoulders of the civil engineer, but many other organizations are coming to rely on the current, accurate, and authoritative geospatial data being delivered through our GIOs. Disaster relief support in the form of maps and imagery provided situational awareness in the 2004 tsunami as well as the aftermath of the devastating hurricanes Katrina and Rita. Users from other service branches, Office of the Secretary of Defense, and other federal agencies are becoming familiar consumers of Air Force geospatial information provided through the strategic GeoBase program. The list of supported mission activities grows daily and includes anti-terrorism and force protection, arms control inspection exercises, disease-vector mapping, the emergency management program, real property inventory and safety, just to name a few.

While GeoBase is reaching out to the new, it is also improving the old. Business process automation and enhancements are becoming commonplace, such as linking maps to CE work order, construction, and environmental impact analysis forms. It's also moving from outside the building footprint to inside the walls by making floorplans and as-builts readily available, and may be a logical entry point to bring building information modeling into the Air Force toolset.

The Headquarters Air Force GeoIntegration Office is shoring up the support structure for this fast-growing fledgling program by creating solid policy and guidance that will translate into revamped geospatial doctrine, organization, training, materiel, leadership, personnel, and facilities across the Air Force. For those of you who still don't have GeoBase on your radar, don't wait too long—by the next sweep you might catch nothing more than the contrail of a concept that knows no bounds.

Col Tinsley was chief of the Information Resources Management Division in the office of The Air Force Civil Engineer, Washington, D.C.

AFMC GeoBase

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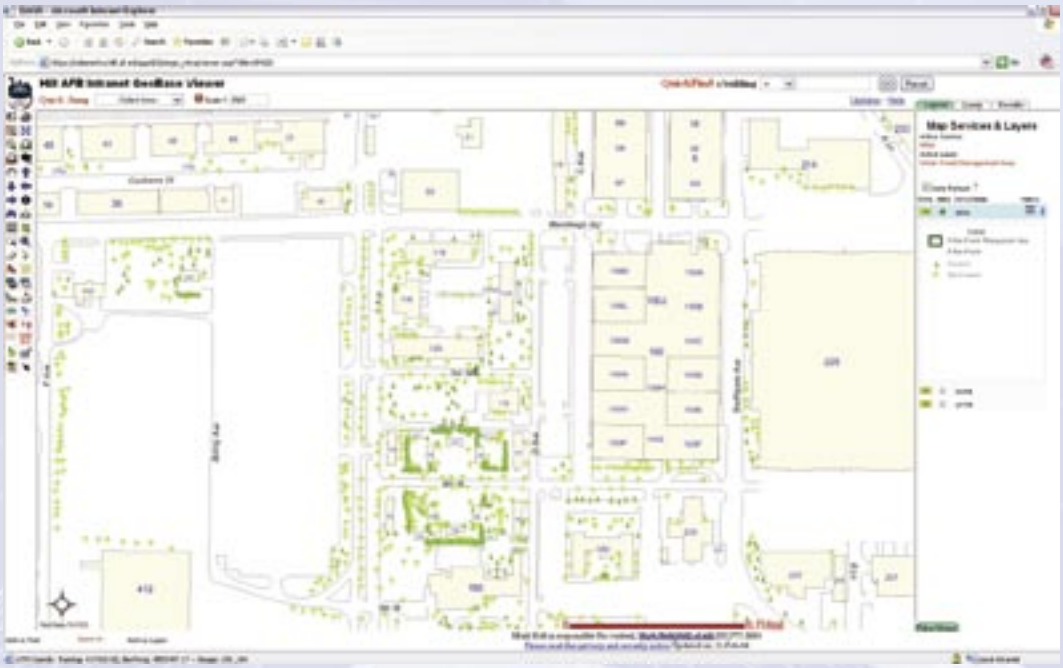
The Air Force Materiel Command (AFMC) investment in GIS capabilities that began in the 1980s has been leveraged to support the GeoBase Program. The following examples describe how four AFMC installations use GeoBase to support their distinct missions.

Arnold AFB: A noteworthy development supports Infrastructure Condition Index (ICI) display by applying facility data collected at low level and rolled up into ICI subcomponents, components, subsystems and systems. The ICI Viewing Tool uses Oracle database formulas and weighting components that were found inside the original ICI Program built on an Access database, as provided by HQ AFMC in 2003, overlaying the CIP.



A screen shot of Hill AFB's intranet-based GeoBase viewer.
(courtesy AFMC)

Eglin AFB: Eglin embraced GIS technology 15 years ago to monitor, maintain and conserve the installation's large area and number of facilities: 500-plus buildings, 2,300 miles of roads and 45 test facilities on more than 463,000 acres. Eglin's GeoBase foundation, the Eglin Enterprise Spatial Database (EESD), provides geospatial features for the Center Scheduling Enterprise (CSE) which is used to manage mission profiles at Eglin's weapon test areas. The easily-used GeoBase Web viewer provides real-time GIS capability for engineers, including a Future Projects tool to map, track and maintain project information. An ICI tool draws upon Automated Civil Engineering System attributes to track and display system status.

Hill AFB: The GIS foundation that began within the Environmental Directorate is now supported by Civil Engineering for the GeoBase Service. The GeoBase Web viewer allows users to steward their own data, as well as assign access rights to others to view that data. Survey-grade GPS tools capture existing utilities to keep GIS data current and accurate. The Urban Forestry Management application accesses an Oracle database to support management of more than 11,500 trees using GeoBase Web tools. GeoBase supports site management from start to finish; revealing critical constraints simplifies planning approval.

Tinker AFB: The CIP was completed in August 2004, giving users access to mission-critical geospatial data using Web-based tools. Detailed maps are commonly created for briefings, including distinguished visitors' routes, utility outages and street closures. The Community Planner applies GeoBase to communicate and solicit ideas for site planning and analysis. Within the year, GeoBase services will support emergency planning and management, as Security Forces personnel routinely use GeoBase for force protection planning, major incidents and vehicle accidents.

PACAF GeoBase

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Pacific Air Forces (PACAF) has GIOs at each of its nine main operating bases, as well as GeoBase capability for headquarters, its three numbered air forces (NAFs) and the new Kenney Warfighting Headquarters. Each GIO has identical hardware and software to ensure compatibility. The Spatial Data Standards for Facilities, Infrastructure and the Environment provided the basic database structure, which can grow as needed to support functional communities. Having a common database structure running on standardized hardware allows PACAF to develop problem solutions or new services at one installation and "clone" them onto systems throughout the command.

PACAF's GeoBase employs a roll-up strategy for data gathering. Main operating bases submit data calls and roll-ups to their respective NAFs, then NAFs submit their AOR data calls and roll-ups to the MAJCOM. Each site maintains data in its defined zone of the Universal Transverse Mercator projection and uses the meter as the standard unit of measure. However, map production is not limited to this standard as custom environments can be rendered on the fly.

Although the civil engineer squadrons maintain the GeoBase service, the services provided by the GIO are wing assets to support all wing missions. Functional wing organizations must continue to validate and maintain their respective subject matter information. Interpretation of the feature classes or layers that should contain common data is vetted through the command and the Data Standards Working Group. Mission data sets, data owned and maintained by subject matter experts, are defined by the functional community and the field operating agency. However, any wing unit can identify mapping requirements and submit them to its installation's GIO.

GeoBase is an important tool in an engineering assistant's toolkit, used both at home station and during deployment. CIP information, both planning and operational, helps EAs with beddown and parking plans. To convert CIPs from "planning" to "operational," teams from the 613th Contingency Response Group at Andersen AFB, Guam, validate them by conducting a site survey. All PACAF CIPs are accessible via SIPRnet with Environmental Systems Research Institute's ArcIMS software. PACAF EAs have used these tools at home station as well as on deployments to Southwest Asia and to support Operation Unified Assistance following the tsunami in December 2004.

SrA McNabb, deployed from Andersen AFB, Guam, uses a backpack unit to survey an entry control point at Ali Al Salem AB, Kuwait.
(U.S. Air Force photo)

AMC GeoBase

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Since 2002 Air Mobility Command's Directorate of Installations and Mission Support (AMC/A7) has contributed over $14M to "operationalize" GeoBase, integrating it into daily garrison (home station) and expeditionary business processes. Each of AMC's 12 main operating bases has a GIO to provide installation GeoBase service.

MacDill AFB uses GeoBase to keep emergency responders up to date during emergency situations. (screen shot courtesy of the author)

AMC is integrating several existing information technology systems into a single common operating picture of AMC-controlled installations. Systems involved include the Logistician's Contingency Assessment Toolkit (LOGCAT), Theater Battle Management Core System-Unit Level (TBMCS-UL), the AMC/A3 Aircrew Portal and a host of other mission-oriented systems. The AMC implementation effort continues to emphasize that GeoBase is not "just an A7 thing" even though A7 does a majority of the "heavy lifting" by supplying key personnel and foundation data.

AMC installations have implemented a wide variety of command and control (C2) capabilities to support the entire mission well beyond civil engineering needs. For example, MacDill AFB implemented an emergency response management system that allows Security Forces, CE Readiness, firefighters, and other emergency responders to simultaneously update their response status on a GeoBase situation visualization service. All Unit Control Centers, the Command Post, and other C2 hubs have the ability to view events as they unfold via a simple intranet site.

This shared, integrated, horizontal, and vertical situational awareness capability for the warfighter is exactly the aim of AMC's GeoBase implementation effort.

AMC has linked GeoBase to many other systems and processes, including DD1391 documentation, the AF Form 332 Civil Engineer Work Order process, AF Form 813 environmental review process, AF Form 103 digging permit process, and ACES-PM, ACES-RP, and ACES-HM data and services. Fire protection flights use GeoBase to automate pre-fire plans. AMC's communications squadrons will soon be able to "layer" their underground communications infrastructure as part of the installation's GeoBase common operating picture. The 60th Communications Squadron at Travis AFB integrated phone numbers with GeoBase by linking buildings on the map directly to the Travis telephone directory. The AMC Base Realignment and Closure assessment teams used GeoBase to access and evaluate proposals by overlaying changes with existing base infrastructure. Additional integration opportunities are identified and prioritized daily.

USAFE GeoBase

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At United States Air Forces in Europe (USAFE), Garrison GeoBase has been operationalized—concepts have been turned into practical applications used daily to support USAFE's mission, as the following examples show. Intranet users can access GeoBase data tailored to their5226.06-39 established roles; maps are available on the desktop PC to anyone with a requirement for maps. USAFE just released an updated base-level GeoBase Web site that makes a live connection to Project, Facility Management and Real Property Data in the Automated Civil Engineering System via clicking on a building on the map.

Ramstein: In 2004, the GIO office gave emergency services and readiness support a new perspective, creating a real-world, coordinate-based grid for crash recovery and Kaiserslautern Military Community-wide emergency services. In a parallel effort, the GIO office began providing support to the battlestaff, with direct mapping and geospatial information during major accident response exercises or real world events; continuously updated installation data; and a GIS data and mapping subject matter expert. The fire department and security forces squadrons are fully supported with incident management software, current data, training and custom hardcopy maps.

RAF Lakenheath: The GIO developed, field-tested and implemented a process for the Snow Control Office to use a simplified ArcGIS interface to perform real-time tracking of snow clearance. Commanders and other personnel can view the most current information about snow clearance though a special portion of the GeoBase Web site. Snow and ice events in February 2004 showed the worth of the system and provided opportunities for reviewing and incrementally improving the process.

RAF Mildenhall: A Web-based General Plan and Installation Development Guide was developed. These documents link to real-time updated planning maps on the base-level Intranet Mapping Service.

Several applications were developed in support of environmental projects throughout USAFE that require access to tabular data as well as the ability to visualize that data on a GeoBase map. For instance, by simply clicking on a building on the map users can access all asbestos survey information. A rich interface provides access to detailed asbestos sampling as well as remediation methods and costs.

An application development guide allowing use of third-party–developed, plug-in applications has been an important factor in bringing together different functional units. The GeoBase office provides third-party developers access to a system architecture document as well as a Web site development guide. All data and applications developed in conjunction with the GeoBase program are reviewed and approved for use by the GeoBase staff.

The numbers below show current active users at various GeoBase servers in USAFE, a measure of the program's success.

USAFE HQ	250
Ramstein AB	1140
Spangdahlem AB	104
RAF Lakenheath	370
RAF Mildenhall	200
Aviano AB	225
Lajes Field	160
Incirlik AB	61

SrA Michael Pfister (left front) and MSgt Jeffrey Heath, engineering assistants from the 31st CES, Aviano AB, Italy, collect data from a mountainside in Albania for an aircraft mishap survey following the March 2005 crash of an U.S. MC-130MH Combat Talon II. The Airmen spent two weeks capturing pertinent data and building a custom geospatial dataset. (U.S. Air Force photo)

GeoBase at the Academy

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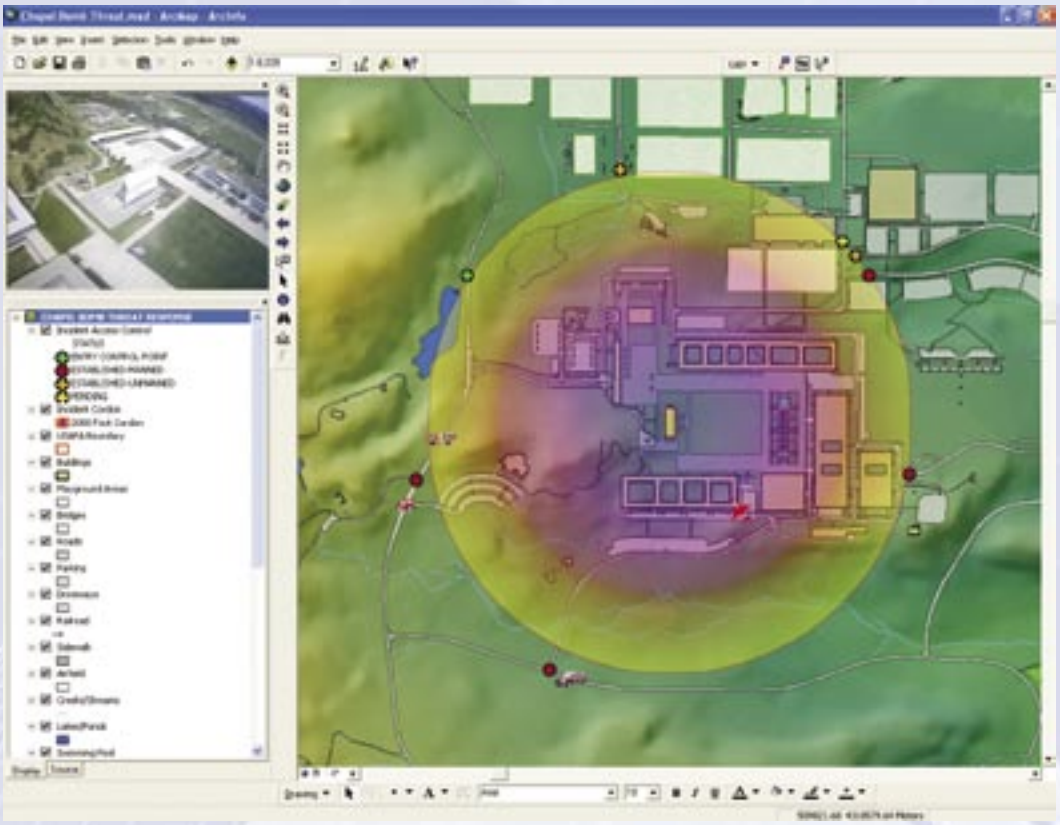
The entire Air Force is rapidly embracing GeoBase, but the U.S. Air Force Academy has been involved from the outset. In 1998, the Institute for Information Technology Applications (IITA) opened as an independent research center at the academy to conduct information technology application research for the DoD, the Air Force and the U.S. Air Force Academy. The GeoBase Initiative had its genesis at the IITA, which continues to provide GeoBase support through research and research grants.

The Academy's 10th Civil Engineer Squadron (CES) reconfigured its legacy GIS System to offer CIP data. Initial capabilities include direct and secure access to more than 120 feature classes, mission-specific maps, historical documents, and digital drawings. The 10th Security Forces Squadron makes use of the 10th CES's installation visualization service to conduct mission planning, such as the 2004 graduation at Falcon Stadium, which was attended by President Bush.



A view of the chapel using ArcGIS software. (screen shot courtesy of the author)

Established in July 2005, the GIS Support Center will continue IITA's GeoBase initiative by providing an application development and testing and evaluation environment to operationalize GeoBase concepts. In addition, the Center will serve as a networking hub for GIS testing facilities to collaborate on GeoBase-related technical issues.

Cadets are exposed to GIS software in many of the core courses. This fall, the laptops issued to the 1,200 cadets in the class of 2009 came preloaded with the basic Environmental Systems Research Institute ArcGIS software tool sets. Using GIS at the Academy is becoming as common as using MS Office products.

The cadets in Computer Science 454, Software Engineering II, currently use GIS software to track the location of, and view streaming video from, unmanned aerial vehicles, using the GeoBase Service as the background frame of reference.

Civil engineering students use GeoBase when they participate in the Contingency Support Exercise, taking on the roles of representatives from the Civil Engineer Squadron, Logistics Readiness Squadron, Security Forces Squadron, and Operations Support Squadron as they plan the deployment of a fighter wing from Elmendorf AFB, Alaska, to South Korea.

AFCESA GeoBase

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Headquarters Air Force Civil Engineer Support Agency (HQ AFCESA) is committed to being the customer's choice for quality and timely support for all contingency, operational and technical services, including GeoBase integration. AFCESA's GeoBase program support spans a variety of implementations and functions:

- Mission data sets (MDS) (data models reviewed by functional area managers)
- Operational data sets (ODS) (the mission critical/essential data models)
- Automated Civil Engineering System (ACES) geospatial integration
- Enterprise Environmental, Safety, and Occupational Health-Management Information System (EESOH-MIS) geospatial integration
- Emergency Management Program applications, data and systems enablement
- Pavements (geospatially enabled airfield management)
- GeoBase, GIS, and GPS training curriculum development and delivery
- Organizational interface with the Installation, Mapping, and Visualization Council for geospatial data and technologies at Air Force installations
- Coordination of CE manpower requirements, including geospatial support positions
- Management and integration of cross-functional joint service-approved applications, such as Contingency Aircraft Parking Planner (CAPP) and Base Engineering Survey Toolkit (GeoBEST).

AFSOC GeoBase

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Headquarters Air Force Special Operations Command Civil Engineering (HQ AFSOC/CE) established a GeoBase program in November of 2002. AFSOC's GeoBase and GeoReach programs are very robust; both support a full range of geospatial services including program management, site planning, database development, systems engineering and on-site geospatial services.

GeoReach plays a vital role in AFSOC's mission by supporting Special Operations Forces' (SOFs) downrange mapping needs. CIP data provides the warfighter with classified mission-specific datasets.

AFSOC's GeoReach cell provides Air Force-wide expeditionary site mapping reach-back capability, storing and maintaining restricted SOF-specific CIPs along with mirrored data from PACAF, ACC and USAFE. AFSOC warfighters can access CIP mapping information via AFSOC's expeditionary website. AFSOC becomes the gateway back to the primary CIP owners to replace lost or corrupt data in the event of a local failure. A "Four Command Agreement" for data sharing and backup is approved and operational.

Since September 11, 2001, AFSOC combat controllers have directed air strikes from just about every aircraft type in the Department of Defense. GeoReach will continue to play a major role by providing our troops with the best mapping information available.

11th Wing GeoBase

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The 11th Wing GeoBase Program has come a long way in a relatively short time frame. We've established a solid partnership with most organizations at Bolling AFB, including the Air Force Band, Air Force Honor Guard, Air Force Surgeon General and the Defense Intelligence Agency, and are quickly building relationships with our outlying DoD and civilian communities.

The 11th Wing GIO assisted the Anacostia Naval Annex and the White House Communications Agency (WHCA) to promote available GIS technologies and the Air Force GeoBase Program. We conducted a successful pilot project that involved mapping communication assets on Bolling AFB, the Naval District Washington Naval Yard, and Anacostia Annex. The GIO collaborated with the Navy Public Works office to support WHCA's pilot mapping project. In addition to eliminating redundant mapping efforts, this collaboration ensured that local DoD installation mapping data will comply with the spatial data standards guidance policies set by the Defense Installation Spatial Data Infrastructure program.

The GIO staff assists various installation agencies in developing mission data sets, including the 11th Wing Threat Working Group, 11th Security Forces Squadron, 11th Civil Engineer Squadron and the 11th Communications Squadron. We routinely provide detailed site data, geospatial data, aerial photographs and global positioning system surveys to support decision makers in planning and implementing all Wing force protection programs.

Key facility attribution data of more than 75 facility real property records has been linked to our CIP, and existing facility drawing project data will be linked to GIS Map. We have approximately 25,000 drawings that will be linked to our CIP. Key data will be extracted from our scanned images into a database that can be merged into our geographic information system.

AFSPC GeoBase

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GeoBase plays an increasingly critical role in assuring the Air Force Space Command (AFSPC) mission: control and exploitation of air and space. Commanders can view entire installations via a Web browser, including locations of utility lines, buildings, roadways, environmental resources/constraints and mission-critical geographic information. We are working with cities and counties to get the same information beyond our fences and further ensure our mission resources.

AFSPC developed a robust, standards-based and sustainable foundation database of geospatial information in-house (as opposed to a large contracted effort) in less than a year. In the fall of 2004, we identified 43 layers with 154 total associated attribute fields to be captured and maintained at each installation; benchmarking found that roughly 30% of the necessary information already existed command-wide. By fall 2005, the needed layers and attribute information had been delivered, bringing our data holdings to 100% in less than one year with only enough funds to hire less than one full-time contractor per base.

We are developing a data sustainment program, documenting actual day-to-day work flow practices and all policy and guidance pertaining to the business processes of recording changes to our installations' assets. This will enable us to identify how we can better tap into the daily workflow to capture structural/locational changes in our geospatial databases. We are also looking at commercial software solutions to help automate this process with as little impact to daily workloads as possible.

ACC GeoBase

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Now entering its fifth year, the Air Combat Command (ACC) GeoBase Program has been supporting the warfighter with mission critical geospatial information at many forward operating locations as well as each of the 15 ACC Installations. As GeoBase momentum builds, so has collaboration across the spectrum of Air Force functional experts.

Within CE, the Environmental Division is working closely with GeoBase personnel to transform the ACC installation Compliance Site Inventory (CSI) database to a geospatial application. Personnel will be able to visually track and maintain the CSI and locate and manage installation environmental areas of interest. Installation spill locations will be added to the CSI layer to monitor for location, equipment and pollutant spill trends, and to archive spill incident histories, information that may also be useful to emergency and fire responders to identify potential hazards.

The GeoBase office is a key member of ACC's Planning Integration Team, providing information—installation boundaries, accident potential zones, noise contours, explosive safety quantity distance arcs, and installation infrastructure—to create an overall planning map. Incorporating base development information on a single map accessible to all functional area experts has streamlined the long-range planning process, saving time and money.

On the horizon is a partnership with Headquarters AFMC's Electronic Systems Center at Hanscom AFB, Mass., to upgrade the Theater Battle Management Core Systems–Unit Level (TBMCS–UL), a command and control application used for contingency responses. ACC's GeoBase office will enhance the TBMCS-UL's Survival Recovery Center base map, adding imagery and details about mapped objects. Incorporating GeoBase data will allow senior leadership to view vital information and make decisions at the touch of a button.

SSgt Joseph Vidacak, 355 SFS, uses Davis-Monthan's GeoViewer at the Law Enforcement Desk. (photo courtesy HQ ACC)

The ACC GeoBase office, along with Davis-Monthan, Dyess, and Holloman AFBs, is leading efforts to give Security Forces a comprehensive view of an installation, its infrastructure and points of interest. By integrating their data layer onto a single map, Security Forces can perform trend analysis of traffic incidents and patterns, monitor all base entrance/exit points, and protect base housing more efficiently.

AETC GeoBase

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Air Education and Training Command (AETC) has completed CIPs for its 13 major bases. An end-of-year funding windfall let the command complete a three-year utilities infrastructure mapping and MDS development program two years ahead of schedule.

Hurricane Katrina briefings for Keesler AFB put GeoBase to good use. Surge level maps were updated in minutes simply by turning data layers on or off. (screen shot courtesy AETC)

Environmental Systems Research Institute teaches classes covering topics from using ArcGIS software to populating and maintaining geo databases. The classes are so popular that there is a waiting list.

AETC puts the GeoBase data to use in various ways. Several installations used GeoBase to answer BRAC 2005 questions regarding infrastructure, facility sitings, and possible encroachments affecting both on- and off-base real estate.

During the summer air shows, countless hours were saved with GeoBase's ability to generate custom maps on the fly, immediately showing the locations of static aircraft parking, concession stands, visitor parking areas and traffic flows. Querying the database also showed possible impacts of proposed changes in layout and positioning.

Keesler AFB automated AF Form 103, Civil Engineer Work Clearance Request, moving it online for completion and transmission, and linking it with GeoBase so that an accurate map of the work location goes with the request. What once took days or weeks to coordinate by hand is now being accomplished in a matter of hours via the Web.

The AETC GeoBase program is still in its maturation phase and will continue to grow. Some bases are farther along than others, but tips, tricks and lessons learned are constantly shared. As with any new program, there are some reservations, but as users see the benefits of the GeoBase program, those reservations are quickly diminishing.

AFRC GeoBase

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All Air Force Reserve Command (AFRC) customers can access, view and utilize centrally maintained geospatial data from an enterprise-level geo-database and web portal. Datasets currently available include the CIPs as well as dimensionally accurate facility floor plans with space-use data and geospatially correct utility maps with attributed features; these datasets can be viewed alongside related ACES Real Property and Project data.

AFRC's GIO successfully provided data to support base realignment and closure requirements and has focused recent efforts toward several development initiatives, including support for facility space management, utility system mapping and Automated Civil Engineering System data integration. Newly developed components must operate on the AFRC network and support command installations from the centrally managed enterprise database.

In partnership with AFSPC, AFRC has collected communications systems pathway data as well as mapped coverage areas for wireless broadcasts from signal strength tests—the first communications utility data for GeoBase. Future efforts will focus on incorporating airfield and airspace data and providing tools to support installation planning.

ANG GeoBase

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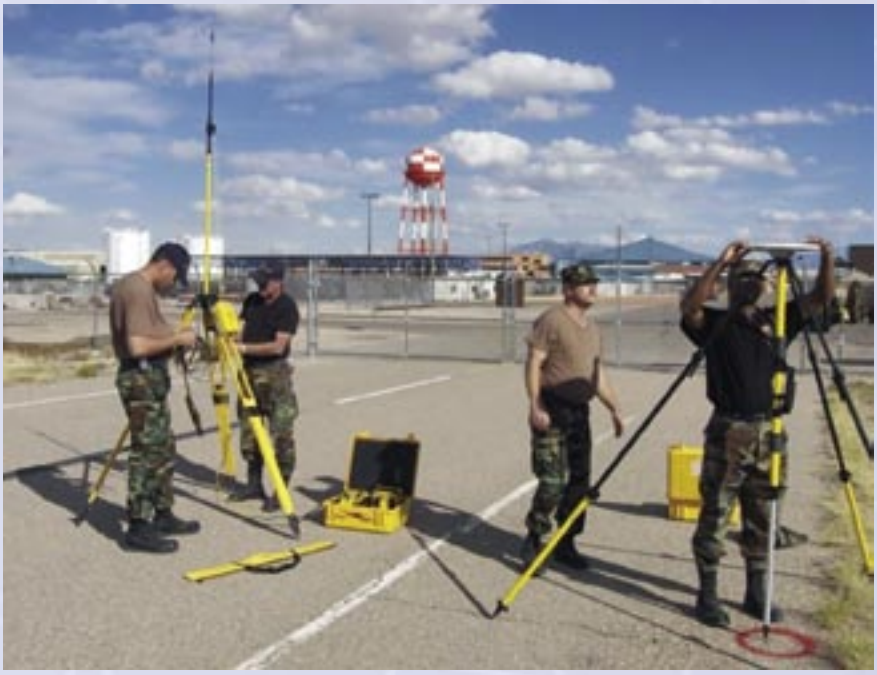
In keeping with the Air National Guard's (ANG) primary mission—providing combat capability to the warfighter and security for the homeland—the ANG GIO initially focused on expeditionary GeoBase needs, providing comprehensive training for ANG Civil Engineer troops. The ANG GIO developed the first of several training classes, 'Fundamentals of GeoBase,' which teaches the GeoBase concept, initial GIS skills and GPS training. All of the Guard's Prime BEEF teams have been provided with GPS equipment for practice and training.

The ANG GeoBase program differs slightly from those of the other major commands because of differences in size, organization and responsibilities. The ANG has 103 units at over 180 locations, including geographically separated units; it has 88 flying wings, and 86 of the wings have Prime BEEF teams. The majority of ANG bases are less than 200 acres and don't have the same facility maintenance and management needs as main operating bases.

To accommodate the command's particular structure and mission, the ANG GIO organized its GeoBase program regionally, dividing it into 6 separate regions based upon the existing communication regions. The GIO will deliver GeoBase capabilities through the established communication infrastructure, allowing the widest possible dissemination of information. Redundancy built into the system architecture will protect installation data in the event of a regional failure.

The ANG GIO shifted focus in early 2005 toward providing a Garrison GeoBase capability, dedicating funds to development of several Spatial Data Standards for Facility, Infrastructure and Environment-compliant CIPs. The ANG GIO has contracted for the development of 38 CIPs and has developed data sharing partnerships with other agencies/groups.



The 162nd CES, Tucson, Ariz., set up RTK5700 equipment during training. (U.S. Air Force photo)

The ANG GIO is also actively coordinating with the National Guard Bureau and Army National Guard on GIS efforts. Joint Operational Centers within states will have access to data about installations and can use this information for multiple exercises and real world situations.

Katrina and Rita: The A

***Top left* (Rita)**: *Members of the Texas ANG, part of Task Force Bowie, assist the surrounding communities of Jefferson and Orange Counties with clearing large obstacles and debris from streets.* (photo by SMSgt Mike Arellano)
***Center left* (Katrina)**: *SrA Shawn Muehler, 119th FW firefighter, spray paints a search symbol on the road in front of a home near Pearlington, Miss., indicating the date of the search, the types of hazards, the searching unit, and the number of people found.* (photo by SMSgt David H. Lipp)
***Bottom left* (Katrina)**: *Crews from the 823rd RHS, Hurlburt Field, Fla., deployed to aid in the clean-up effort at Keesler AFB, Miss.* (photo by TSgt Jennifer C. Wallis)
***Center* (Katrina)**: *SSgt Shane Heiser, 1st Combat Camera Squadron, Charleston AFB, S.C., helps civil engineers remove debris from the streets of Algiers in New Orleans, La.* (photo by SSgt Jacob N. Bailey)
***Top right* (Katrina)**: *Although it didn't receive a direct hit, Columbus AFB, Miss., sustained more than $765K in damage.* (photo by 2Lt Jeremy Cotton)
***Center right* (Katrina)**: *Members of CEMIRT guide a generator into place at Keesler AFB, Miss.* (photo by Mr. Timothy Collins)
***Bottom right* (Katrina)**: *Military heavy equipment operators help local authorities clean up in coastal Mississippi towns.* (photo by TSgt Connie Reed)
***Background image* (Katrina)**: *Pararescuemen from the 38th Rescue Squadron, Moody AFB, Ga., search for stranded residents of New Orleans, La., from a HH-60G Pave Hawk helicopter.* (photo by TSgt Mike Buytas)

Aftermath

CEMIRT's Got the Power

MSgt Michael A. Ward
HQ AFCESA/PA

Two days after Hurricane Katrina hit Keesler AFB, Miss., nine members of the Civil Engineer Maintenance, Inspection and Repair Team (CEMIRT) left Tyndall AFB, Fla., in a nine-vehicle convoy loaded with equipment to help restore electrical power to the heavily damaged base.

AFCESA's CEMIRT transported three 500 kW generators from Tyndall AFB, Fla., to Keesler AFB, Miss., immediately after Hurricane Katrina and installed them to provide much-needed emergency power. (photo by Mr. Timothy Collins)

As they entered Biloxi, Miss., just miles from Keesler's main gate, it became clear that the storm had turned the road well traveled into a road less traveled.

"Several of us had been to Keesler before, but you couldn't tell where you were supposed to be," said Mr. Timothy Collins, CEMIRT high-voltage electrician supervisor. "Everything was everywhere. You couldn't recognize any of the access roads, and Highway 90 is just a big beach now."

The convoy had to find an alternate route, dodge downed power lines and fix a few flat tires caused by nails that littered the road, but they made it. The team brought nearly everything in their shop, including three trailer-sized, 500 kW generators (a typical home generator is rated at about 5 kW), an assortment of smaller generators and truckloads of cables, equipment and supplies.

Hurricane Katrina damaged most of family housing and portions of the base infrastructure. Power was down for the entire area and it would be days before Mississippi Power, the local utility company, would have it restored. That was bad news for the approximately 6,000 Keesler students and residents who rode out the storm in base shelters and emerged to find their homes and dorms ruined.

CEMIRT was asked to provide power to facilities that could house people first since there wasn't sufficient shelter, Collins said. The team quickly provided emergency power to the base lodging facility.

"That was critical because it allowed our people to get out of the shelters and have a place to bed down and shower," said Mr. Stanley Morgan, infrastructure manager for the 81st CES at Keesler.

Shortly afterward, the team brought up the dining facility, student dorms, community center and portions of Keesler's medical center.

Although the team brought all the equipment it had, it was far from enough to run the entire base. To maximize their capability, they tapped into Keesler's existing underground electrical distribution system. This allowed them to isolate some transformers and energize others so they could operate multiple facilities from a single generator. Eventually, they were able to bring most of the base's critical offices and facilities on line.

"Emergency power is something we are real good at," Mr. Collins said, "probably the best in the business. It could be a difficult job if you didn't have the right assets, weren't prepared or weren't expecting to work 14-, 15- or 16-hour days, but that's what we're geared to do."

Finally, five days after the storm hit, Mississippi Power restored the high-voltage transmission lines feeding the base substation. Most buildings on the base now have electrical service.

Team members say they are ready to return to Keesler to help install new equipment if requested. If they go, hopefully the road between the two bases will be in better shape by then, or at least a little more recognizable.

407th ECES Expands Clinic

TSgt Paul Dean
407th AEG/PAO

Fifteen Airmen from several occupational specialties came together Sept. 19 to double the 777th Expeditionary Airlift Squadron medical clinic's work space at Ali Base, Iraq.

Patients now have more privacy during screenings and treatment, there is a clinic waiting area and the 6-person clinic staff don't trip over each other during sick call hours.

"It was a truly amazing effort," said Lt Col Anthony Ghim, 777th EAS flight surgeon deployed from the 37th Airlift Squadron, Ramstein AB, Germany. "Civil engineering carpenters, electricians, air conditioner technicians, heavy equipment operators and communications technicians all came together to make this happen."

Before Sept. 29, the clinic was housed in one expandable storage container (ESC) with an adjacent ESC for supplies. The two are now attached with the original ESC being used as the administrative and waiting room area and the new ESC dedicated to evaluation and treatment.

The expanded size of the clinic has improved the way service is given, according to SrA Dora Sherrill, 777th EAS clinic medical technician deployed from the 118th Medical Squadron, Tennessee ANG, Nashville, Tenn.

Added privacy seems to be the most welcome feature of the expansion, according to the clinic staff. The clinic treats a broad range of patients, from male and female Airmen to the Iraqi Air Force members who live, work and train at Ali Base.

The expansion project involved the combined efforts of four groups within the civil engineer squadron: heavy equipment; structures; electrical; and heating, ventilation and air conditioning.

MSgt John Gaskill, 407th ECES NCOIC of electrical systems, deployed from the 60th CES, coordinated and planned civil engineer involvement in the project, which he said totaled about 100 man-hours.

"We had a little pow-wow, made sure everybody knew their part and went to town," MSgt Gaskill said. "It's really great what a bunch of CEs can get done. We're just thrilled that we could be a part of making medical service better for everybody here."

The clinic staff will soon be responsible for administering the post-deployment health assessment to redeploying Airmen and now has space to accommodate the five computers that will be used to take the online survey.

A team lowers the floor panel and vertical wall that supports the roof and ties the side walls.
(photo by SrA Dora Sherrill)

Making a POInT

Maj Theodore Bloomer
AF/ILEHM

Deployed with the U.S. Army's 42nd Infantry Division's Regional Reconstruction Operations Center (ID RROC), three Air Force civil engineers have become oil and power liaisons in Iraq's Kirkuk region. Maj Bo Bloomer, Capt Jeremy Oldham and CMSgt Cevin Cox are the Power, Oil and Infrastructure Team, aka the POInT.

The POInT, a forward portion of the 42nd ID RROC, provides cross-functional expertise to several agencies on various oil and power initiatives. The focus is on capacity building: promoting Iraqis designing and inspecting their own construction projects, helping to ensure their self-sufficiency when coalition forces draw down. Working with Kirkuk's city planners and engineers, the team seeks plans and designs from engineers working in the region's oil, gas and power companies.

The first priority of the reconstruction effort has been to provide security and ensure that oil and power infrastructure is hardened against insurgents, potentially saving millions of dollars in lost export revenues that are essential for nation-wide reconstruction. The 42nd ID RROC and Multi-National Corps Iraq began a berming project for the country's key oil pipelines to make it more difficult to put explosive devices directly on them. The POInT is continuing the project, working with the Army's Project Coordination Cell to contract $1.2M of earth-moving equipment.

POInT member CMSgt Cevin Cox conducts a final inspection on a guard-house and tower facility at the Mullah Abdullah Power Plant.
(photo by the author)

Working with the 42nd ID RROC's oil team, the POInT programmed and designed a construction program comprising 23 facility and infrastructure projects valued at more than $7M. The POInT oversaw construction of six hardened guard towers for Iraqi Army security forces who guard the pipeline. Crews will soon break ground on several oil security facilities for Iraq's state-owned Northern Oil Company. The team has also planned upgrades for deteriorated communications facilities across the northern portion of the country.

The POInT coordinated more than 50 power production and electrical infrastructure projects valued at over $9M, ranging from the mobile substation for northern Iraq's Sarchnar Water Project to obtaining three specialized mobile crane trucks used to repair high-voltage electrical towers. The team procured a wide range of vehicles and equipment and continued the 42nd ID RROC's efforts to build three state-of-the-art health clinics at regional power plant centers. These facilities are critical because many families live and work on the sites, where there is little local support.

POInT engineers oversaw the construction of a perimeter wall for the Northern Regional Control Center for electrical distribution. The wall drastically reduced the center's vulnerability to vehicle bombs coming from highways adjacent to the complex. Acting as forward coordinators for 42nd ID RROC's power team, the POInT built security walls and guard towers, purchased patrol vehicles and contracted control centers and living quarters for the Electrical Power Security Service, which protects maintenance crews repairing high-voltage towers downed by insurgents.

"The formation of the POInT has enabled RROC to become more effective and responsive to the needs of the Iraqi Infrastructure Directors General," stated Army Lt Col James Lettko, 42nd ID Engineer Brigade deputy commander. "The entire RROC and POInT team has brought the reconstruction efforts in North Central Iraq to a new level."

Maj Bloomer was a member of the POInT in Kirkuk, Iraq.

Paving Your Way to Success

Capt Kevin Cramer
20th CES/CEV

"How long will it take you to open a second runway at a main base in Iraq?" Both shocked and intrigued by the question, when I heard I had 40 days to complete the job, my feelings quickly changed to fear and doubt.

This was going to be a massive undertaking. When I arrived at Balad AB for AEF 5/6 to join the 332nd Expeditionary Civil Engineer Squadron in April 2005, Runway 12/30 was a parking ramp for about 50 Army helicopters.

Before construction began my biggest fear was that we missed something major or underestimated the time for critical pieces during the intensive planning with the CE shop leads.

After the helicopters were relocated and construction started, my fears were put on the back burner because of other concerns, the biggest one being logistics. I've been taught many times that this function can make or break you, but I guess I didn't listen. We ordered all of the supplies we needed with what we thought was plenty of lead time, but we never followed up on delivery status. Instead, we allowed the supply chain to simply work without considering that it didn't have as tight a deadline as we did.

Overcoming late deliveries and lost shipments taught us another lesson: the power of teamwork. After requesting help from Contracting and the Logistics Readiness Squadron, almost all of our supplies made it in time for runway construction.

I said "almost all"... Airfield painting was the last task that would make or break the deadline. The team given this task was backed into a corner—the equipment they ordered had no chance of arriving on time. This obstacle provided another lesson: the power of ingenuity. If you let people know the desired result and turn them loose, they'll surprise you with their imagination. The painting team repaired a drastically undersized paint striper and went to work. They painted a 12,000 foot runway—hold lines, edge lines and center lines—6" at a time.

Getting to the point "after all the helicopters moved" was not simple. It took a lot of coordination between many organizations for the helicopters to have an operating "home." All efforts were made to square away every aspect of construction, and it worked. But operations were left by the wayside—meetings about the runway's use and control were held only five days prior to opening. When operations could not begin until two days after construction was complete, the importance of coordination became very clear.

The knowledge I gained by opening a new runway goes beyond the importance of a solid and complete plan. The ultimate lesson learned was the importance of trust. Trusting your troops can empower them to take pride and ownership in their tasks. I also found that a lack of trust can hinder the mission and must be overcome for success.

In the end we hit all the target dates despite many setbacks. I will leave Balad AB with a new understanding of the importance of teamwork, ingenuity, coordination, planning and trust, and with the knowledge that lessons can be learned from both positive and negative aspects of any task.

SrA Giles Dame stripes the second runway at Balad AB.
(U.S. Air Force photo)

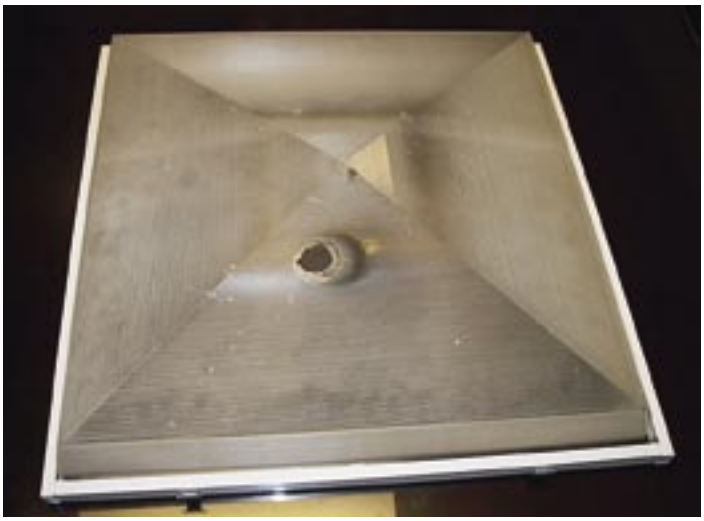
Capt Kevin Cramer is the Deputy Environmental Flight Chief, 20th CES, Shaw AFB, S.C. He served as the Operations Flight Chief for the 332nd ECES at Balad AB.

Safely Illuminating the Workplace

Dr. Daryl Hammond, P.E.
AFCESA/CESM

Hundreds of light fixtures are needed to produce enough light for workers to repair intricate avionics equipment. At Warner Robins Air Logistic Center, Robins AFB, Ga.,the Avionics Repair Center in Building 645 gets bright, white light from metal halide lighting systems.

But are these systems safe? There's always some degree of risk with electrical products, and light fixtures are no exception. Metal halide lighting systems contain a special lamp that operates under high pressure and high temperature, and it can rupture unexpectedly. When the bulb ruptures, glass fragments and hot pieces of lamp metal splatter throughout the light fixture.



The acrylic diffuser beneath the lamp is designed to evenly spread light from the lamp, as well as contain any glass fragments and molten metal from a failed lamp. Underwriters Laboratories (UL) certify the diffusers to safely contain a single lamp rupture, but they must be replaced immediately following.

However, that doesn't always happen. That means that the weakened diffuser can't safely contain additional lamp ruptures; molten metal could burn through the acrylic material, becoming an ignition source or a hazard for anyone who happens to be under the fixture.

Civil engineers at Robins AFB developed a procedure to retrofit existing metal halide lamp fixtures with tempered glass overlays inserted between the lamp and the acrylic diffuser. The tempered glass contains any glass particles and hot metal pieces from a lamp rupture, preventing damage to the acrylic diffuser.

The overlays are UL-approved. The retrofit procedure is simple, inexpensive, and approved by the Air Force Civil Engineer Support Agency (AFCESA). After installing the overlay, it will no longer be necessary to buy costly acrylic diffusers every time a lamp rupture occurs.

Currently, the 778th Civil Engineer Squadron has awarded a contract to retrofit tempered glass overlays into 924 metal halide fixtures in Building 645. Additional contracts are planned for other base facilities that use metal halide fixtures. Robins AFB is saving money while making the work environment safer for employees.

AFCESA has issued Engineering Technical Letter (ETL) 05-01, "Use of Acrylic Diffusers with Metal Halide Fixtures," as guidance for new and existing installations. ETL 05-01 is available on AFCESA's Web site (http://www.afcesa.af.mil), and AFCESA personnel are available to interpret.

Dr. Hammond is The Air Force Electrical Engineer. He works at HQ AFCESA, Tyndall AFB, Fla.

Top: Multiple metal halide lamp ruptures damaged this acrylic diffuser, spraying hot metal and glass across it and eventually causing burn-through, which could result in a fire or personal injuries. Bottom: A UL-approved tempered glass overlay inserted between the lamp and the diffuser catches the hot metal and glass, preventing burn-through. (U.S. Air Force photos)

Shutting Down a Security Problem

Lt Col John T. Enyeart
HQ USAF/ILEXR

Generally, security experts determine a base's anti-terrorism and force protection (AT/FP) issues and then get engineers to build the solutions. A civil engineer at Malmstrom AFB, Mont., brought a solution to the AT/FP table before anyone asked for one.

Mr. Chuck Moler, the energy management and control system (EMCS) manager for the 341st Civil Engineer Squadron, got his idea from family members who were postal workers in Washington, D.C., during the anthrax scares in late 2001. More than anything, the postal workers wished for a way to shut down their building's air system quickly when they had a suspicious package or an actual threat, to prevent the threat from spreading. Mr. Moler knew he had direct control over almost every air handling system across the base connected to his EMCS, originally installed to handle energy-saving temperature adjustments (e.g., night setbacks). Finding a way to instantaneously shut down all the systems became his mission.

Taking the initiative to write control programs that could affect several buildings at once, Mr. Moler visited the company that installed Malmstrom's basewide EMCS. After a week of tutorials in their software development office, he was able to write a shutdown sequence for the whole system within a few months. Then all he needed was a single button, a solitary switch accessible to emergency responders, to initiate an EMCS shutdown. Two days and $250 saw it installed in Malmstrom's consolidated 911 center.

In parallel with the software development, Mr. Royce Shipley and other emergency managers at the 341st CES developed action procedures. Working from established "shelter in place" measures, Mr. Shipley created checklists and training for an ideal mix of wing-wide players: troops from the security forces, command post, disaster control group, and HVAC as well as alarm room managers.

During its first test, the system worked like a champ. With only minor software adjustments, the system was able to completely shut down all EMCS air handling systems in 25 seconds. When the button was pulled out, the systems automatically went into their start-up routines, and all were back up within 20 minutes.

Despite the successes, there was still a challenge left to tackle. The EMCS controlled only 76% of Malmstrom's facilities. The operations flight laid out a plan to procure 33 building controllers and narrow-band wireless transceivers to extend the EMCS to every occupied building on the base. Recognizing the direct relation this project has with the Global War on Terror, the squadron requested funding for the $256,000 in material costs from USSTRATCOM and received it in the middle of FY04. The flight dedicated a group of electricians and HVAC technicians to install the new equipment building by building.

When the Air Force Space Command (AFSPC) Inspector General team saw the initial system demonstrated—live, not a simulation—during a 2003 operational readiness inspection, they touted it as a Best Management Practice. The base uses the system during HAZMAT exercises, such as mock chlorine leaks. The battle staff has become comfortable with the system because they know it's responsive and really works.

According to the Energy Team at the Air Force Civil Engineer Support Agency, this was the first time anyone attempted to use an EMCS in such a manner. It clearly exemplifies two goals of the 341st CES: "work smarter" and "be prepared."

Lt Col Enyeart was chief of the 341st CES Operations Flight, Malmstrom AFB, Mont.

Chuck Moler, EMCS Manager, shows TSgt Craig Spicer, HVAC Craftsman, the EMCS station for hands-on control from the HVAC shop. Any shop standby member can verify the auto shutdown plus restart specific facilities or areas of base from this terminal. (U.S. Air Force photo)

Not Just HORSE-ing Around

C1C Matt Mumm
C1C Will Ferries
USAFA

During the summer, the Air Force Academy offers a research program for cadets to get involved in the operational Air Force and real world processes within their majors. As civil engineering majors, we were assigned to the 819th RED HORSE Squadron at Malmstrom AFB, Mont.

Academy cadets Will Ferries and Matt Mumm geared up for a deployment exercise with the 819th RHS. (U.S. Air Force photo)

We had two main tasks during our five-week stay with the 819th: conduct research applicable to the Air Force and RED HORSE missions, and shadow second lieutenants to get an overall understanding of a CE officer's duties and responsibilities.

For our research project, we tested the effects of different admixtures—polymer fibers, steel fibers, and hay bale binder wire—to find the most efficient admixture based on added compressive strength and cost, as well as workability and availability.

We poured and tested 12 cylinders: three for each admixture, and three of plain concrete (control). We learned that admixtures do increase the compressive strength of concrete, and that polymer fibers are the most cost-effective. We also found that baling wire, while it was the least effective admixture, could work as an expedient substitute.

During our stay, we observed and experienced many different facets of the 819th. We arrived just in time to participate in Phase 1 of a deployment exercise.

During Phase 1, vehicles—called "chalks"—scheduled to go into theater are washed, maintenance-checked, weighed, loaded, weighed again and then given one last maintenance inspection. We recorded each chalk's progress throughout the day in a spreadsheet and later briefed the commander.

Phase 2 took place the following week. After convoying to the exercise site, we immediately swept the area for unexploded ordnance and established a security perimeter. Next, we began work on the tent city. Our squad erected the mess tent and several billeting tents.

During the exercise, we were attached to the engineering flight, whose taskings included hosting a 1,000-troop Army Special Forces unit and a runway construction team. The flight's engineers showed us how to use several bare base asset manuals to plan for our Army tenants' needs.

We also worked with the engineering assistants to determine runway construction feasibility for the site, using a dynamic cone penetrometer to see if the soil could support a mobile aircraft arresting system.

The next week, back at the squadron, we toured many of the "backbone" shops of the 819th RHS: the cantonments shops, airfields building and supply shop. Talking with experienced troops from the HVAC, plumbing, electrical, wood and metal shops helped us better understand the jobs and responsibilities. Squadron-wide meetings and engineering flight briefings gave us a deeper understanding of RED HORSE's mission and how officers and enlisted work together.

C1C Mumm and C1C Ferries are civil engineering majors at the U.S. Air Force Academy, Colo.

Renovating Warren's Historic Homes

2Lt Joshua S. Edwards
90th SW/PA

The 90th Civil Engineer Squadron has nearly completed negotiations on an estimated $28M lead-based paint abatement project for historic brick houses at F.E. Warren AFB, Wyo.

"The base and the entire Air Force are very committed to ensuring that these homes are safe for our military families, as well as ensuring their historical preservation," said Col Michael Carey, 90th Space Wing commander.

The extensive work on the 155 brick homes, expected to take 18 to 20 months, is the result of a hazardous environment created by deterioration of the paint. The lead-based paint in the homes has been monitored over the years, and interim maintenance control measures were no longer a viable option.

The $28M price tag for the project includes environmental testing after the renovation to ensure that air in the houses is safe for incoming residents, said Lt Col Joe Ballard, 90th CES commander.

Air Force Space Command became involved with the issue of lead-based paint in 2001, and in 2003 discussions began in earnest between Warren, Air Force Space Command, the State Historic Preservation Office and other agencies to come up with possible solutions to the lead concerns, said Lt Col Ballard.

While quality of life is important, it's not the only concern Warren has.

"All of Warren's historic brick homes are on the National Register and are some of the oldest homes in the Air Force, dating back to the late 1800s," said Col Carey. "We are the caretakers of this historic place which presents unique challenges to renovate while preserving the heritage."

Warren has worked closely with the State Historic Preservation Office, the Advisory Council on Historic Preservation, and the National Parks Service to ensure environmental protection throughout the renovation process.

"The National Trust Society and the National Park Service were in consultation with the State Historic Preservation Office on those negotiations as to what we really could and could not do to the houses because they are national historic landmarks," said Lt Col Ballard.

According to Ms. Leilani Woods, 90th CES chief of environmental compliance, items in the homes that cannot be replaced are being restored by means of 'dipping and stripping' to maintain historic character. This also makes it is easier to contain and treat waste. Soil under the eaves of the homes will be tested for contamination, and if the samples display elevated lead levels, the soil will be removed and replaced with clean soil.

Lt Col Ballard estimates that the entire lead-based paint abatement and privatization will take between five and eight years to complete.

"Housing at Warren has a very bright future," said Lt Col Ballard.

Mr. Bob Farnsworth, housing facilities manager for the 90th CES, F.E. Warren AFB, Wyo., assesses chipped paint on the porch of one of the base's historic brick houses. The house is one of 155 homes undergoing renovation in a lead-based abatement project on the base. (U.S. Air Force photo)

$10 Billion AFCAP Award

MSgt Michael A. Ward
HQ AFCESA/PA

The Air Force awarded a 10-year, $10 billion contingency support contract to six firms Nov. 8. It is the largest contingency support contract ever awarded by the service.

The contract, called the Air Force Contract Augmentation Program (AFCAP), is a pre-awarded contingent contract designed to quickly assist federal agencies needing fast acquisitions during contingencies, humanitarian relief missions and the Global War on Terrorism.

AFCAP is managed by the Air Force Civil Engineer Support Agency (AFCESA), Tyndall AFB, Fla., and the Air Force Services Agency, San Antonio, Texas. Contract task orders will be executed by the six firms: Washington Group International, CH2M Hill Global Services, URS/Berger JV, Bechtel National, DynCorp International and Readiness Management Support.

AFCAP originated in 1997 as a five-year contract worth $452M. The Air Force, which had just finished a major drawdown of its active duty forces, developed the program as a way to provide support during emergency operations without draining military civil engineer personnel and resources.

"AFCAP was developed as a force-multiplier for the Air Force," said Mr. Wayland Patterson, AFCAP program manager for AFCESA. "It allows the Air Force to use fewer military resources, but retain full civil engineer capability by contracting out some services."

Capabilities provided by the contract are generally aligned with Air Force combat support and combat Services support such as carpentry, plumbing, electrical, mechanical, air conditioning, food service, lodging management, laundry plant operation, fire protection, emergency management, professional engineering and project and program management.

Since 1997, AFCAP task orders had been executed by a single contractor, Readiness Management Support of Panama City, Fla. But world events, including the war in Kosovo, the attacks of 9-11 and the Global War on Terrorism, have increased the scope and requirements of AFCAP.

"The decision to go with more than one contractor helps provide flexibility in our planning and helps mitigate the risk of a single contractor possibly being overwhelmed by a large number of task requirements," said Mr. Patterson.

AFCAP has been used numerous times since its inception and was most recently used in relief and recovery efforts after Hurricanes Katrina and Rita. It has been used to provide tents after devastating earthquakes in Turkey and Iran and to set up refugee camps in Kosovo during the Serbian campaign. During the build-up to Operation Iraqi Freedom, it was used to help set up air bases in Southwest Asia. It is currently being used to assist in rebuilding Iraq and in support of relief efforts in the Horn of Africa.

AFCESA provides the best tools, practices and professional support to Air Force civil engineers worldwide. The agency supports 82 major and 10 minor active-duty installations, plus the 83 Air Force Reserve and Air National Guard installations.

Helping Rebuild

Since 1997, the Air Force Contract Augmentation Program has been used to support a variety of humanitarian, contingency and disaster relief operations. One of the more interesting uses of AFCAP occurred in 2000 when 30,000 tons of lumber was provided to war-ravaged Kosovo residents.

In 1999, Serbian forces burned nearly all of the homes in Kosovo to drive out the residents. Most of the homes were made of concrete block and withstood the heat, but their roofs burned and collapsed.

When the war ended, residents returned and the U.S. State Department made arrangements to help Kosovars rebuild their homes. The contractor, Readiness Management Support, was able to deliver 30,000 tons of lumber in 30 days.

"I kind of thought going in that we were setting them up for failure by asking them to deliver in that short a time," said Mr. Joe Smith, the AFCAP program manager at the time. "Nobody could do that, but they did it."

Day Receives DoE Award

MSgt Michael A. Ward
HQ AFCESA/PA

Mr. Alvin Day, chief of the Air Force Civil Engineer Support Agency's Mechanical and Electrical Engineering Division, was named a recipient of the Department of Energy's Federal Energy and Water Management Exceptional Service Award. The announcement came just weeks before Mr. Day's retirement after 40 years of federal service.

"It came as a giant shock to me," he said, "but it's a real honor to receive this at the end of my career."

Mr. Day was submitted for the award by the people he manages, members of the Air Force Energy Management Team (EMT) and the Utility Rates Management Team (URMT). The EMT helps bases reduce energy costs and usage, and the URMT negotiates utility rate costs with states and regulatory agencies.

"This award is really a reflection of the work all the people involved with the Air Force energy program are doing and the leadership the Air Force is showing in the area of renewable energy," Mr. Day said.

The Air Force is the largest purchaser of renewable power in the nation. Last year the Air Force bought 41% of the renewable power purchased by the U.S. government. Since he took on his position five years ago, Mr. Day has been one of the leading forces in increasing the amount of green power purchased by Air Force bases.

Mr. Day retired at the end of September, a month before the award's presentation in Washington D.C., but that was no problem. "Oh, I'm be sure I'll be there," he said.

A Copy of Your Own

Want it? Need it? Here's how to get your own copy of the *Air Force Civil Engineer* magazine.

AFCE magazine is distributed at no charge to all Air Force civil engineer units at a ratio of one copy for every six members. We also send the magazine to individual CEs who may not be attached to traditional units. If you or your unit are not receiving the magazine or not getting enough copies, please contact us at cemag@tyndall.af.mil.

If you don't fit into the categories above, you can still receive the magazine. Individual paid subscriptions are now available through the Government Printing Office's Online Bookstore at http://bookstore.gpo.gov—just enter "Air Force Civil Engineer" into the search field to find us.

Air Force Civil Engineer is also available in PDF format online under the "Periodicals" link at http://www.afcesa.af.mil/library/.

Correction

In the previous issue of AFCE, a key personnel change was incorrect. The correct information follows.

Col William P. Albro is now The Civil Engineer, HQ Air National Guard, Andrews AFB, Md., replacing Col Janice M. Stritzinger, who is now Deputy Director of Construction for the Office of the Assistant Secretary of Defense for Reserve Affairs (Materiel and Facilities). Col Albro was previously the Commander of the 235th Civil Engineer Flight, Martin State Airport, Md.

We apologize for the error.

Sheppard Team Wins "Rodeo"

MSgt Jairus D. Steel
366 TRS/TTE

On, Sept. 18, a three-member team of civil engineers from Sheppard AFB, Texas won the military division of the of the 22nd Annual International Lineman's Rodeo. The team members, SSgt Jesse Evans, SSgt Edward Jordan and Army SSgt Michael Whitehead, are all electrical instructors from the 366th Training Squadron.

The Sheppard team competed against 142 other teams during the event, held annually at Bonner Springs, Kansas. Five military teams participated: three Air Force teams from Sheppard AFB, one Air Force team from Scott AFB, Ill, and one Army team from Ft. Belvoir, Va.

SSgt Jesse Evans and Army SSgt Michael Whitehead show off their winning form at this year's International Lineman's Rodeo. (U.S. Air Force photo)

Editor's note: Although the PPE in use was correct at the time of the competition, requirements are about to change. ETL 06-01, to be released in early 2006, will specify more stringent PPE requirements for high-voltage overhead line work at 69 kV (nominal) or less.

Teams and apprentices work hard throughout the year for the opportunity to come to the rodeo and compete among the "best of the best" in the military and electrical industry. The competition at this level is normally very tough and this year was no different. The winning team edged out the competition by a mere four points, winning the title with 392 points out of a possible 400.

Teams compete in four different events, each with a specific purpose. Two of the events are standard and held at each competition: the egg climb and the hurt man rescue. The other two are aptly named "mystery events." The judging criteria for each event is "safety first, then job knowledge." Total elapsed time is used only in the event of a tie between two or more teams.

The egg climb tests a participant's ability to climb smoothly and professionally while following exact guidelines. To complete the climb, a competitor carries a small canvas bucket containing an unbroken raw egg to the top of the pole. At the top, the climber attaches the safety strap around the pole, removes and tosses the canvas bag positioned by the previous climber, then places the raw egg in his or her mouth, hangs the canvas bucket on the hook, and carefully climbs down the pole. Breaking or cracking the egg results in a significant penalty.

The hurt man rescue is a timed event that simulates rescuing a lineman who was injured while working on power lines at the top of the pole. A life-sized mannequin weighing 180 lbs is positioned near the top of the pole. Competitors put on climbing equipment and insulated rubber gloves and climb to the "injured" mannequin, where they tie a rope around its chest using a previously installed rope and pulley called a "handline." After cutting the "hurt man's" safety strap, the climber sends him down on the handline.

The two mystery events are a closely guarded secret until just before the competition. This prevents teams with large training areas from getting an unfair advantage by practicing the events. One of this year's mystery events was changing the center insulator on a three-phase (three-wire) pole line while the lines were simulated energized with 12,470 volts. The insulator was changed using fiberglass sticks with tools attached to the end of them. The second mystery event involved using rubber insulated gloves and hand tools to change a dead-end type insulator on a single phase (two-wire) pole line simulated energized at 4,160 volts.

MSgt Steel is the Electrical Flight superintendent for the 366th Training Squadron, Sheppard AFB, Texas.

CE Tapped As "Tops" Performer

SrA Amaani Lyle
52nd FW/PA

This year, a Spangdahlem AB Airman was selected as one of 30 "ambassadors" of music, vocals and dance in the U.S. Air Force's premiere performing troupe, Tops In Blue.

Upon hearing the news, A1C Beverly Sadural, an engineering assistant with the 52nd Civil Engineer Squadron (CES), said the initial jitters concerning the fate of her car and her cat were soon replaced by the anticipation of working with a variety of other Air Force members committed to boosting service members' morale. By the end of the 2005 tour, she will have brought America's unique brand of culture and entertainment to more than 120 locations in the U.S. and 25 foreign countries.

"We are bringing a piece of home to wherever Air Force members and their families are stationed," A1C Sadural said. "This is especially true for our desert troops—we give them a moment to forget where they are and lose themselves in the moment."

A1C Sadural said she often finds the general public is amazed at the rich blend of musical talent found within the profession of arms.

"Our audience is typically very proud that we can serve and represent our country in this way," the Tops In Blue vocalist said. "They seem more patriotic after seeing the show."

A1C Sadural's journey from civil engineer troop to member of a performance troupe is one of the latest chapters in a vision more than half a century old.

Tops In Blue was the brainchild of Col Alvin E. Reilly, who in 1953 aimed to recognize the high caliber of entertainment available in the Air Force community.

Over a span of decades, Tops In Blue has performed in films, produced albums and has been featured on national television with such legends as Ed Sullivan, Bob Hope, Lucille Ball, Barbara Mandrell and the group Alabama.

Embarking on an adventure such as Tops In Blue takes the determination of a performer as well as the teamwork of the office left behind for the one-year commitment.

"My shop has been very supportive of my selection," A1C Sadural said. "Fortunately, around the time of the news, we'd just received three Airmen from technical school. Though they still needed further training, office space was limited, so my chance to represent the squadron, the wing and (U.S. Air Forces in Europe) solved the space problem and became a win-win situation.

One member of her office said he couldn't be more proud of his friend and colleague, who he described as "diligent and quiet-natured." He recalled that her humility kept the depth and breadth of her talent somewhat obscured prior to her selection.

A1C Beverly Sadural, 52nd CES, is currently one of 30 performers with the U.S. Air Force's Tops In Blue performing troupe. (U.S. Air Force photo)

According to A1C Gregory Bault, 52nd CES, "She was so humble about her skill that we didn't know all that she could do until after the Tops In Blue selection when she finally told us of her accomplishments."

Her dedication earned her the prestige that less than 2,000 other Tops In Blue performers have enjoyed over the past 50 years.

"Tops In Blue is the Air Force's premier entertainment showcase," said Mr. Tom Edwards, show producer and chief of Air Force Entertainment. "The new 2005 team is a reflection of the 'best of the best' performers throughout the Air Force."

AFIT On the Road

Capt Deron L. Frailie
AFIT/CEM

In early September, instructors from the Air Force Institute of Technology's Civil Engineer and Services School (AFIT's CESS) conducted a Customer Service and Housing Management Seminar at RAF Lakenheath for 18 personnel working at RAF Lakenheath, RAF Menwith Hill, and RAF Alconbury.

The RAF Lakenheath on-site course was an abbreviated form of MGT 406, "Housing Flight Commander," which was specially tailored by the AFIT CESS faculty to meet the user's distinct requirements. Some of the course topics included: Customer Service in Housing, Family Housing Master Plans, Housing Financial Management, Housing Assistance, Environmental Concerns for Housing, Housing Facilities, Overseas Allowances, Family Community and Housing Design Considerations, Housing Programming, and Stress Management. The course concluded with a tour of several different types of MFH units.

CESS offers a broad range of courses in Engineering Management, Environmental Management, Services Management, various seminars, and Interservice Environmental Education Review Board approved courses. A full list of the many courses offered by CESS may be found at http://www.afit.edu/cess. To request a customized course or more information on the specific programs offered, contact the CESS faculty at cess@afit.edu. CESS is here to help meet your continuing educational needs. We look forward to seeing you on the road in the near future.

312th Training Squadron

Goodfellow AFB TX

Rescue Tech	18-Jan/25-Jan/01-Feb/08-Feb/15-Feb/23-Feb/ 02-Mar/09-Mar/16-Mar/23-Mar/30-Mar	07-Feb/14-Feb/22-Feb/01-Mar/ 08-Mar/ 15-Mar/22-Mar/29-Mar/05-Apr/12-Apr/19-Apr
Fire Officer II	18-Jan/03-Feb/22-Feb/10-Mar	02-Feb/21-Feb/09-Mar/27-Mar
Fire Officer III	29-Mar	11-Apr
Fire Inspector I	06-Feb/27-Feb	17-Feb/10-Mar
Fire Inspector II	19-Jan/27-Mar	01-Feb/07-Apr
Fire Inspector III	13-Mar	24-Mar
HAZ MAT T-t-T	23-Jan/06-Mar/27-Mar	17-Feb/31-Mar/21-Apr
Weapons of Mass Destruction	07-Feb/22-Feb	24-Feb/10-Mar
Airport Firefighter	01-Mar/07-Mar/29-Mar	17-Mar/23-Mar/14-Apr

Additional course information for the 312th TRS is available at http://www.goodfellow.af.mil/Training_Group/312TRS/newfire/index.htm. Students must go through their MAJCOM CE staff to obtain training slots

AFIT

Wright-Patterson AFB OH

Course No.	*Title*	*Off.*	*Start Dates*	*End Dates*
WENG 464	Energy Management Technology	06A	06-Mar	10-Mar
WENG 466	Energy Management Policy	06A	13-Mar	17-Mar
WENG 555 (S)	Airfield Pavement Construction Inspection	06A	20-Mar	24-Mar
WENV 020 (S)	Environmental Compliance Assessment	06B	20-Mar	23-Mar
WENV 022 (S)	Pollution Prevention Prog. Ops. & Mgmt.	06A	06-Feb	10-Feb
WENV 419	Environ. Planning, Progr. & Budgeting	06B	28-Mar	30-Mar
WENV 441	Environ. Project Planning	06A	27-Feb	03-Mar
WENV 521 (S)	Hazardous Waste Management	06A	13-Feb	17-FEb
WENV 531	Air Quality Management	06A	30-Jan	03-Feb
WENV 541	Water Quality Management	06A	23-Jan	27-Jan
WESS 010 (W)	Hazardous Waste Accumulation	06B	06-Mar	10-Mar
WESS 070 (S)	Hazardous Matl. Mgmt.	06B	28-Mar	28-Mar
WESS 200	Protocol Fundamentals	06B	20-Mar	20-Mar
WMGT 101	Intro to BCE Organization	06B	18-Jan	03-Mar
WMGT 102	Intro to BCE Org. for Reserve Forces	06A	27-Feb	10-Mar
WMGT 400	CE Commander/Deputy	06A	27-Mar	07-Apr
WMGT 412	Financial Management	06B	06-Mar	17-Mar
WMGT 484	Reserve Forces Air Base Combat Eng.	06A	13-Mar	24-Mar
WMGT 570	Civil Engineer Superintendent	06B	27-Mar	07-Apr
WMGT 580	CE Advanced	06A	27-Feb	03-Mar

Resident courses are offered at Wright-Patterson AFB, Ohio. Registration begins approximately 90 days in advance. Students should register for CESS courses through the online registration process. Visit the CESS Web site at http://www.afit.edu (under Continuing Education) for satellite and Web classes.

366th Training Squadron

Sheppard AFB TX

J3AZR3E050-001	CE Work Estimating	23-Jan/27-Mar	10-Feb/14-Apr
J3AZR3E051-003	Cathodic Protection Maint.	23-Jan/10-Feb	03-Feb/24-Feb
J3AZR3E051-007	Airfield Lighting Systems	01-Mar	10-Mar
J3AZR3E051-008	High Voltage Sys. Maint.	13-Feb	13-Mar
J3AZR3E051-010	Bare Base Electrical Sys.	13-Feb/13-Mar	27-Feb/24-Mar
J3AZR3E071-001	CE Advanced Electrical Troubleshooting	13-Feb	13-Mar
J3AZR3E072-113	Bare Base Power Generation (Diesel)	06-Feb/06-Mar	02-Mar/30-Mar
J3AZR3E451-004	Fire Suppression Sys. Maint.	02-Feb	23-Feb
J3AZR3E453-002	Pest Management Recertification	27-Feb	03-Mar
J3AZR3E453-003	Pest Management Certification	23-Jan	17-Feb
J3AZR3E471-101	Bare Base Water Purif. & Distr.	01-Mar/15-Mar	10-Mar/24-Mar
J3AZR3E472-00AA	Liquid Fuels Storage Tank Entry	06-Mar/16-Mar	20-Mar/30-Mar
J3AZR3E472-01AA	Liquid Fuels Maint. Technician	30-Jan	10-Feb
JCOZP32E1D-01AA	Readiness Flight Officer	23-Jan	17-Feb

Gulfport MS

J3AZP3E351-003	Metals Layout, Fabrication and Welding	30-Jan/21-Feb/13-Mar	16-Feb/10-Mar/30-Mar
J3AZP3E351-004	Roof Installation, Maint., Insp. & Repair	23-Jan/06-Feb/27-Feb/20-Mar	02-Feb/16-Feb/09-Mar/30-Mar

Ft. Leonard Wood MO

J3AZP3E571-003	Engineering Design	30-Jan/27-Feb/13-Mar	10-Feb/10-Mar/24-Mar
J3AZP3E571-004	Construction Surveying	27-Mar	07-Apr
J3AZP3E571-005	Construction Materials & Testing	17-Jan/13-Feb	27-Jan/24-Feb
J3AZP3E971-003	Advanced Readiness	13-Feb	17-Feb
J3AZP3E971-005	NBC Cell Operations	06-Feb/13-Mar/27-Mar	10-Feb/17-Mar/31-Mar

Additional course information is available at https://webm.sheppard.af.mil/366trs/default.htm or https://etca.randolph.af.mil. Students may enroll on a space-available basis up until a class start date by contacting their unit training manager.

Military engineers walk through the Algiers section of New Orleans following Hurricane Katrina, on their way to remove downed trees. Additional coverage of the storm damage appears inside. (photo by SSgt Jacob N. Bailey)