

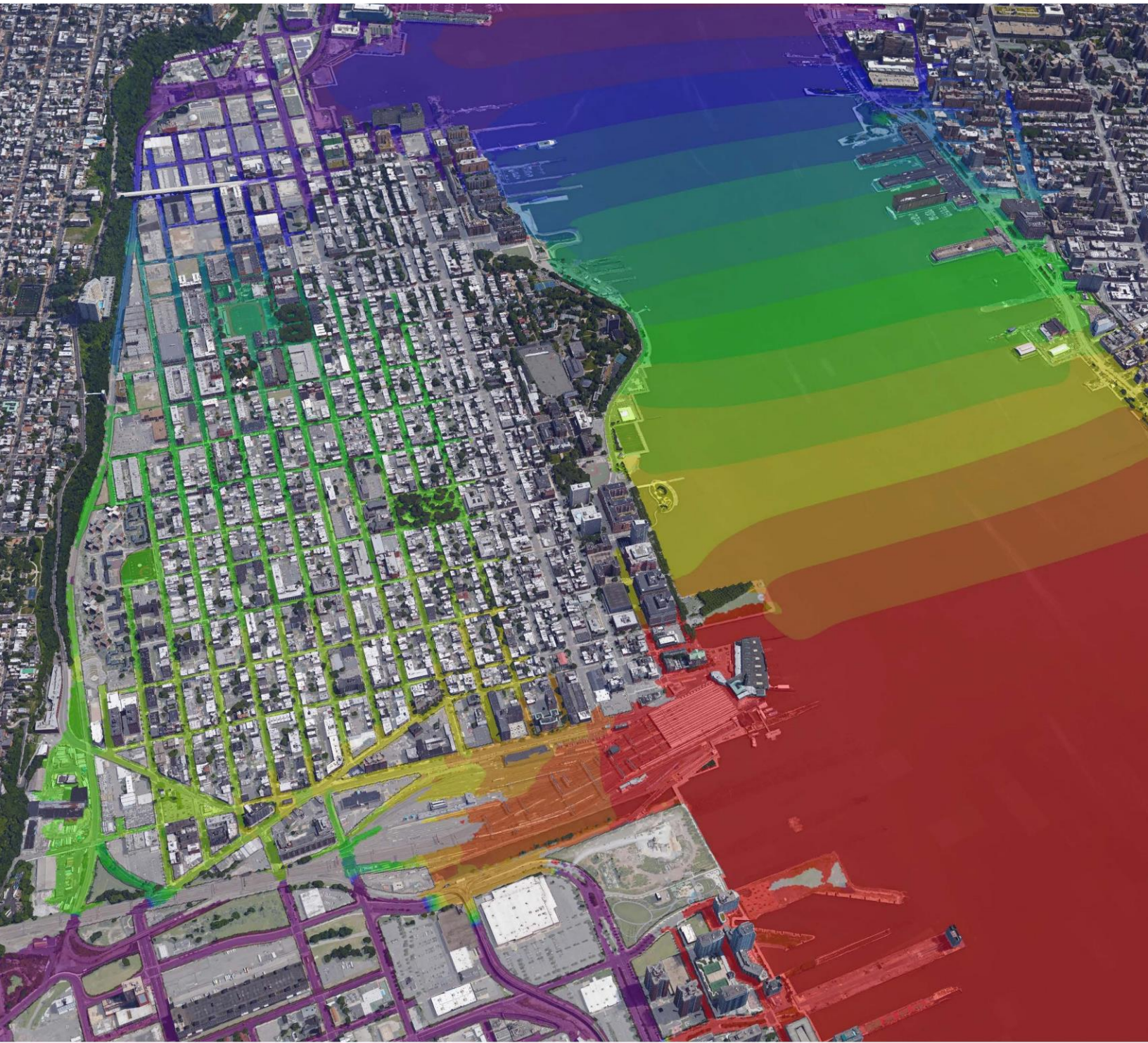
*Winter 2021*

# Army Engineer

*Magazine*



*30<sup>th</sup> Anniversary  
Desert Storm*



# DELIVERING ENVIRONMENTAL ENGINEERING SOLUTIONS TO BUILD A **RESILIENT NATION**



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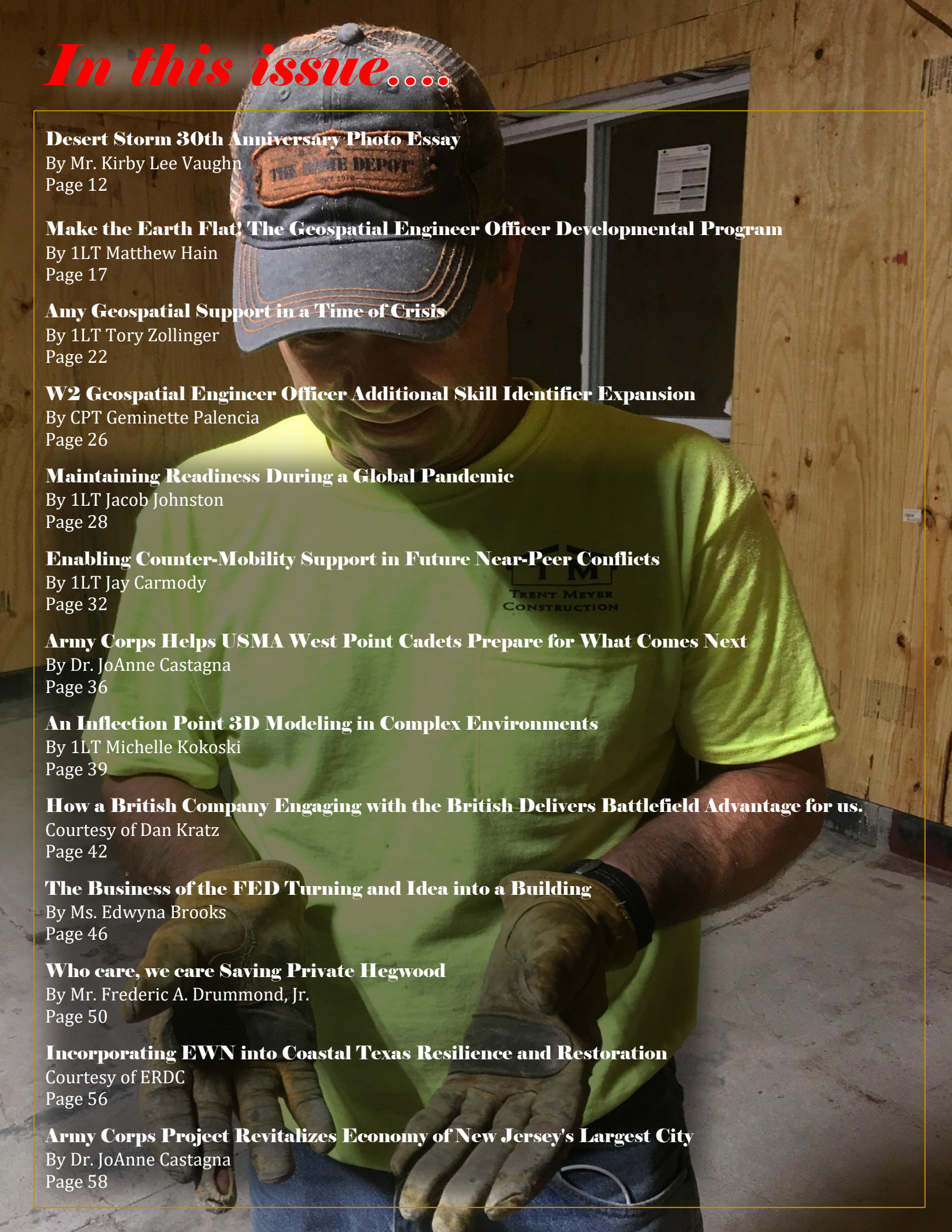
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*Happy New Year!* I was recently reminded that “we are living through interesting times”, indeed. Nevertheless, we are continuing to be inspired by the commitment of the Soldiers in the Corps of Engineers. In this issue we look back at Desert Storm that began 30 years ago. We also look to what the future holds in re-integrating non-persistent AP mines into terrain-shaping operations, 3D modeling of terrain and man-made structures, and USMA’s upcoming Cyber Engineering & Academic Center. We explore how Geospatial Support has continued to grind during the challenges of the past year and we are shown the fabric of W2 Geospatial engineers themselves. The 618<sup>th</sup> Engineer Support Company (Airborne), “The Nasty”, demonstrates how to keep laser focused on readiness. We travel around the world to the UK to explore innovations in Counter-IED and Counter-Mine rollers and to The Far East District that demonstrates their unparalleled engineering and construction capabilities. Our USACE districts explain how the benefits of their work in improvements in water resource management is advantageous to the nation. Mr. Frederic A. Drummond, Jr. explains to us why Soldiers are Soldiers for life.

I would like to send my prayers and deepest sympathies to the family and friends of MG (Ret) Bo Temple. General Temple was a great man and a good man who will be deeply missed literally by an army of people.

Stay well!

Best,

*Linda S. Mitchell*

Linda S. Mitchell, Editor  
Army Engineer Magazine

### **COVER PHOTO**

**CPL Andrew Hodnik of Bravo Company, 27<sup>th</sup> Engineer Battalion takes a break during a training exchange with the French 6<sup>th</sup> Light Armored Regiment. Engineers would spend weeks developing clearing techniques for any obstacles they would encounter during the ground assault into Iraq. 14FEB1991. Taken near Rafha, Saudi Arabia.**

### **BACK COVER PHOTO**

**Tulsa District Commander COL Scott Preston presents Caterpillar Silver Order of the de Fleury Medal to Curt Munson and Bruce Munson, sons of LTC Orville O. Munson (posthumous). Troy Morgan, Director of Army Engineer Museum looks on.**

# REGIMENTAL AWARDS

## CATERPILLAR SILVER DE FLEURY

LTC (Ret) Orville O. Munson

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CSM Rathe S. Thompson  
CSM Robert W. Ferguson

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## AEA Update

21 January 2021



Members of the Regiment:

It has been over a year since I've updated you on the status of our Association. I wanted to wait until we could see our way forward from the Covid-19 crisis. With the roll out of the vaccines, there is "some light at the end of the tunnel."

A majority of our Association's financial support comes from industry through advertising and sponsorships (Regimental Week, Castle Ball, seminars, etc.). With the Covid-19 shut down last March, these events were canceled. Our Regimental Store at Fort Leonard Wood is our secondary source of funds which was severely impacted by the lock down of the Post and closure of the museum for a period of time.

During this period, our AEA staff, led by Dave Theisen and John Rather, have done an outstanding job of navigating the Covid-19 challenges. They have:

- Activated an online the Regimental Store and worked with the Command Team to get graduating soldiers an opportunity to visit the store.
- Automated back office functions which have significantly reduced overhead costs.
- Worked with Industry partners to retain their financial support.
- Applied for and received a PPP Covid-19 Forgiveness Loan from the SBA.

**These actions and others have allowed your Association to operate in the black this past year!**

The way forward is still going to be challenging. We are currently planning for a Castle Ball and Regimental Week in the Aug/Sept timeframe, but that will be a function of Army policy and the rollout of the vaccines—yet to be determined.

What can our membership do. We have three programs that are important to AEA that you can be a part of.

- Pay It Forward - This program allows one to sponsor the first-time membership of Engineer soldiers. This program has become popular with many of our "Lifetime" members who want to "pay it forward".
- Memorial Fund - This fund supports our "memorialization" efforts, especially as it relates to Engineer Grove at Fort Leonard Wood. This past year we provided three engineer families with \$2,000 stipends so they could attend the ceremony when their fallen soldier's name was added to the wall.
- Guardians of the Castle - This is our major fundraising effort each year and supports other endeavors that the AEA Board deems appropriate.

Many of you have contributed to one or more of the above funds and I thank you. Until we get back to some degree of normalcy and we can again hold our Engineer functions that Industry can sponsor—These Funds will have to provide our "margin of excellence".

The bottom line is I'm proud of how our Association has weathered these challenging times and look forward to the day I can report that we have returned to normal operations.

Please stay safe and remember that better times are coming.

Essayons,

MG Russ Fuhrman, USA (Ret)  
President, AEA

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# LTC (Ret) Bill Munson

The Engineer Regiment Best Platoon Leader Award is being renamed for LTC (Ret) Orville Munson.

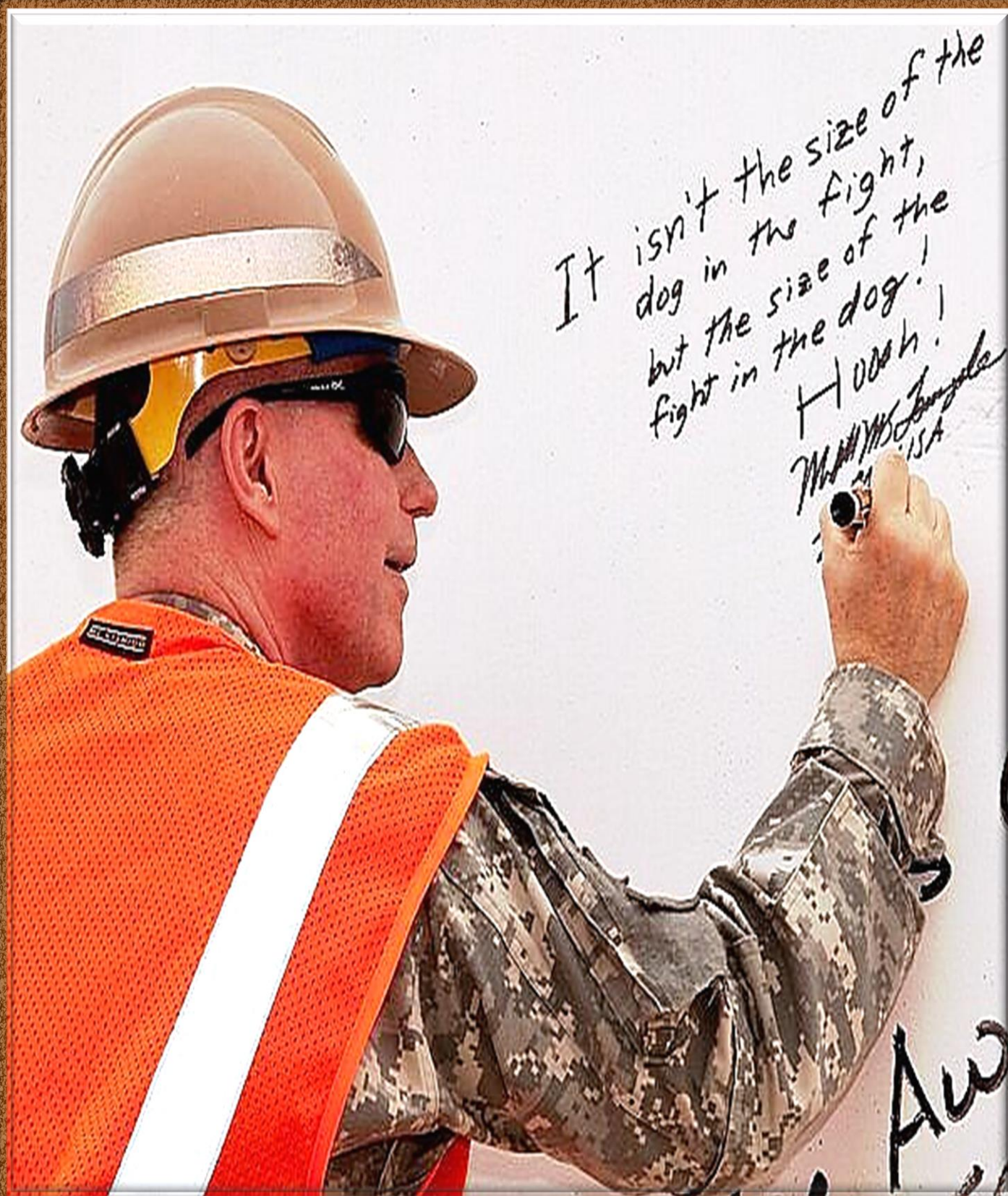


AEA is are proud to announce the LTC (Ret) Orville Munson Caterpillar Silver de Fleury Award presentation to LTC (Ret) Orville Munson's family.



# MERDITH "BO" WYNDHAM BOLLING TEMPLE

1953-2020



USACE & Army Regiment Teammates,

It is with deep sadness that I share with you the news of the passing of Major General(R) Merdith Wyndham Bolling "Bo" Temple. MG(R) Temple lost his 13-year battle with cancer on November 1st, 2020. We will share the memorial service details once they become available. Please join me in offering our prayers and condolences to his surviving family members: his wife of 40 years, Mrs. Nancy Temple, their son, Peter, and daughter, Meredyth.

Following his 1975 graduation from the Virginia Military Institute, with a bachelor's degree in Civil Engineering, MG(R) Temple commissioned as an Engineer Officer. During his 37 years of service, MG(R) Temple led a diverse and demanding career across numerous assignments. He started as a Platoon Leader in the 44th Engineer Battalion, then while assigned to the 548th Engineer Battalion, as Executive Officer, S-3 (Air), and a Company Commander. It was during this period that MG(R) Temple deployed to Saudi Arabia in support of Operations Desert Shield and Desert Storm. He was later selected to be the 307th Engineer Battalion Commander, then the Chief of Engineering Branch at NATO Headquarters in Izmir, Turkey, the 20th Engineer Brigade Commander, and G-3, XVIII Airborne Corps – to list on a few. Along the way, he earned his master's degree in Civil Engineering from Texas A&M University.

In August 2001, MG(R) Temple assumed command of the Transatlantic Programs Center in Winchester, Virginia. The following year, in November 2002, he became the Commanding General of the North Atlantic Division in Brooklyn, New York, with duty as Theater Engineer, C-7, Combined Joint Task Force-7, in support of Operation Iraqi Freedom.

As many of you know, MG(R) Temple's service to the USACE Headquarters is nothing short of remarkable! Beginning in 2005, MG(R) Temple served as the Director of Military Programs, moving next to be the Deputy Commanding General for Civil Works and Emergency Operations, then as Deputy Chief of Engineers and Deputy Commanding General, USACE – where he simultaneously served as the longest-serving Acting Commander in USACE history from June 2011 to May 2012. In this role he provided his hallmark outstanding leadership to the Corps and the Regiments between LTG Van Antwerp's retirement and LTG Bostick's assumption of command. Although he earned his nickname "Bone Crusher" during his Airborne days he used to say he really earned the title during his acting Chief/USACE Commander days.

On September 1st, 2012, MG(R) Temple retired from the U.S. Army yet remained an active and esteemed steward of the Engineering profession. MG(R) Temple provided expertise to industry as a consultant and worked with the Society of American Military Engineers to promote mathematical achievement among school-aged students. In 2013, the American Society of Civil Engineers awarded MG(R) Temple the Outstanding Projects and Leaders Lifetime Achievement Award for Government.

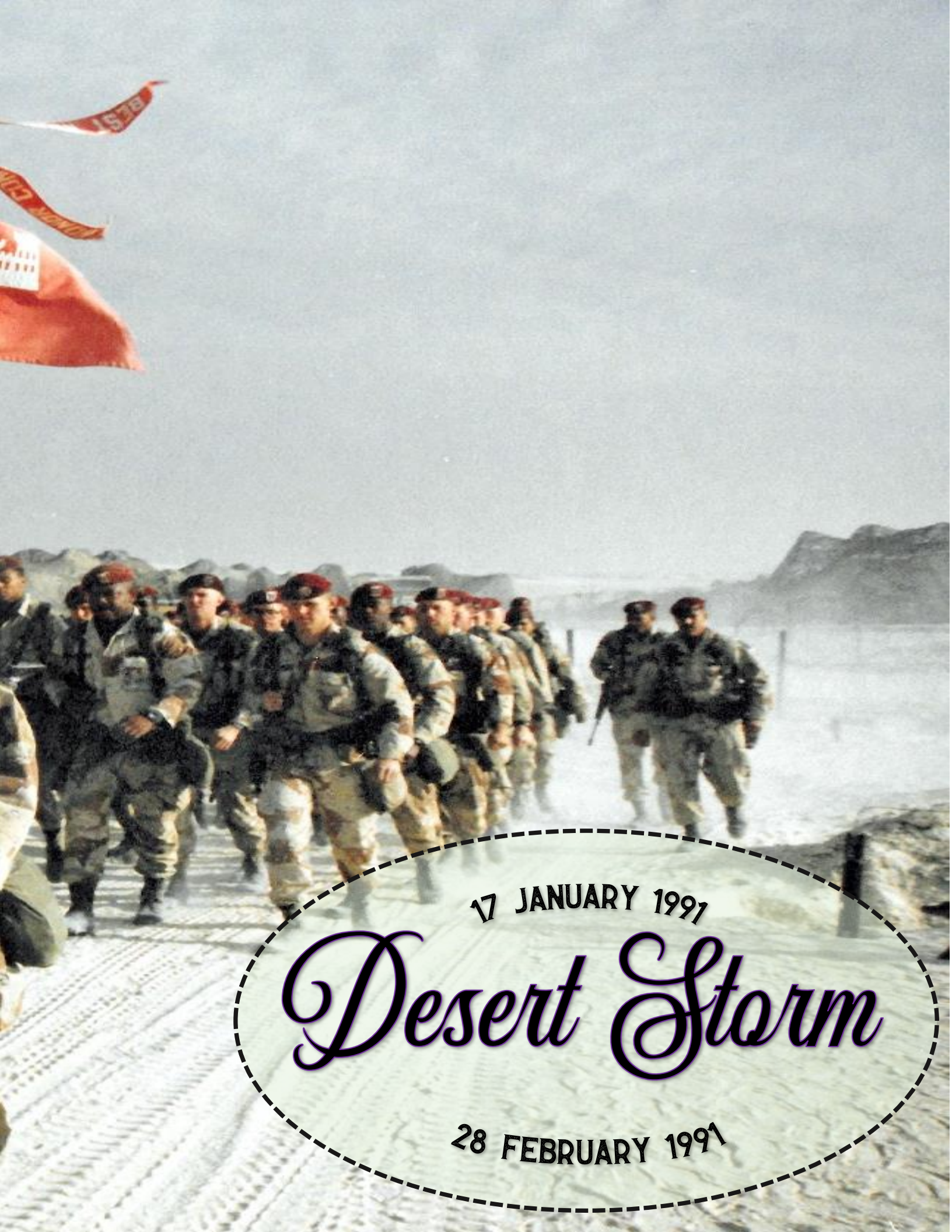
"Bo" was a gifted leader whose legacy lives on in every future engineer in the Army Regiment and the Corps. We all stand on the shoulders of this giant – a true patriot by any definition. Please join me in honoring the life and accomplishments of Major General(R) Merdith Wyndham Bolling "Bo" Temple, an Engineer Soldier, Combat Veteran, inspiring leader, devoted husband, and loving father.

VR

LTG Scott A. Spellmon  
55<sup>th</sup> Chief of Engineers  
Commanding General, USACE  
ARMY STRONG... BUILDING STRONG!!







17 JANUARY 1991

# *Desert Storm*

28 FEBRUARY 1991

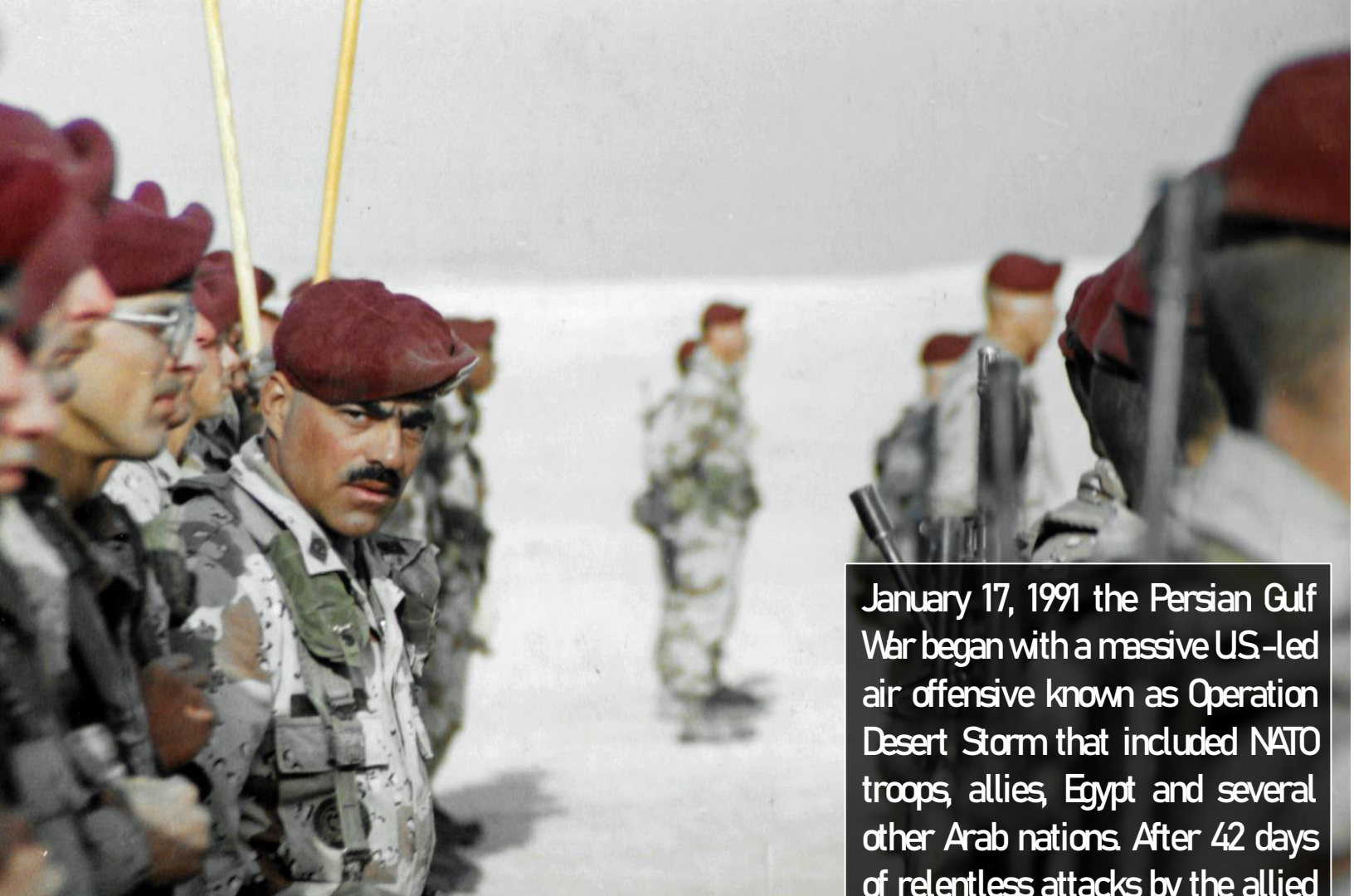


## *Desert Storm 30th Anniversary Photo Essay*

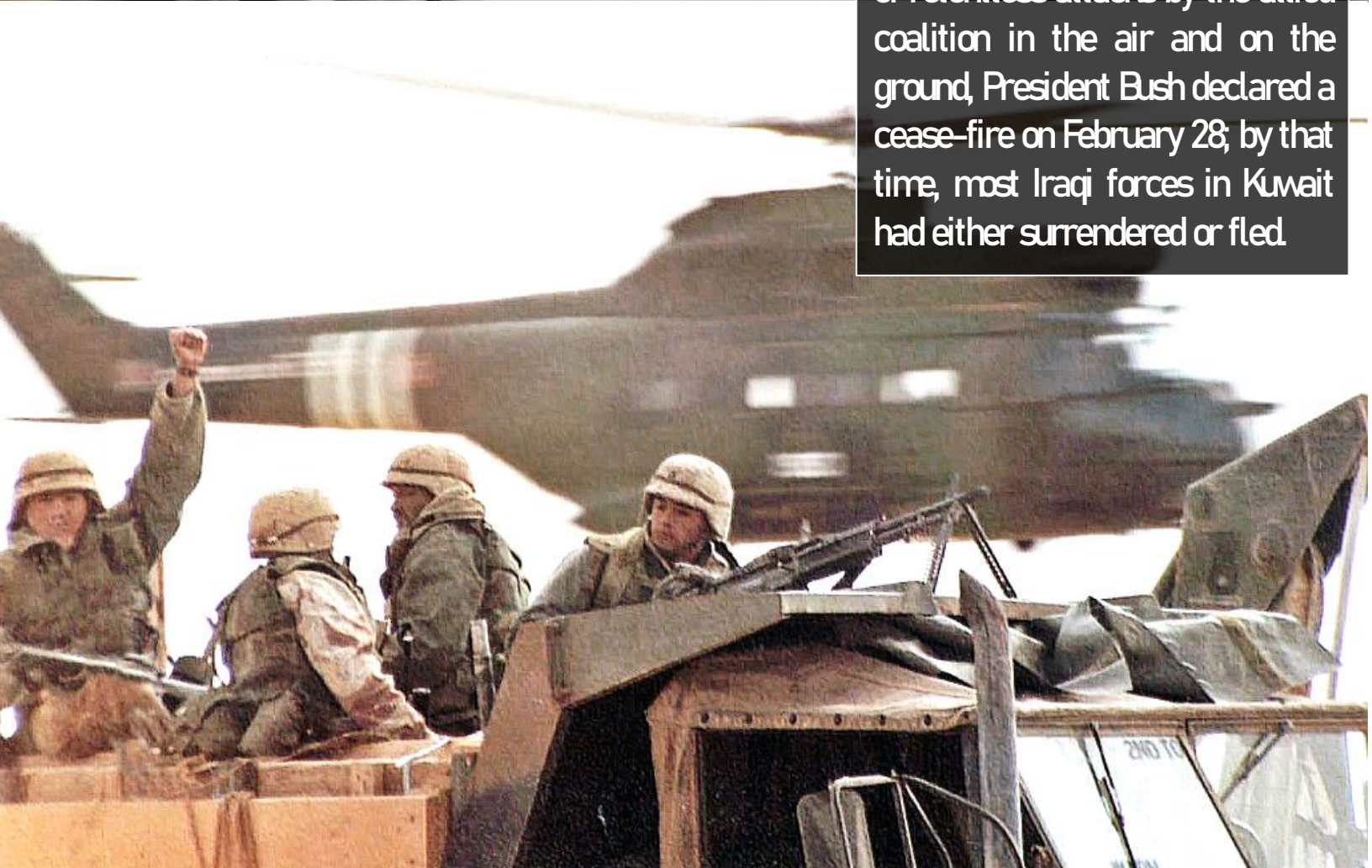
BY KIRBY LEE VAUGHN

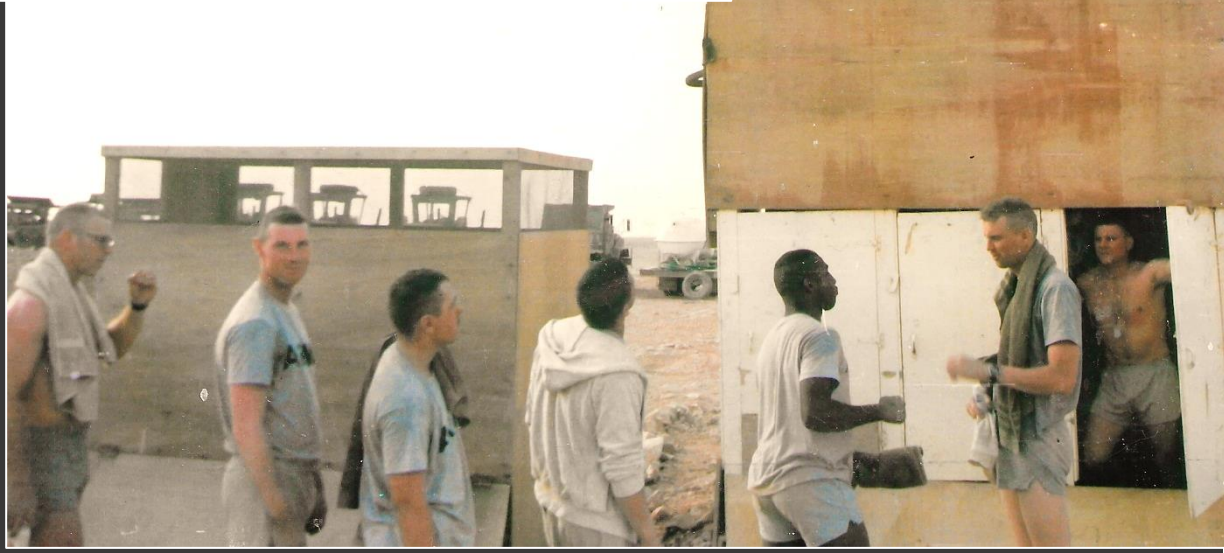
I was a 12BRAVO20 Airborne Engineer. I started photographing my military service right out of OSJ. Germany in the summer of 1985 was paradise after winter basic in Missouri. And I saw the countryside from up high behind a 5-ton dump truck with heavy tool trailer and troops in the bed...Then Fort Dix. Then Korea. Airborne School. Fort Bragg. Honduras. Saudi Arabia. Iraq. By Desert Shield/Storm I was an experience photographer in my own right. The week after the Iraqi invasion I approached my chain of command with the ideal of me photographing our deployment for posterity. I would shoot dozens of rolls of film over the next six months sending it back to a mail order lab in NYC for processing with a stateside return address for safe keeping. I would not see a single print until home on leave after the war. And I have been hauling around a footlocker full of prints and negatives from all my military service. The Desert Storm images I've attach represent my best shots from that deployment.





January 17, 1991 the Persian Gulf War began with a massive US-led air offensive known as Operation Desert Storm that included NATO troops, allies, Egypt and several other Arab nations. After 42 days of relentless attacks by the allied coalition in the air and on the ground, President Bush declared a cease-fire on February 28; by that time, most Iraqi forces in Kuwait had either surrendered or fled.







# MAKE THE EARTH FLAT!

## THE GEOSPATIAL ENGINEER OFFICER DEVELOPMENTAL PROGRAM BY 1LT MATTHEW HAIN

The Engineer Regiment is an extraordinarily diverse professional organization comprised of a wide array of specialists responsible for executing a broad mission set. To effectively lead within such an organization, in which no two assignments are necessarily alike, engineer officers are encouraged to develop a strong generalist skillset founded on three interdependent disciplines. FM 3-34 *Engineer Operations* identifies these three disciplines: combat engineering, general engineering, and geospatial engineering; while emphasizing their mutually reinforcing nature and the importance of developing a solid foundational skillset in each.

The Geospatial Engineer Officer Developmental Program (GEO-DP) is an initiative within the Engineer Regiment providing company-grade officers the opportunity to serve with geospatial units prior to attending the Engineer Captains Career Course in order to build foundational geospatial skills early in their career. Officers at this stage in their career typically have limited contact with Army geospatial assets operating at the Brigade and above and few opportunities to serve in geospatial positions typically held by field-grade officers at those same echelons.

As a result, these officers complete company command and assume staff positions as senior Captains and Majors with an underdeveloped understanding of the geospatial assets available to them and how geospatial engineering supports the engineer mission set and the warfighting functions the staff must execute. By engaging officers early on, the program seeks to bridge this gap between the limited geospatial instruction delivered during the Engineer Basic Officer Leader Course and later field-

grade geospatial positions, while laying the foundation for their improved performance in staff positions in the interim.

The program targets First Lieutenants who have served as platoon leaders and assigns them to geospatial units at the operational and strategic level. Lieutenants assigned to operational geospatial units may be stationed within or outside the continental United States and serve with the Geospatial Planning Cells (GPCs) responsible for providing geospatial support to one of seven Army Service Component Commands. Lieutenants receiving strategic level assignments serve at duty stations within the continental United States, either with the National Geospatial-Intelligence Agency (NGA) or Training and Doctrine Command (TRADOC) as part of TRADOC Proponent Office – Geospatial.

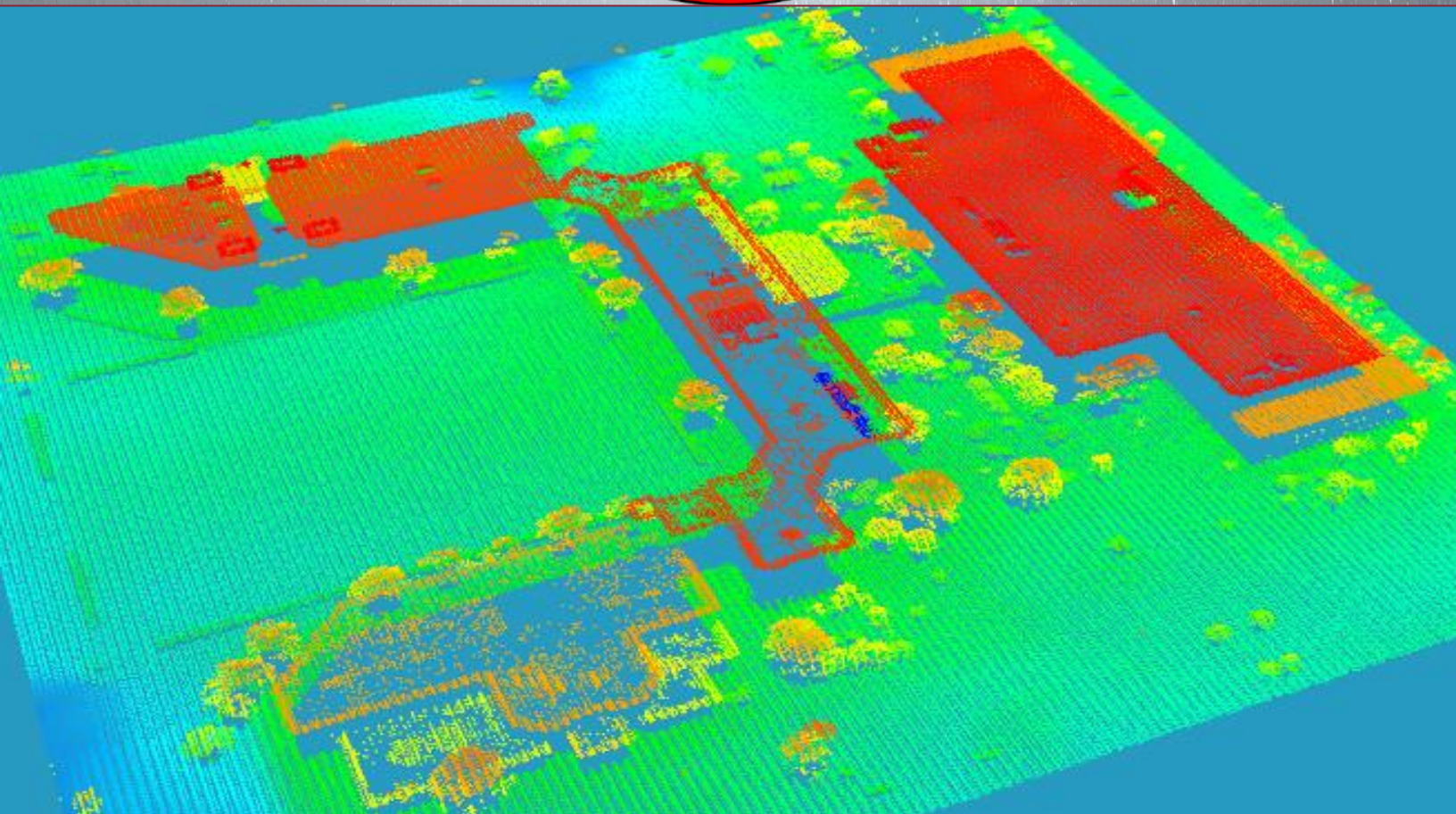
Assignment to a GPC provides GEO-DP officers with firsthand experience executing the Geospatial Engineering Functions; generate, manage, analyze, and disseminate; that guide the creation and distribution of geospatial data, products, and services. GEO-DP officers provide direct assistance to units and staffs requesting geospatial engineering support in order to plan and execute joint and international training exercises, joint and coalition military operations, and defense support to civil authorities within the United States.

Assignment to NGA or TRADOC Proponent Geospatial provides GEO-DP officers with direct insight into the organizations and processes driving the Army Geospatial Enterprise (AGE) and the National System for Geospatial Intelligence. Officers in these positions gain an in-depth look at the full spectrum of geospatial assets and capabilities

Geospatial Products and Services are critical to engineers executing all engineer missions both combat and general. Strong geospatial skills allow engineer officers to effectively manage their formations in both space and time placing assets where they are needed at the right time. Source: ATP 3-34.80 Geospatial Engineering February 2017.

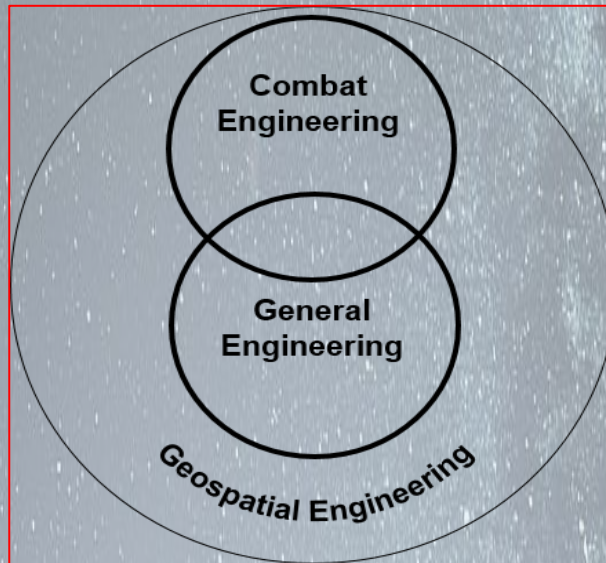


First Return Lidar Point Cloud of the Maneuver Support Center of Excellence displayed using ENVI's image analysis software created for use in 3D Geospatial data integration studies. Source: TRADOC Proponent Office – Geospatial.



*Three interdependent disciplines underpin the Engineer Regiment. Source: FM 3-34 Engineer Operations April 2014.*

commercial, government, and foreign partners that provide the data and tools necessary to continuously update and improve them. GEO-DP officers assigned to these organizations facilitate working groups and professional forums that serve to bring together internal and external patterns tasked with developing future geospatial capabilities and solving current problems hindering integration and collaboration within the AGE.



Regardless of assignment, all officers leave the Geospatial Engineer Officer Developmental Program with a sound understanding of the Army Geospatial Enterprise. In the near-term they attend the Captains Career Course able to leverage geospatial information during their staff exercises and share this knowledge with their peers. As company commanders they are

They contribute to professional research and forums dedicated towards the AGE and Army doctrine and also provide assistance to the GPCs and support for select combatant-command level exercises. Past participants in the program have had the opportunity to:

- **Lead forward geographic information service (GIS) teams supporting coalition military operations in the Middle East.**
- **Provide geospatial support to the units and staffs executing joint, international training exercises in Europe and the Pacific.**
- **Build high-quality geospatial products now available for order from national geospatial databases.**
- **Assist in the integration of new technologies, tools, and methodologies including the use of bathymetric Lidar to improve understanding of coastal regions in the Pacific and generation of vector maps detailing an entire operational theater.**
- **Contribute to the common operating pictures used to help local, state, and federal agencies forecast and track the progress of natural disasters within the United States including wildfires, hurricanes, and the COVID-19 pandemic.**
- **Contribute to the integration of 3D data into the AGE by coordinating demonstrative aerial 3D drone captures and materiel requirements studies.**

better equipped to use geospatial products produced by their higher echelons to improve their own situational awareness and that of their subordinates while continuing to share this knowledge with both peer and subordinate leaders; strengthening the Engineer Officer Corps as a whole. Later, as they assume staff positions as senior Captains and Majors they do so possessing a firm understanding of the geospatial assets available to them and how to integrate them into their staff's common operating picture to provide the best geospatial support possible to each of the warfighting functions. Equipped with this knowledge, they provide their Commanders with a clear picture of the battlefield as it evolves in space and time while highlighting the opportunities and limitations the terrain provides their forces. Beyond this, GEO-DPs' experiences with the program, time on staff, and assignments with combat engineering and general engineering units combine to form the balanced engineer officers necessary to command battalions and excel through the end of their military careers.

1LT Matthew Hain is currently assigned to TRADOC Proponent Office – Geospatial at Fort Leonard Wood, MO. He previously served as a platoon leader and executive officer with the 911<sup>th</sup> Technical Rescue Engineer Company at Fort Belvoir, VA. He is a graduate of the Engineer Basic Officer Leader Course, Air Assault School and Pathfinder School. He graduated from Virginia Tech with a bachelor's in aerospace engineering and Commissioned out of ROTC in 2017.

*Gold de Fleury medal recipients MG Trent Kelly (MSARNG)  
Becomes Highest-Ranking Military Member in Congress*



## MG Trent Kelly

**M**G Trent Kelly (MSARNG) becomes highest-ranking military member of Congress and is designated as the assistant adjutant general of the Mississippi National Guard. MG Kelly is an engineer and combat veteran who served in the 1991 Persian Gulf War and deployed to Iraq in 2005 as operations officer for the 150<sup>th</sup> Engineer Battalion. He returned to Iraq again in 2009 as battalion commander for Task Force Knight, 155<sup>th</sup> Brigade Combat Team. His awards include two Bronze Stars and the Combat Action Badge. We are honored to have him as a Gold de Fleury recipient in 2018.

BG Trent Kelly began his military career in 1985 at the age of 19 when he enlisted in the Mississippi Army National Guard. After completion of Basic Combat Training, he was assigned to the 134<sup>th</sup> Engineer Company in Union, Mississippi. BG Kelly was sworn in as a cadet in the Reserve Officer Training Corps at the University of Mississippi and commissioned on May 14, 1988. BG Kelly is a career engineer who has served in various positions of increasing responsibility to include command at the company, battalion, and brigade levels. He has filled various key staff positions in the Mississippi National Guard and is currently serving as the Director of the Joint Staff at the Joint Force Headquarters.

Throughout his service to our nation, which included two deployments to Iraq, BG Kelly has continuously proved his commitment to bettering the units and nation he serves. In 1990, he mobilized for Desert Storm as an Engineer Second Lieutenant. Aforementioned, in 2005, he deployed as a Major to Iraq with the 155<sup>th</sup> Brigade as the Operations Officer of the 150<sup>th</sup> Engineer Battalion. From 2009 to 2010, he deployed to Iraq as the Battalion Commander of Task Force Knight of the 155<sup>th</sup> Brigade Combat Team. In 2012, then Colonel Kelly took command of the 168<sup>th</sup> Engineer Brigade headquartered in Vicksburg, Mississippi. BG Kelly graduated from the Engineer Officers Basic Course at Fort Belvoir, VA in 1989. He completed the Armor Advanced Course at Fort Knox, Kentucky in 1992 and the Command and General Staff College course at Fort Leavenworth, KS in 2004. In 2010, BG Kelly earned a master's degree in Strategic Studies from the United States Army War College in Carlisle, PA.

In 2015, BG Kelly was elected as the Congressional representative of the 1<sup>st</sup> District in Mississippi and served in 114<sup>th</sup> Congress. In the 115<sup>th</sup> Congress, he serves on the House Armed Services Committee, The House Agriculture Committee, and the House Small Business Committee. He has been married to wife Sheila for 27 years and they have 3 children and just won reelection this year.

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# Amy Geospatial Support in a Time of Crisis

1LT TORY ZOLLINGER

## 2020 HAS BEEN A YEAR FOR THE HISTORY BOOKS.

Not only have we lived through one of the most devastating viral pandemics in over a century, we have also endured a record-setting Atlantic hurricane season and extremely large and destructive wildfires in the Western United States. Through these events, the U.S. Army has been called upon to support federal, state, and local agencies engaged in relief and rescue operations.

Most Army operations occur outside the borders of the United States, but one Army Service Component Command's mission focuses on North America: United States Army North (ARNORTH). Assigned to ARNORTH, the Engineers of the 543<sup>rd</sup> Geospatial Planning Cell (GPC), provide support to the command and staff with geospatial information and products to synchronize and coordinate DoD support to federal, state, and local agencies during national disasters, also known as Defense Support of Civil Authorities (DSCA). Throughout 2020, ARNORTH has continuously worked within this joint and interagency environment through each of these disasters, and the 543<sup>rd</sup> has provided decision makers at every level with the geospatial information required to support DSCA operations during this unprecedented time.

When the COVID-19 pandemic began to take shape, there was no playbook for how to defeat this invisible enemy. The Engineer Regiment and Corps of Engineers stepped in to build Alternate Care Facilities (ACFs) in the hardest hit areas, providing much needed bed space for both COVID-19 and non-COVID patients. As the situation developed, leaders needed

to visualize the "COVID key terrain" and how and where could we anticipate the local healthcare capacity to be overwhelmed. The 543<sup>rd</sup> GPC was able to utilize COVID-19 modeling from universities, national laboratories, non-profit organizations, and DoD Analysis to show the projected spread at the county level, not just with raw numbers but normalizing the numbers to the population. We presented this information through various mediums to maximize distribution. For general information and awareness, we utilized extensively the Army Geospatial Enterprise web portal operated by USACE and the Army Geospatial Center, where anyone with a DoD CAC could log in to view our web maps depicting this information, updated in real time.

We also sent out daily static products to various organizations, including the ARNORTH Staff, USACE, DoD, and FEMA task forces to assist in the geospatial synchronization of the whole-of-government response to the pandemic. In all, the Soldiers of the 543<sup>rd</sup> created over 360 individual COVID products from February to September. These efforts played a small part in synchronizing the military and civilian decision makers, allowing them to allocate limited resources where they were most needed during the initial stages of the COVID-19 crisis.

In the midst of the COVID-19 pandemic, the 2020 Atlantic hurricane season was the most active on record, with 30 named storms. Of these, 12 made landfall in the contiguous U.S., breaking the record of nine set in 1916. While continuing to support the COVID-19 response, the 543<sup>rd</sup> created approximately 167 hurricane products for the

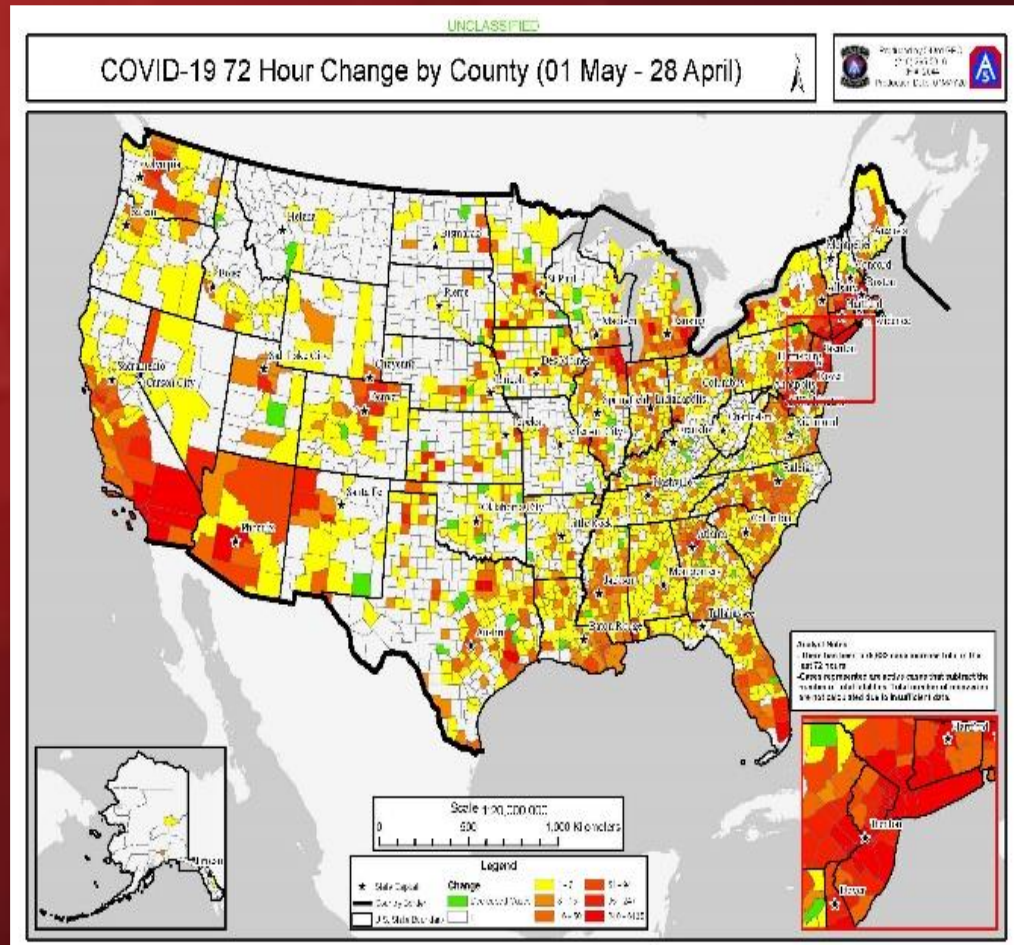
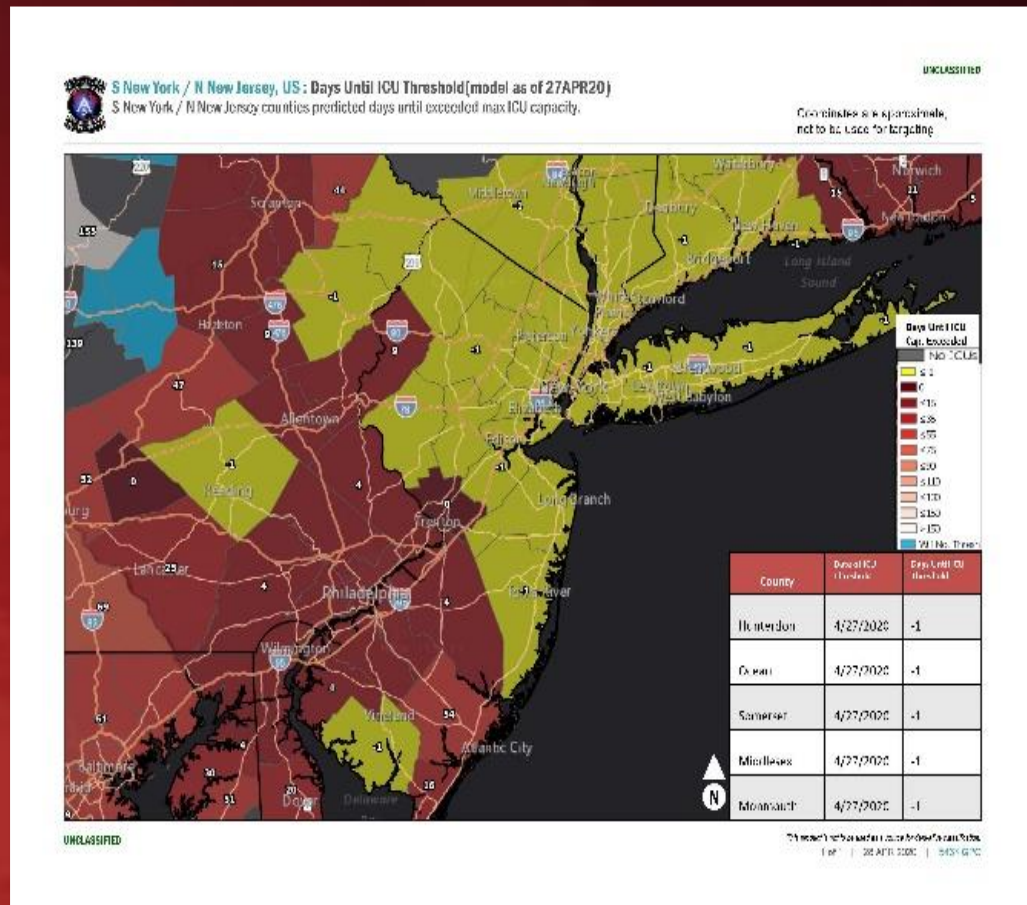
*Photo Left: SPC Bixby assists SPC Beeson with flood modeling and data extraction during hurricane operations. Photo right: PFC Palma works on feature extraction during training at the 543<sup>rd</sup> GPC. Photos by SSG Jeremy Franklin.*

ARNORTH command and staff for potential DSCA operations post-landfall. Much of these efforts focused on predicting the extent and degree of damage to local communities and infrastructure through storm surge and flood modeling. The Soldiers utilized models from the National Hurricane Center (NHC), the Pacific Northwest National Laboratory (PNNL), and USACE to provide the ARNORTH planners with models and projections of flooding.

These products enabled the staff to anticipate any civilian requests for DoD support or assistance, and plan accordingly. Post landfall, our efforts focused on damage assessments and route trafficability. Geospatial Engineers built these products through our partnership with the Civil Air Patrol (CAP), whose overflight missions provided near real-time images of the affected areas. We also consolidated and utilized trafficability data from the state and local transportation departments, providing the units on ground with the ability to make informed decisions as they attempted to reach and supply the hardest hit areas.

While the COVID-19 pandemic continued and hurricanes battered the coasts, wildfires were destroying homes and land in the American West. 2020 wildfires were some of the most destructive on record, and the Engineer Regiment played its part as many of these fires overwhelmed

Depiction of the increase in confirmed COVID-19 cases by county across the US over a 72-hour period from 28APR20 to 01MAY20. Modeling is utilized from the Center for Army Analysis to predict the number of days until the number of patients exceeded the ICU capacity in each county during the first peak of the pandemic on 27APR20. Many counties had already exceeded their ICU capacity.



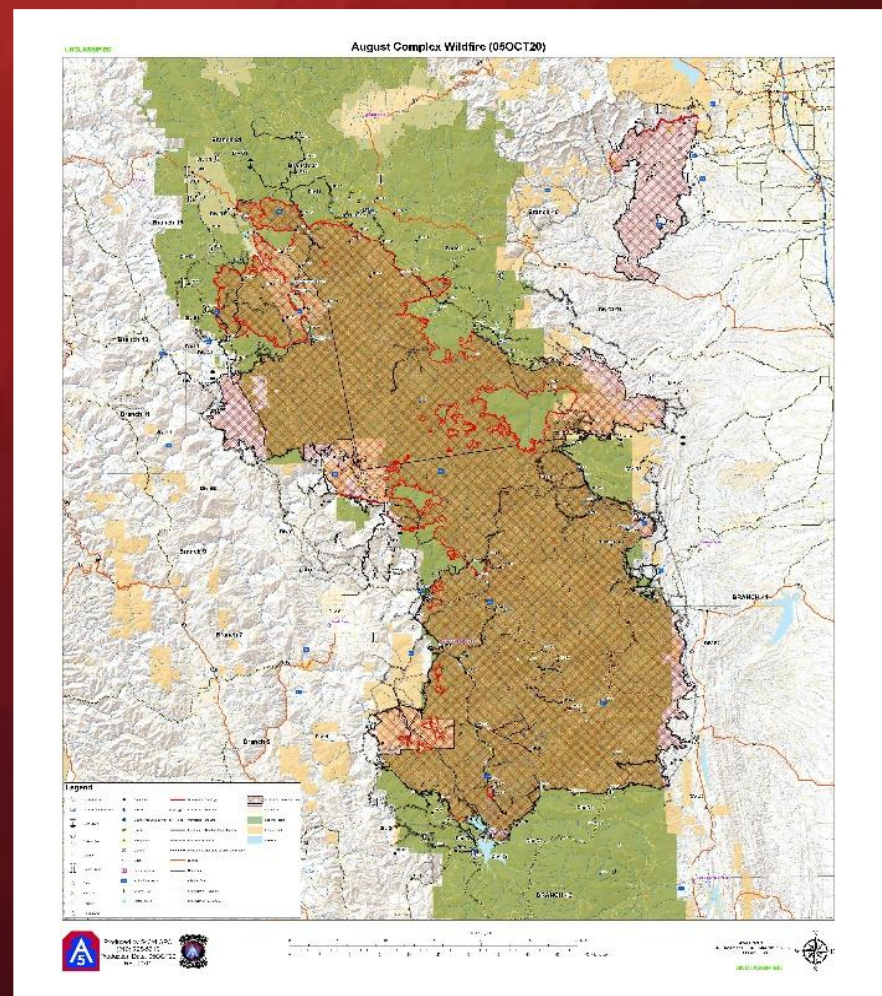
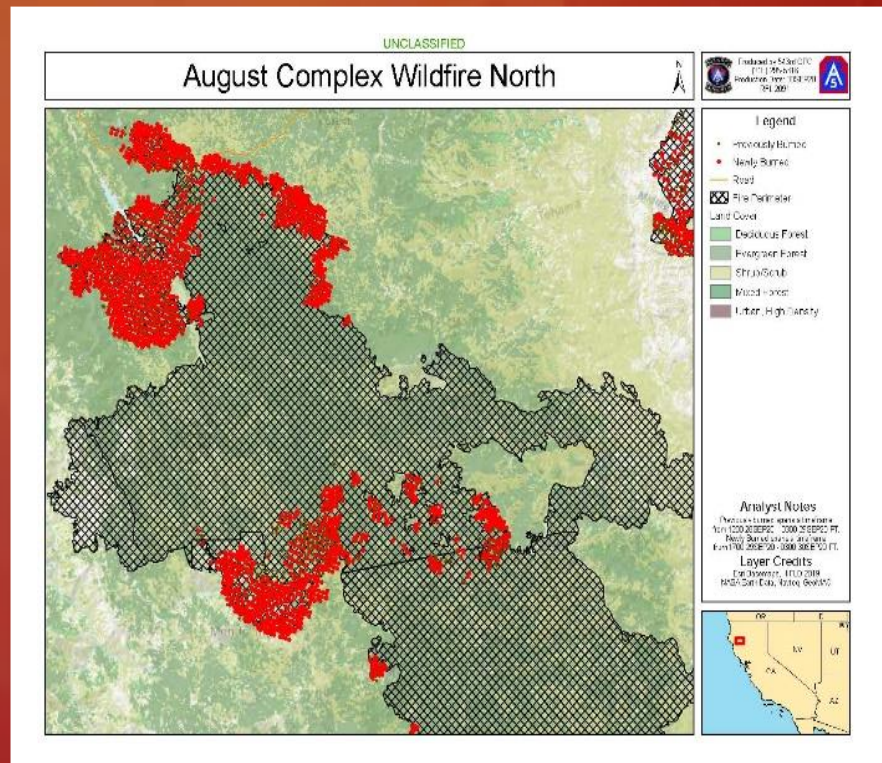
the civilian firefighters' impressive efforts to contain them. Over 200 Soldiers of the 14<sup>th</sup> Engineer Battalion deployed to California to help fight the August Complex Fire in August and September. The 543<sup>rd</sup> also deployed two Soldiers to the forward operations center in support of the National Interagency Fire Center (NIFC) and the California-based ARNORTH Defense Coordinating Element. These Soldiers worked to provide a common operating picture for the military and civilian officials on site, with up-to-date information on the locations and activities of military and civilian personnel as well as the extent of the fire. At Fort Sam Houston, the GPC provided reach-back support to our forward deployed personnel and situational awareness maps for the larger fires in the worst affected states. The Soldiers created these products utilizing data from NASA Visible Infrared Imaging Radiometer Suite (VIIRS) satellites, which can spot thermal activity from their orbits, allowing users to "see" through clouds and smoke to track the forward extent of the fire.

Collectively, the Soldiers created approximately 387 wildfire products, providing civilian and military organizations with a common map sheet, supporting their decision-making processes and ensuring that their limited resources are utilized in the most efficient manner possible.

2020 has been a challenging year for many of us. The COVID-19 pandemic coupled with a record-breaking Atlantic hurricane season and destructive wildfires left our first responders stretched thin. When needed, the Army has stepped in to fill those gaps. The Geospatial Engineers of the 543<sup>rd</sup> GPC have worked tirelessly to provide our leaders with the geospatial information to determine when and where to provide that assistance to our fellow Americans.

One of the daily products pushed to civilian and military personnel involved in the August Complex Wildfire in California in OCT2020. The product depicts the current extend of the wildfire, as well as base camps and unit locations.

This product utilized data from NASA VIIRS satellites to depict the current extend of the northern end of the August Complex Wildfire in near real time.

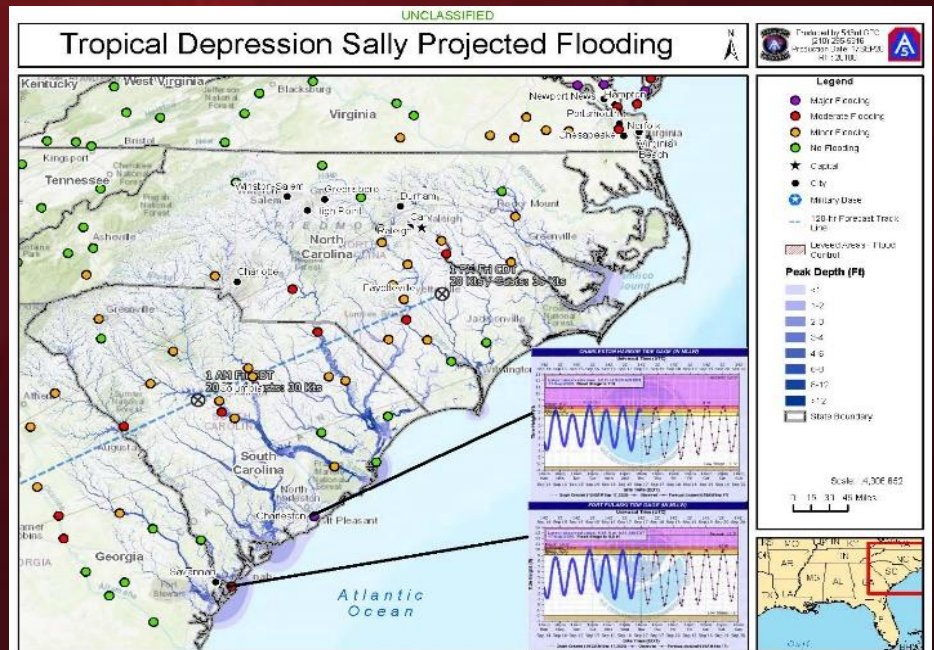
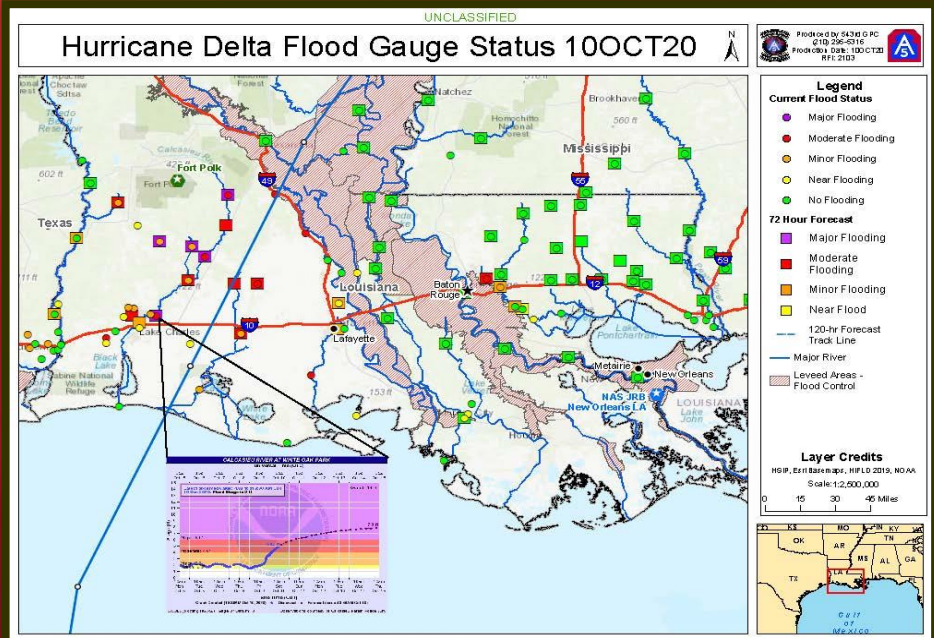
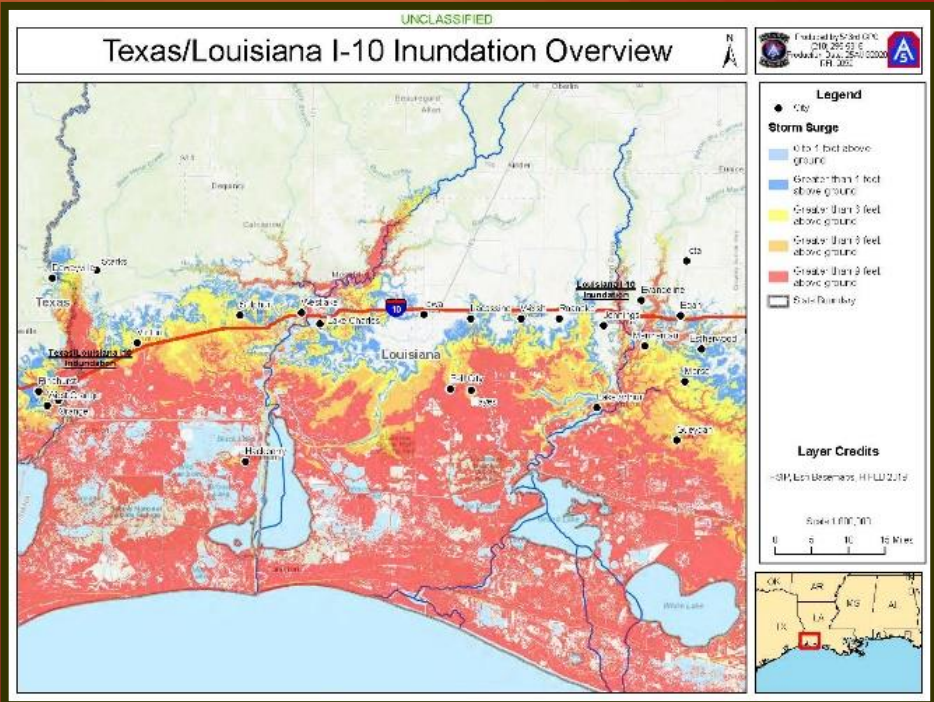




A Real-time flood gauge readings and future flood modeling from the Pacific Northwest National Laboratory (PNNL) to show current and predicted flood levels in the aftermath of Hurricane Delta in Louisiana, 10OCT20.

This product utilizes flood modeling from the National Hurricane Center and USACE to predict the incoming storm surge around the Interstate 10 corridor from Hurricane Lara, 25AUG20.

Flood modeling from PNNL and USACE to predict flooding from Tropical Depression Sally, 17SEP20. This storm made landfall in the Gulf Coast but caused flooding on its path through Georgia and the Carolinas as well.



1LT Tory Zollinger is the Executive Officer of the 543rd Engineer Detachment at Fort Sam Houston, TX. He is assigned to the detachment through the Regiment's Geospatial Engineer Officer Development Program. He has a BS from the United States Military Academy in Geospatial Information Sciences, and will attend then Engineer Captain's Career Course in July 2021.

# W2 GEOSPATIAL ENGINEER OFFICER ADDITIONAL SKILL IDENTIFIER EXPANSION

*CPT GEMINETTE PALENCIA*



**U**nderstanding the terrain is critical to the success of any ground combat operation. Engineers are masters of the terrain tasked with maintaining and delivering the core discipline of geospatial engineering. In previous years, W2 Geospatial Engineer Officers were only slotted in several positions across the Army. This specialized skill known as W2 Additional Skill Identifier (W2 ASI) were awarded to engineer officers with a bachelor's degree or higher in geospatial engineering or related field with a GEOINT Professional Certification – Fundamental (GPC-F) certificate. An

engineer officer with a W2 ASI serves as an advocate and a bridge between planners and commanders to the geospatial community. An asset capable of providing a common operational picture by leveraging geospatial resources and allowing commanders to assess and visualize where engineer assets can be best distributed in time and space while shaping the terrain as an advantage.

Shoot, move, and communicate. Three basic elements that requires a Soldier to effectively synchronize efforts in the battlefield. However, in order for commanders to execute a plan,



*Photo left: 1LT Hain from the TRADOC Proponent Office – Geospatial observes the eBee as it approaches final descent during data collection with the Army Geospatial Center on a trestle bridge in Fort Leonard Wood, MO. eBee is an autonomous (pre-programmed flight path) mapping drone capable of capturing high-resolution aerial photos. Above: MAJ Wolfe and SFC French from the TRADOC Proponent Office – Geospatial takes a closer look of the eBee before takeoff. Photos courtesy of USACE.*

they must first understand their operating environment. Combat and General engineering are common terms when it comes to engineer operations but not so much about geospatial engineering. In fact, according to FM 3-34, Engineer Operations, “Geospatial engineering discipline is the foundation that supports the combat and general engineering disciplines, and the lines of engineer supports”, yet not many know about the capabilities of geospatial engineering. A W2 identified officer will fill the capability knowledge gap as an advocate to support combat and general engineer operations and within the warfighting functions.

Geospatial Engineering is more than just maps. It is important for engineer officers to understand the different types of geospatial data and software capabilities in order to provide commanders recommendations on how to best employ the capability in training and operational environments. It is imperative to drift away from the idea of requesting for a specific product and shift towards providing the criteria needed to support the mission when it comes to geospatial resources. This will allow 12Y Geospatial Engineers and 125D Geospatial Engineering Technicians to produce a product tailored to support the mission. Having the proper geospatial resources early on in planning will greatly benefit staff and commanders when preparing for a mission. For example, a geospatial engineer can provide hydrological assessment, soil analysis, crossing site analysis, and

cover and concealment to name a few capabilities to prepare for a gap crossing mission or exercise.

Geospatial Engineering is a technical field that is constantly evolving in personnel, training, and equipment. In the previous years, obtaining a W2 Geospatial Engineer Officer Additional Skill Identifier was exclusive to those with a bachelor’s degree or higher in geospatial engineering and related field. Officers with this skill identifier as described in Smartbook DA Pam 611-21 is as follows; “Officers serving in any geospatial engineering capacity or officers whose duties include managing Geospatial Information & Services (GI&S), Geographic Information Systems (GIS), and related operational or generating force assignments where geospatial data is Generated, Managed, Analyzed, and/or Disseminated (GMAD).” Leaders recognized the need to expand such technical skill and knowledge across the Army. The expansion is part of a broader campaign to ensure geospatial capabilities are known, understood, and delivered to commanders. The new qualifications allow engineer officers to attain W2 ASI through academia or military education and training with the opportunity to serve in positions at the Tactical, Operational and Strategic level.

*CPT Geminette Palencia serves as a Geospatial Development Officer at TRADOC Proponent Office – Geospatial (TPO-Geospatial).*



# Maintaining Readiness DURING A GLOBAL PANDEMIC

By 1LT Jacob Johnston  
Photos Courtesy of USACE



*SPC Ciza testing his confidence by executing a Hollywood Rappel.*



**T**he United States Army was established June 14, 1775, gaining its roots from the Continental Army of the Revolutionary War. Over the years, as the nation changed, so too did the Army. Despite the constant changes, the Army is obligated to maintain readiness in support of the defense of the nation. Soldiers conduct physical readiness training, maintenance, and MOS-related training to support the Army's readiness standards. As COVID-19 began to affect the health of the U.S., it also began to affect the ability of Soldiers to maintain personnel, equipment, and training readiness. Despite these challenges, the 618<sup>th</sup> ESC (A) continues to maintain worldwide deployability by adapting to the situation and getting creative.

The 618<sup>th</sup> Engineer Support Company (Airborne), known as "*The Nasty*", was activated in 1943 to conduct construction operations. Today, as part of the 27<sup>th</sup> Engineer Battalion (Airborne), it maintains the unique capability to drop light engineer equipment onto damaged airfields in order to conduct Airfield Damage Repair (ADR). Due to the unit's strategic location at Fort Bragg, NC, 618<sup>th</sup> remains part of the Immediate Response Force (IRF) mission and must be ready to deploy within 96-hours of notification. As with many units, physical fitness of its Soldiers is crucial to maintain that readiness and capability.

Physically fit Soldiers are critical to the unit's success on the battlefield. Engineers and maintainers work side-by-side in *the Nasty* lifting heavy equipment and working extended hours when the mission requires. Fort Bragg instituted Minimum Mission Essential Manning

(MMEM) lasting from the beginning of March through the end of June closing almost all services on the installation, to include fitness centers, and prohibiting Soldiers from conducting PRT in groups. In this challenging environment, leaders needed to be engaged with their Soldiers in developing challenging PRT programs utilizing the resources they had available. The battalion is fortunate to have an organic Holistic Health and Fitness (H2F) team consisting of a dietician, athletic trainer, two strength coaches, a physical therapist, and an occupational therapist all organized to assist in the physical well-being of the organization. The H2F team has taught the company's leaders how to build a PRT program using Army-issued equipment. H2F also designed and instituted workouts through an active social media presence with videos and resources for Soldiers to reference.

The H2F team sought out volunteers to test multiple fitness apps seeking feedback from Soldiers across the company. *Nasty Soldiers* enthusiastically tested the applications using mostly body-weight exercises, loaded rucksacks, and their individual body armor. Soldiers of varying fitness levels participated in the testing providing the H2F team a balanced snapshot of the company fitness needs. Based on the feedback the H2F team selected the Bridge Athletic application that is now available to every Soldier in the Battalion. The application allows Soldiers to customize individual plans and track their progress. The application also allows leaders to measure and track various fitness metrics of their Soldiers proving exceptionally useful during times of quarantine and non-formational PT. Soldiers



CPL Beauchamp repairing a leak on a 1094 Dump truck to transport dirt at Sicily Drop Zone.

can also provide feedback to the coaches in order to improve the plan and maximize its effectiveness.

As an Engineer Support Company (ESC) with over 100 pieces of rolling stock, maintenance, and equipment readiness is just as crucial. This means that *the Nasty* must work tirelessly to keep its fleet ready and operational even through a pandemic. Typically, the company would conduct its maintenance focus with all personnel on hand every Monday, with further maintenance operations occurring throughout the week. With new restrictions, the company has altered its maintenance plan to achieve maximum weekly output with modified work schedules. With a decrease in operations and training events throughout Fort Bragg during the MMEM periods, *the Nasty* dedicated small teams of seven maintainers to work six-hour shifts Monday through Friday.

The 618<sup>th</sup> narrowed their focus from the normal tactical airborne battle rhythm to a more maintenance focused mission set, ensuring that pacing items maintained their operational readiness in order to respond to an IRF deployment. The teams also conducted services in order to keep the vehicles properly maintained. 12Ns worked alongside the mechanics to ensure everyone understood the repairs conducted and the status of their equipment. All these efforts supported the equipment readiness of the company.

In support of readiness, the company must also maintain airborne skills proficiency. Conducting heavy equipment drops from aircraft is part of this unique capability. Prior to rigging, the vehicle needs to undergo thorough maintenance and inspection to ensure there are no leaks of any kind and no other significant issues that could lead to damage to the aircraft or parachute malfunctions. The company recently provided an M1094 dump truck for an airborne operation. Once cleared, the dump is connected to a metal platform reinforced by cardboard honeycomb, which is meant to absorb a majority of the shock of the impact with the ground.

The platform itself is made with grooves to slide the dump directly from the rigging facility, into the aircraft, and out the door into the sky. Unique to the 27<sup>th</sup> Engineer Battalion is conducting a combination jump “aft-end chase” operation, in which paratroopers exit the ramp of the aircraft directly following heavy equipment deployment out of the aircraft. The ability to follow the equipment saves time on the drop

zone as paratroopers do not wait for the aircraft to make another pass, or “racetrack”. As soon as the paratroopers are on the ground, they begin conducting de-rigging procedures on the Heavy Equipment (HE) in order to prepare it for operation. Due to the shock of the landing, occasionally equipment does not start.

Fortunately, *the Nasty* was successful and drove themselves off the drop zone instead. Teams train on de-rigging every time we drop any HE and the operations also reinforce the importance of proper maintenance. Despite the inherent risk to equipment, participating in heavy drops aids in the advancement of both the Army and Air Force’s airdrop capabilities. Maintaining proficiency in this skillset supports the company’s readiness to deploy in any capacity and at any time.

During Fort Bragg’s MMEM status, *Nasty Soldiers* assisted maintainers and supply clerks in accomplishing company designated missions on a weekly basis, all while

*Nasty Soldiers installing the ERACC System onto a 120M Grader in preparation for the Sicily Drop Zone reconstruction project. Photo right: SPC Brown, SPC Broecker, SPC Williamson, and SPC Rosas getting after a PT session while following COVID mitigation measures.*





maintaining proper COVID-19 safety measures. Without the ability to conduct ranges and run collective training events, units have been forced to seek out innovative ways to engage Soldiers and maintain Mission Essential Task (MET) proficiency.

To keep the Soldiers engaged and focused, *the Nasty* implemented a combination of digital Leader's Time Training, completion of Army correspondence courses, as well as executing various annual training requirements. Among these courses were FEMA, USACE, and JEOC online certifications in support of Defense Support to Civil Authorities (DSCA) operations that may arise. Squad leaders developed digital training plans focusing on individual and collective-level tasks, including Airfield Damage Repair (ADR), vehicle familiarization, and constructing survivability positions.

Squad leaders utilized a variety of digital media platforms to conduct video

conference calls. Soldiers were also assigned reading in preparation for discussion-based classes. They focused the majority of their training towards scenarios Soldiers could encounter during an IRF mission. The array of topics that taught were enhanced basic soldier skills. In turn, this creates a well-rounded company with a strong foundation in doctrine.

This form of dispersed training not only gave Soldiers more control over their daily agenda but also the opportunity to conduct independent research and focus on a different set of leadership and team building skills not frequently used. These skills include public speaking, cross communication (acknowledgment of need for assistance), open sharing of ideas and information, plan development, and group coordination.

By the time Fort Bragg re-opened, the Soldiers completed 300 hours of correspondence training (Army sponsored developmental courses, often worth promotion points) and even college courses.

By the time Fort Bragg re-opened, the Soldiers completed 300 hours of correspondence training (Army sponsored developmental courses, often worth promotion points) and even college courses.

In this generation of endless technology and innovation, the *Nasty* has devised interactive ways to continue to develop their soldier's fitness, maintain equipment, and continue to conduct training. Through the use of applications and conferencing, Soldiers have remained engaged with each other and their mission.

*The Nasty* effectively created and executed a battle rhythm that allowed them to accomplish maintenance goals, training plans, and physical training while following all Health Protection guidelines. However, detrimental the global pandemic, the Soldiers of the 618<sup>th</sup> ESC (A) continued to stand as stewards of the profession and maintain readiness for when the nation calls.

1LT Jacob Johnston is stationed at Fort Bragg, NC and is part of the 27<sup>th</sup> Engineer Battalion (Airborne). He is currently the Platoon Leader for 3<sup>rd</sup> Platoon, 618<sup>th</sup> Engineer Support Company (Airborne).

# *Enabling Counter-Mobility Support in Future Near-Peer Conflicts*

BY 1LT JAY CARMODY

On January 31, 2020, the Trump administration issued a new policy concerning the use of anti-personnel (AP) land mines outside the Republic of Korea (ROK). The new policy allows for the use of anti-personnel non-persistent landmines across combatant commands at the discretion of the geographic combatant commander. This article focuses on the tactical implications of this policy shift as it relates to the Engineer Regiment's terrain shaping operations and does not address the geopolitical impacts of the use of AP mines. From a tactical perspective, this change in U.S. policy is a significant step towards enabling the Engineer Regiment to provide counter-mobility support to maneuver commanders in future near-peer conflicts.

Anti-personnel landmines were first introduced as an obstacle during the American Civil War, with Confederate forces emplacing "booby-traps" to slow down Union advances. Their effectiveness and expedience as an obstacle were quickly realized worldwide and by 1914, a variety of AP mines were in production and use by armies across the world throughout both World Wars. Since then, the use of AP land mines has diminished due in large part to a series of international treaties aimed at curbing the civilian death toll resulting from persistent mines.

The first international treaty to deal with land mines was the 1980 Convention on Certain Conventional Weapons which took place in Geneva, Switzerland. The most significant implication of this treaty,

coupled with its 1996 amendment, for the regiment today is the requirement that remote delivered minefields must be able to self-destruct or self-neutralize. In 1996, President Clinton published Policy Directive NSC-48, which further restricted the use of persistent AP mines with the intent of eliminating all stockpiles internationally by 1999 (excluding the Korean peninsula). With this policy in mind, the international community convened in Oslo and began drafting what would become the 1997 Ottawa Treaty, which bans the use, development, production, acquisition, and stockpiling of AP mines. Notable exceptions to the list of signatories are the United States, Iran, the Democratic People's Republic of Korea, Russia, and the People's Republic of China.

Over the past twenty years, the policies of the Obama and Bush administration have brought the U.S. into almost total compliance with the Ottawa Treaty. These policy decisions left the Engineer Regiment with only non-persistent AT mines as a tool for use in counter-mobility operations. The most recent development has allowed for non-persistent AP mines in all theaters "under exceptional circumstances". This change significantly improves the Engineer Regiment's ability to provide maneuver commanders with effective obstacles.

In order to take advantage of this new authority to employ AP mines, the Engineer Regiment must identify the current tools available to it. The Family of Scatterable Mines (FASCAM) system is



the current system for delivering non-persistent mines, consisting of the rotary wing mounted Air Volcano, the artillery based Remote Anti-Armor Mine System (RAAM), and the ground Volcano. Until the policy shift of the previous administration, the fixed wing launched GATOR, the Modular Pack Mine System (MOPM), and the artillery-based Area Denial Artillery Munition System (ADAM) were in use but have been banned in almost all uses as they contained non-persistent AP mines. After twenty years of stability operations in the Middle East, these systems have been neglected and were seldom used until the shift to countering a near-peer adversaries was prioritized across

the force. With the new policy, the Engineer Regiment must once again place a training emphasis on the use of these tools, to include the GATOR and ADAM in planning for defensive operations.

Using minefields as a terrain-shaping tool remains a critical component to the planning of defensive operations in a future near-peer engagement. LTG (Ret) Semonite highlighted the significant role of minefield obstacles in defensive operations during the 2018 AUSA conference, referring to a 1999 study which concluded that effectively emplacing land mines could reduce a division in the defense's requirement from three brigades to two. The regiment's current plan to remedy our

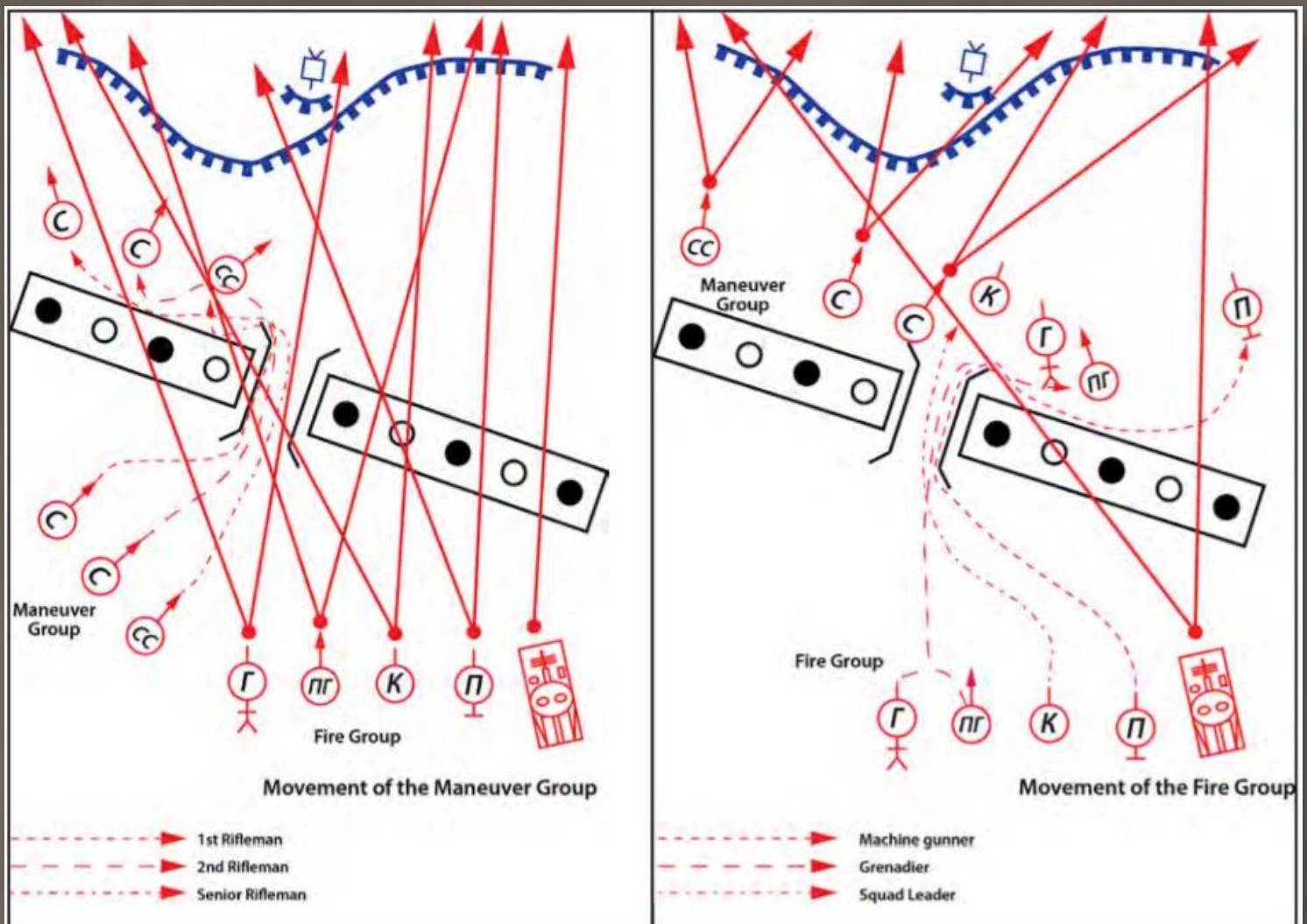


*Soldiers from 2<sup>nd</sup> Bn., 2<sup>nd</sup> Aviation Regiment, 2<sup>nd</sup> Combat Aviation Brigade, use a UH-60 Black Hawk helicopter to employ M-139 Air Volcano Mines. Photo courtesy of 2<sup>nd</sup> CAB, Defense Visual Information Distribution System, Yangpyeong, South Korea.*

mine-laying deficit includes the short-term rehabilitation of the Volcano systems and the use of the Spider munition system with Volcano canisters to create what is called the Standoff Activated Volcano Obstacle (SAVO), an 80m x 80m remote activated AT minefield. Long-term solutions include the next generation of “smart” AT mines with both top and bottom attack capabilities and a replacement for fixed-wing mine laying systems, which is the best option for so-called “deep defense”. These plans are praiseworthy for their ingenuity in solving terrain-shaping challenges within the confines of previous policy, but their lack of AP mines will hinder their effectiveness in a near-peer fight.

In order to maximize the effectiveness of this terrain-shaping tool, an AP/AT mix remains the best option.

Contemporary Russian squad offensive mechanized doctrine encourages motorized units to dismount when moving through a breach under fire. Interspersing AP mines into U.S. minefields would slow down a Russian breach force by forcing enemy sappers to proof the lane more thoroughly or risk losing significant dismounted follow-on forces. Additionally, reliance on surface laid mines already makes conventional near-peer breaching vehicles, such as the Chinese GCZ110 tank (similar to our Assault Breacher Vehicle) an effective option. By interspersing AP mines, enemy sappers will be disincentivized from dismounting in the breach, providing fewer and larger targets for our next generation top-attack AT mines, overwatch, and artillery.



Current near peers, such as China, continue to rely on a largely light infantry task organization. This coupled with the numerical advantage China would have in a future conflict, especially a future enemy breach operation, greatly reduces the practicality of all AT minefields as they would not have the desired effect on a predominantly dismounted force. The lack of an AP threat places manned overwatch positions in a precarious situation and increases their vulnerability to exploitation by dismounted enemy soldiers. AT exclusive minefields do not provide the same level of defensive protection as AP/AT mixed minefields. The engineer regiment should take advantage of the policy shift to reintegrate non-persistent AP mines into its counter-mobility arsenal.

A few historical examples vindicate the requirement for AP mines in order to achieve the desired counter-mobility effect. One of the most notable is the Battle of Kursk during July and August of 1943. Soviet forces built one of the most complex defenses-in-depth and were able to deter German sappers from breaching through their laying of approximately equal number of AP and AT mines throughout the 40km obstacle belt. During the engagement, German engineers were unable to penetrate the complex minefields in a consistent manner. A fitting counterexample was Rommel's use of almost exclusively AT mines during the Second Battle of El Alamein in the North African theater in 1942. These minefields achieved their desired effect only briefly. In this case, dismounted British sappers were able to open lanes through covert and nocturnal breaches and secured obstacles by overcoming overwatch positions with dismounted infantry.

Many have argued that despite the tactical benefits, there are significant challenges to the use of AP mines from a

geopolitical and international relations perspective. This article does not seek to explore these policy challenges but instead focuses on the tactical employment of mines for the purpose of terrain shaping operations within the boundaries set by policy makers. Another common counterargument to the incorporation of AP mines was articulated by Mr. Rowan, the former Deputy Commandant of the Engineer Regiment, during the 2018 AUSA conference. He expressed that future smart and top attack AT mine belts would compensate for the lack of AP mines by their increased complexity. In the meantime, he argued, the existing mixture of AT mines with the SAVO and other man-in-the-loop munitions systems can create the same effect if employed correctly. This argument discounts the continued emphasis by near-peers on dismounted operations as well as the procurement and funding timeline for next generation AT mines. The use of the Regiment's current systems with an AP/AT mix, as was intended in their design, coupled with a rehabilitation of discontinued FASCAM systems can solve the current shortcomings of engineer terrain-shaping operations.

Current Russian tactics along with the versatility of Chinese breaching assets and the vulnerability of friendly overwatch positions necessitates the use of non-persistent AP mines if policy permits it. The development of smarter, safer, and more targeted mines will likely decrease collateral and post-conflict casualties in the future, but the regiment must prepare to shape terrain with what we have today. Re-integrating non-persistent AP mines into terrain-shaping operations ensures that U.S. combat engineers can continue to provide the force with unparalleled counter-mobility support.

*1LT Jay Carmody served as a Platoon Leader for a Mobility Augmentation Company and a Company Executive Officer for a Route Clearance Company in the Republic of Korea. He currently serves as a Project Officer for Joint Task-Force Bravo at Soto Cano AB in Honduras.*



*Army Corps Helps USMA West Point Cadets  
Prepare for What Comes Next*



Rendering of the Cyber Engineering and Academic Center's Robotics High-Bay Lab (first floor)

*By Dr. JoAnne Castagna*

Mr. James Gagliano has carried a valuable lesson with him that he learned 37 years ago as a cadet at the U.S. Military Academy at West Point, NY. He recalled that "One of the most lasting and indelible images that I have retained since my graduation involves a crusty, old senior, non-commissioned officer and Vietnam War veteran who taught Military Science. He cautioned us young cadets about the old adage – 'Generals always fight the last war.' This means that military strategy often focuses on what has happened rather than what will happen. "The warning has remained with me across my military and law enforcement careers. I learned that you have to anticipate what could happen and that imagination and daring are essential leader traits," stated Mr. Gagliano, who has served as a counterterrorism operator in Afghanistan and as part of the Federal Bureau of Investigations' elite counterterror unit. Like Mr. Gagliano, the academy is also anticipating what could happen next for its cadets.

The academy is working with USACE, New York District to begin construction on a Cyber Engineering & Academic Center that will prepare cadets for what comes next. When completed, the center will replace outdated facilities at the academy and will be used by instructors to provide cadets hands-on core courses in science, technology, engineering and math. The structure will have large, open workspaces where cadets and faculty, from different disciplines, can collaborate. The space will also enable them to grapple with cutting-edge technology and equipment, and creatively and critically tackle complex problems. The goal is to inspire the cadets, ignite innovation, and develop them into the technically-competent leaders that are needed for the battlefield of 2030. The center is one of many structures USACE has constructed on the 200-year-old campus that is 50 miles north of New York City on the Hudson River.

The 136,000 square-foot world class academic facility will sit on five acres of land near the south entrance of the campus and other academic buildings and dormitories. Mr. Silas Bowman, project manager, New York District, USACE said that, "The center will be the first thing new students and their families will see as they enter West Point. The center will be the gateway to the academic center of West Point and will stand out as a beacon of gothic beauty on the exterior and the forefront of technology on the inside."

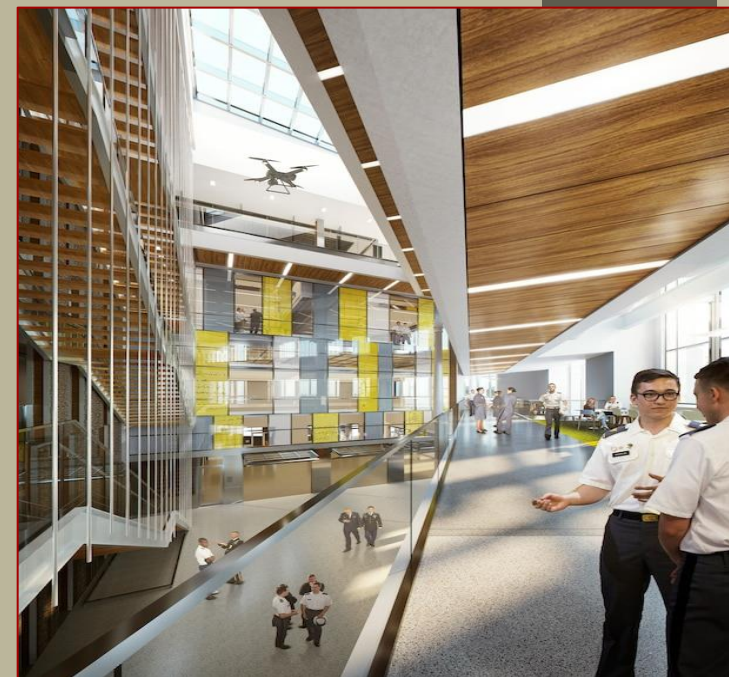
Mr. Gagliano can appreciate a new center like this for the cadets, being an educator himself. He's an adjunct professor, a doctoral candidate, and educates the public as an on-air cable news subject-matter analyst on law enforcement and counter terrorism. He continued that "The 21<sup>st</sup> century battlefield is complex and amorphous, which demands that our military leaders have a clear understanding of emergent threats and process intelligence in terms of how we can dominate the nebulous realm of asymmetrical warfare."

The center will have four floors, a multi-story underground parking garage and a walkway connecting the center to an adjacent academic building. It will house the engineering department with classrooms for instruction on civil, mechanical, electrical, and cyber engineering. The center will also have laboratories for instruction on topics including thermodynamics, biomechanics, weapons, photonics, telecom, computer, sensors, artificial intelligence, and environmental and energy sustainability. The center will be used for cadets to receive training on robotics and drones and will have a Robotics High-Bay Lab to allow indoor drone flight and robotics use.

When visitors enter the center, they will be welcomed by a three-story light-filled atrium. The atrium will be the hub of the center and will be surrounded by glass walls, providing visitors a window view into the Robotics High-Bay Lab. The center's atrium entrance and the entire fourth floor will serve as collaboration space. The fourth floor – with views of the Hudson River - will provide collaboration space and a setting for notable speakers and dignitaries to give presentations and hold meetings with access to high tech audio-visual equipment.



Above: Rendering of the Cyber Engineering and Academic Center's Robotics High-Bay Lab. Below: Rendering of the Cyber Engineering and Academic Center. Bottom: Rendering of the Cyber Engineering and Academic Center's Atrium. Photos by Jacobs Ewing Cole Design Firm.



Mr. Gagliano expressed that, "I cannot help but see the parallels between the old Thayer riding hall - where cadets used to be trained in equine warfare - and the modern-day high-bay lab for drones and robotics testing. West Point must stay abreast of evolving technologies and training opportunities for the young men and women who will be leading our next generation of American warfighters. Just as cadets like George Armstrong Custer (c/o 1861) trained in equine warfare -- horsemanship and cavalry operations -- in the footprint that is Thayer Hall during the Civil War era, cadets today are being exposed to robotics and drones, their own version of "saddle skills." He added, "Successful interdiction "left of boom" requires cutting-edge technological innovations for data collection, intelligence gathering, and weapons delivery. Drones are the answer. They are as necessary and ubiquitous today as pack horses were during 19<sup>th</sup> century warfighting." Left of boom refers to the moments before an explosion or attack – a period when you still have time to prepare and avert a crisis. Part of being prepared for left of boom moments is being able to work with others across disciplines. Collaboration among cadets and faculty will be encouraged and the center will be designed to facilitate this.

To further encourage collaboration, a 30-foot wide pedestrian enclosed bridge with an exterior rooftop will connect the center to Mahan Hall and span over Thayer Walk, the main pedestrian access way on the campus. This bridge will not only provide an iconic entrance to the academy, but will encourage collaboration between the buildings.

While the inside of the center will have the latest technology, the outside will pay respect to West Point's past. Mr. Bowman expressed that, "The center will have the same gray and black granite exterior as the other historic buildings on the campus and will reflect the historic military gothic revival architecture of West Point with arches, buttresses, and a granite façade, while the interior is high tech and modern."

Modern also means the building will be energy-efficient and designed for Leadership in Energy and Environmental Design (LEED) Silver certified. To meet this certification, the center will have high volume – low velocity fans in the Robotics High-Bay Lab and there will be solar panels on the roof.

Construction on the center is expected to be completed in the Summer of 2025. USACE sees this new academic center as an important way to protect our Nation. "The 21<sup>st</sup> Century battlefield is complex and demands that our cadets and future military leaders process emergent threats including cyber intelligence warfare. I believe this complex will continue to provide additional resources in helping them learn to safeguard our Nation's interests," explained LTG Scott Spellmon, 55<sup>th</sup> Chief of Engineers. "This modern academic facility will inspire collaboration across engineering disciplines in a way that can't be achieved in the current 1960s-style building space." When Mr. Gagliano was asked why this center is important for U.S. citizens he said, "The modern battlefield, where military and civilian lives remain at stake and every action is consequential, is not the arena to test these systems and platforms. Make your mistakes and retreat to the drawing board during testing and train-ups. Or as General Norman Schwarzkopf's adage goes – "The more you sweat in peace, the less you bleed in war."

**YOU ARE THE CONVOY COMMANDER FOR A ROUTE NEVER BEFORE TRAVERSED BY COALITION FORCES AND TASKED TO MOVE AN ENTIRE BRIGADE COMBAT TEAM (BCT) THROUGH BOTH MANMADE STRUCTURES AND EXISTING ROADS. WHILE PREPARING FOR THE UPCOMING COMBINED ARMS REHEARSAL (CAR), YOU NOTICE MULTIPLE UNAVOIDABLE BRIDGE STRUCTURES ON THE ROUTE FROM THE MAP RECONNAISSANCE. AFTER REVIEWING THE TOPOGRAPHIC LINE MAP (TLM) OF THE AREA OF OPERATIONS, YOU RECOGNIZE A POTENTIAL TERRAIN IMPACT TO THE MISSION: CAN ALL VEHICLES CONVOY OVER OR UNDER THESE BRIDGES? YOU WERE TRAINED TO PROBLEM SOLVE, BUT YOU NEED MORE INFORMATION THAN WHAT THE INITIAL 2D ANALYSIS OFFERS. YOUR ONLY OPTION MAY BE TO SEND A RECONNAISSANCE ELEMENT INTO A CONTESTED AREA AND GATHER BRIDGE DATA.**

# **AN INFLECTION POINT 3D MODELING IN COMPLEX ENVIRONMENTS**

**1LT Michelle Kokoski**

## LIDAR

Light Detection and Ranging (LiDAR) is a method for measuring distances by illuminating the target with laser light and measuring the reflection with a sensor. Differences in laser return times and wavelengths can then be used to make digital 3-D representations of the target. It has terrestrial, airborne, and mobile applications.

The above scenario is a broad overview revealing the need for 3D modeling of terrain and man-made structures. The TRADOC Proponent Office – Geospatial (TPO-Geo) located in the Maneuver Support Center of Excellence (MSCoE) at Fort Leonard Wood, MO is leading the effort on defining requirements for 3D terrain and man-made structure modeling capabilities within the force.

The U.S. Army currently has 3D mapping capabilities but lacks the ability to produce and use 3D models with geospatial accuracy. For reference, 3D mapping can be defined as data with x, y, and z values (we have this) whereas 3D modeling is data with x, y, and multiple z values (we need this). There are no records across the U.S. Army's current issued equipment that highlights a sensor capable of producing 3D models. When 3D maps and models are combined, accurate measurements from a distance become available.

### Case Study: The Devil's Elbow Railroad Trestle Bridge

The TPO Geo's field study focuses on a railroad trestle bridge located southeast of Devil's Elbow near Fort Leonard Wood, MO. From a geospatial perspective, trestle bridges are complex 3D structures; if we are able to generate, manage, analyze, and disseminate this level of complexity, other 3D features such as buildings should be much simpler.

On 6 October 2020, the Mapping and Geo Visualization Team from the Army Geospatial Center (AGC) conducted data collection on the Devil's Elbow Trestle Bridge, using an eBee drone, or small Unmanned Aerial Sensor (sUAS), and a LiDAR (Light Detection and Ranging) backpack. The eBee is an autonomous (pre-programmed flight path) mapping drone



Photo Left: Devil's Elbow Trestle Bridge. Photo by Chief Baber. Photo top: COL Ken Frey, Matt Trani, and Casey Shanks with custom drone equipped with LiDAR. Photo by 1LT Matthew Hain. Photo bottom: Parrot Anafi drone for photogrammetric capture. This is COTS (commercial off the shelf) for \$800. Photo by 1LT Matthew Hain. Photo right: LiDAR scan of the Devil's Elbow Trestle Bridge. Photo by SFC Andrew French & the NGA.



capable of capturing high-resolution aerial photos. The LiDAR backpack used during the study captured georeferenced high-resolution imagery and high-precision point cloud data of the bridge. The data collected comprised of approximately a half-kilometer plot of land with the trestle bridge and computed a point-cloud data set that can be viewed here:

On 4 November 2020, TPO-Geo partnered with the National Geospatial-Intelligence Agency (NGA) Research team based at NGA-West in St. Louis and conducted LiDAR and photographic data collections on the same trestle bridge. LiDAR collections were conducted utilizing a custom octocopter sUAS built in-house by the NGA from commercially available and 3D-printed parts. Photographic data of the bridge was captured using a Parrot Anafi sUAS, an \$800 commercially available product. The total capture time was under 30 minutes, with initial processed products available in less than two hours. Unlike previous data collects of the same bridge, the NGA's sUAS system demonstrated 3D modeling exists in a Disconnected, Intermittent, and Limited bandwidth (DIL) environment. The ability to capture a LiDAR scan and process the data without internet connection is significant and directly supports the six Warfighting Functions as a cross-cutting capability.

### Impact on the Force

The LiDAR capture demonstrated the ability to accurately measure bridge components from a set distance determined by the sUAS operator. In this case, the sUAS flew beyond line of sight of the operator's viewpoint while the sensor scanned the trestle bridge. In this particular field study, the profile views processed from the NGA's LiDAR point cloud are precise enough for measurement of the bridge structure. This enables Military Load Class determination and demolitions requirements, without having to deploy an Engineer Reconnaissance element for physical measurements. Additionally, with the LiDAR point cloud collected and imagery overlaid, the end user can visually determine if this route is suitable for convoy operations without deploying troops to gather attribute data. These sUAS systems can help reduce the need to send troops forward, therefore aiding in risk mitigation and timelier decision-making during operations.

### Future Initiatives

U.S. Army Engineers are depicted as terrain experts and have mastered the art and science of making 2D and 3D maps. As sUAS become more capable and available, the ability to provide expedient dissemination of 3D models within a 3D mapping environment increases, giving a new and refined mission for the geospatial engineer. The need for simultaneous LiDAR and photogrammetric capture will likely increase as sUAS become more capable and ubiquitous. Furthermore, a geospatial-enabled sUAS has a requirement to provide geospatially accurate data, on all missions, given the use of the data may serve multiple purposes, to include navigation and fires. The key performance parameters, key system attributes, and additional performance parameters are currently being established based on exploratory efforts with AGC, NGA, and the USACE, St. Louis District.

The ability to capture and process data without internet connectivity highlights a significant turning point in the study, and as the networks supporting data transport improve, there is going to be a nexus. That nexus will come together when an operational unit deploys and suddenly has a demand for 3D geospatial data on some portion of the area of operations. Additionally, the systems used to process the data are no better than the current Geospatial Work Station used by geospatial engineers; there is no new materiel required (except for the drones).

Back to the above scenario, tactical leaders in the not-so-distant future are going to task a geospatial-capable sUAS to perform Engineer reconnaissance to build 3D datasets on targets, thereby mitigating the risk of deploying a ground element, while also enabling a host of other geospatial analytics with the same data. While sUAS systems are not currently in the warfighter's arsenal, TPO-Geo is closing the gap on the requirements necessary to help field future products across all warfighting functions, with cooperative efforts within Army Futures Command.

1LT Michelle Kokoski is a Geospatial Development Officer at FLW, MO and has a Bachelor of Science Degree from the United States Military Academy in Geospatial Information Sciences (GIS). She will begin working on her Master's Degree of Homeland Security emphasizing Geospatial Intelligence from Penn State University in January 2021.

**HOW A BRITISH COMPANY ENGAGING  
WITH THE BRITISH**





**DELIVERS BATTLEFIELD ADVANTAGE  
FOR ALL OF US**



**A** long-serving provider to the U.S. Army and U.S. Marine Corps is leading the way when it comes to engagement with their domestic customer, the British Army. Pearson Engineering Ltd, which is based in Newcastle upon Tyne in the northeast of England, contributed significantly to U.S military operations in recent years via the Assault Breacher Vehicle and Stryker Engineering Support Vehicle programmes, as well as through the supply of a large quantity of innovative Counter-IED and Counter-Mine rollers.

Having supported a number of militaries through recent conflict with their highly adaptable range of interchangeable engineering attachments, the company is now engaged with the British Army to develop their latest thinking. It is an initiative that is set to benefit militaries in the U.S. and throughout NATO as they turn their attention to the next most demanding conflict scenarios. With battlefields predicted to become ever more congested, cluttered, contested and connected, Pearson Engineering are investing heavily in Research & Development to provide evolved solutions to mobility and counter mobility on the battlefield. With a focus on agility, speed and enhanced adaptability, new developments will provide Commanders with the opportunity to create confusion in the enemy's mind and allow rapid exploitation of advantage on the battlefield.

The company has recently been involved in two capability development working groups to discuss product developments with the Royal Scots Dragoon Guards - a light cavalry regiment, and with Project *STREETFIGHTER*, an initiative led by the British Army's Royal Tank Regiment which seeks to enhance armoured vehicle capabilities through experimentation providing new technologies and technical solutions. In short, the project puts the end-user at the start of capability development.

The demonstrations have proven successful in supporting two-way communications,

providing Pearson Engineering with a forum to better understand their customers' requirements and anticipated challenges whilst also sharing the latest technologies and thinking which can help to unlock challenges for armoured units and prepare for Urgent Operational Requirements. It is an approach to engagement between the military and industry which is not often seen, but which gets essential capability into the hands of the warfighter more quickly.

Through rapid prototyping, discussion and demonstration, Pearson Engineering can quickly share ideas, gain informal feedback and progress. This provides the company with greater focus and ensures that the products that come to market meet the needs of both today's and tomorrow's fight. In turn, militaries around the world will be able to take advantage of solutions which are user-focused, compatible with modern military thinking, entirely supportable and rapidly available.

As well as supporting product development, this type of engagement has been hugely beneficial for personnel. Many companies that operate in the defense industry employ retired military personnel to bridge the gap between the civilian world and the Armed Forces, but Pearson Engineering have taken this a step further. With regular interaction, such as this, comes a deeper understanding of how operations are planned and executed for a wider range of employees, further supporting the company's ability to provide mission critical capability when it is needed, and an understanding of end-user needs.

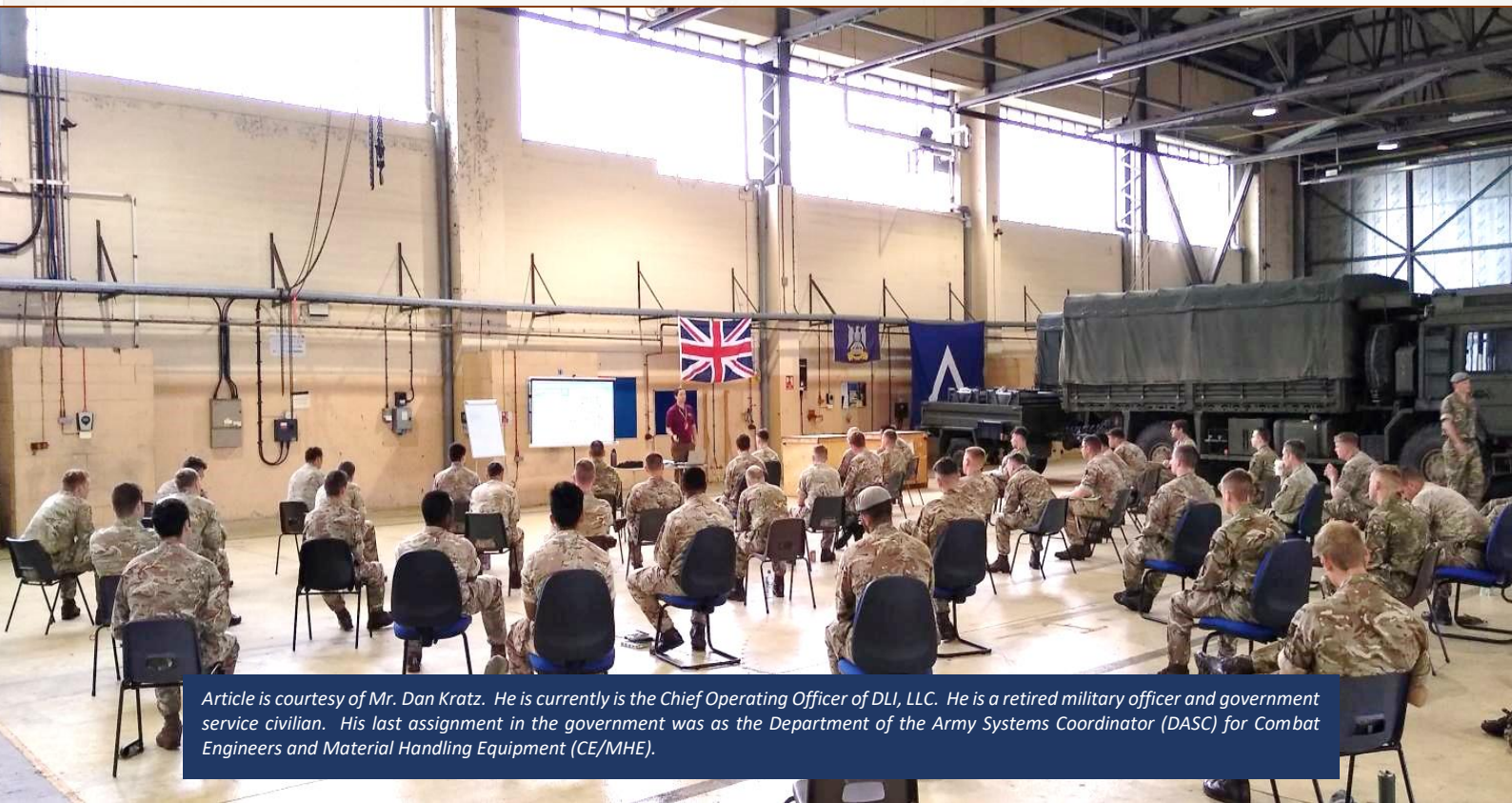
In further support of engagement between defense and industry, there was a unique interactive discussion group with the subject of armoured mobility held in June 2020. Having recognised that COVID-19 would decrease engagement and prevent useful conversations, Pearson Engineering sponsored 'The Threat to Mobility' webinar which sought to keep the conversation going, sharing insight between expert military personnel and industry at large. The event




which was chaired by LTG (Ret) Ben Hodges, former CG USAEUR, attracted 300 registrants from 14 countries and its success has led to a subsequent event which will take place later this year.

Whilst this type of engagement delivers undoubtable benefits for product development and military capability, another important and significant outcome has also begun to emerge. With a reputation as champions of putting the end-user first and bringing military expertise within the company, it is now recognised in the UK as a

supportive employer of serving and veteran defence personnel. Their contribution includes support to Reservists within the company to undertake military training with full pay, hosting study days for local Army units, support to British Military charities with both time and funds, skills development activities for Veterans and various recruitment initiatives. The company was recognised for their efforts in July 2020 with a prestigious Gold Award from the UK Ministry of Defence under its employer recognition scheme.



Article is courtesy of Mr. Dan Kratz. He is currently is the Chief Operating Officer of DLI, LLC. He is a retired military officer and government service civilian. His last assignment in the government was as the Department of the Army Systems Coordinator (DASC) for Combat Engineers and Material Handling Equipment (CE/MHE).



**THE BUSINESS OF THE FED  
TURNING AN IDEA INTO A BUILDING**  
*BY EDWYNA BROOKS*

**T**he US Army Corps Engineers (USACE) Far East District (FED) operates on the Korean peninsula, an area about the size of Indiana. With 339 current projects and project amounts totaling 6.9 billion dollars, the FED is the paramount engineering solution in South Korea for multiple stakeholders. The Far East District's team of multidisciplinary professionals have a synergistic workflow that empowers collaborative accountability from each of its divisions. Conversely, each division must rely on its respective branches to complete the individual tasks required to push a project from cradle to grave and deliver a quality product to customers and stakeholders.

The Business of the Program and Management Division. "We become advisors to our customers on what is in the realm of possibility and we take them through the steps to get to that building, parking lot, or final product." says Richard Byrd, Deputy District Engineer and Chief of the Program and Project Management Division. As the senior civilian in the Far East District, responsible to the Commander, COL Christopher Crary, Mr. Byrd maintains complete project oversight to ensure his team of professionals deliver the program and meet customer requirements. He oversees the planning, design, and construction of military, environmental and host nation funded construction programs in Korea.

The Far East District is renowned for its unparalleled engineering and construction capabilities. As such, it is responsible for taking a customer's idea or intent and turning that concept into a completed project. This seamless action has made the US Army Corps of Engineers one of the most sought-after engineering firms in the world. The Corps' sophisticated project vetting and approval processes set the organization apart from its would-be contenders. In fact, a project manager leads a methodical series of events anytime the District is consulted for services or presented with a new project. While the FED may be approached with the best of ideas, it begins its process by determining the viability of each request. Mr. Byrd's Program and Project Management Division (PPMD) is adept in taking the customer's ideas and helping them define that scope into a deliverable project. "A project manager is assigned to ascertain the customer needs and a Project Delivery Team (PDT) is assembled to

refine the scope of the project and determine the best acquisition, design, and construction tools to execute the work in accordance with the stated time and financial requirements.," said Mr. Byrd. The PDT includes contracting specialists, design managers, project or resident engineers, and counsel that all work collaboratively with the project manager to help the customer with their final product. "Clear and concise communication is the pillar of the District's Program and Project Management Division's processes," said Project Manager Eman Sundquist.

The subject matter experts who make up the PDT have essentially perfected their value-based business procedures, incorporating their customers in the design process the entire way. FED is equipped with the capability to complete their customer's designs internally. This in-house capability allows the Corps to trim down their total completion time by passing the viable idea along to their Engineering Division's Design, Geotechnical and Environmental, and Cost Engineering Branches for the design process.

## THE ENGINEERING AND DESIGN PROCESS

"FED creates customer designs based on the customer intent in one of three ways. They solicit an external Architectural Engineering (A/E) firm, complete the design with the in-house staff in the District, or engage another US Army Corps of Engineers district who may be the center of expertise and best suited to design the specific project," said Byrd. The customer's concept comes alive in design after detailed planning and a civil layout of the structure is completed by the US Army Corps of Engineers Design Branch or Architectural Engineering firm with support from the subject matter experts in the Technical Review Branch.

The geotechnical team uses the civil layout of the structure to begin their on-site research. The branch's geotechnical investigation starts with branch surveyors providing the lay of the land and drillers that sometimes drill as deep as 130 feet or more into the ground to investigate subsurface conditions needed to inform the designers.

This daunting task also falls within the Far East District's exceptional internal proficiencies as they are one of nine districts within the US Army Corps of Engineers with this unique drilling and sampling capability. The geotechnical professionals of the Far East District assess soil samples in the

Materials Testing Lab (MTL) utilizing another unique district capability. Housed within Chief Pam Lovasz's Engineering Division, the MTL is one of eight district labs within the US Army Corps of Engineers. The assessments from the hydrological and geological exploration at the proposed site are compiled into the branch's comprehensive study.

The geotechnical lead will use these results to begin their work with the project manager as the interdisciplinary design continues and their results are incorporated into the overall design process. This group of focused professionals will work with others from the Engineering Division to create the final computer-aided draft of the proposed structure.

The geotechnical engineer uses the results and analysis of their comprehensive investigation to create a foundation design and soil movement recommendations. These reports along with others are used to refine the design the Engineering Division produces whether in-house or through an A/E firm. Once the design is completed, a set of plans and specifications are reviewed by the project manager and the Project Delivery Team before being handed off to the Office of Counsel for a legal review and then to the contracting office to award to a construction contractor. Jon Cole, Business Process Manager, gives a simplified explanation of the Corps' contracting process, "Our Contracting Division along with the rest of the Project Delivery Team (PDT) uses the scope of work and other associated documents to determine an acquisition strategy and then issues a Request for Proposal (RFP) to award a construction contract. The Contracting Division reviews the proposals to determine if they meet the necessary criteria. Once a contractor is deemed technically acceptable, their proposal is reviewed for proper cost estimates and the contract is awarded to the company who can provide the best value based on their written proposal."

## THE CONSTRUCTION PROCESS

Chief of Construction, Chad McLeod explains his division's entry into the project. "Up until this point the Corps' Construction Division has limited involvement with the design other than reviews to make sure the project is constructible. Once the design is approved, and the construction contract is awarded, the onsite work of building the structure begins." He expounds on the process by explaining, "The FED's Construction Division operates as the government's representative on the worksite. The Construction Division Resident Office takes the lead

during the construction process to provide quality assurance through its three-phase inspection process as they administer the construction contract." "Quality is essential to our Construction Division as they deliver best value to our customers. They ensure all phases of construction are within the specifications, plans, and requirements of the contract," remarks Mr. Byrd. "The Construction Division's cyclical three-phase inspection process is the main driver behind the Corps' reputation for high quality and is required for every feature of work," says Chad McLeod.

### Phase One of Construction

The construction division team meets with the contractor's staff to review the contract requirements in the preparatory phase of construction. They also discuss the contractor's plan to meet those specifications. "The preliminary phase identifies what we're building and how we're going to build it," says McLeod. "It ensures the construction crews have a total understanding of the work to be performed and the way in which it must be completed to achieve the Corps' quality standards."

### Phase Two of Construction

The initial phase is the second step in the division's inspection process. Here, the contractor completes a small sample of work and then calls for the initial inspection. The Construction Division reviews the representative sample with the contractor and once any identified deficiencies are corrected, a consensus is reached, and the work will set the standard for all other areas of the project," says Mr. Ricky Thomas, Construction Control Representative.

### Phase Three of Construction

After the initial phase is completed, the contractor and Construction Division representatives continually inspect the work to ensure that the standards continue to be met. These daily follow-up inspections are the third phase of the process. "We stand by the quality of what we build here," says Resident Engineer Aaron Schuff. "I would gladly live in the buildings we build because of the way they are constructed. They are built to last. Our buildings stand and I am proud of our work." Mr. Rich Byrd echoes, "Everything we build is governed by a specification. We use those specifications to guarantee quality. Our Construction Division ensures all phases of construction are within the specifications, plans, and



requirements of the contract. This is how our team brings the best value synonymous with the Corps' projects." Inspections are led by the Contractor's Quality Control Staff and the FED's Quality Assurance Representatives and Project Engineers. They assist during this process by conducting major milestone inspections at critical points in the project. This three-step process is a repeating one that guarantees quality levels of work throughout the varying features of the job and ultimately prepares the team for successful project completion via the Red Zone Process.

"We make sure everything requested by contract is satisfied and simply, that everything we said we would do, is done and that the contractor has been paid properly. The Red Zone very involved process to make sure everything is wrapped up contractually," said Byrd.

Chad McLeod explains the red zone, "The red zone is an American football term that refers to the last 20 yards before a touchdown. It is oftentimes the hardest to complete. Similarly, the final activities of a construction project are often the most challenging to finish. As such, we normally execute the red zone process 60 days from completion to guarantee a timely and smooth turnover to the customer."

This red zone meeting requires input from each of the project's stakeholders and sets the conditions for the way the project will be completed.

Co-chaired by the Project Manager and Resident Engineer, the final status, milestones, estimated completion dates, and all the actions necessary to complete the project are discussed, resulting in the schedule of events needed to meet project completion and financial closeout.

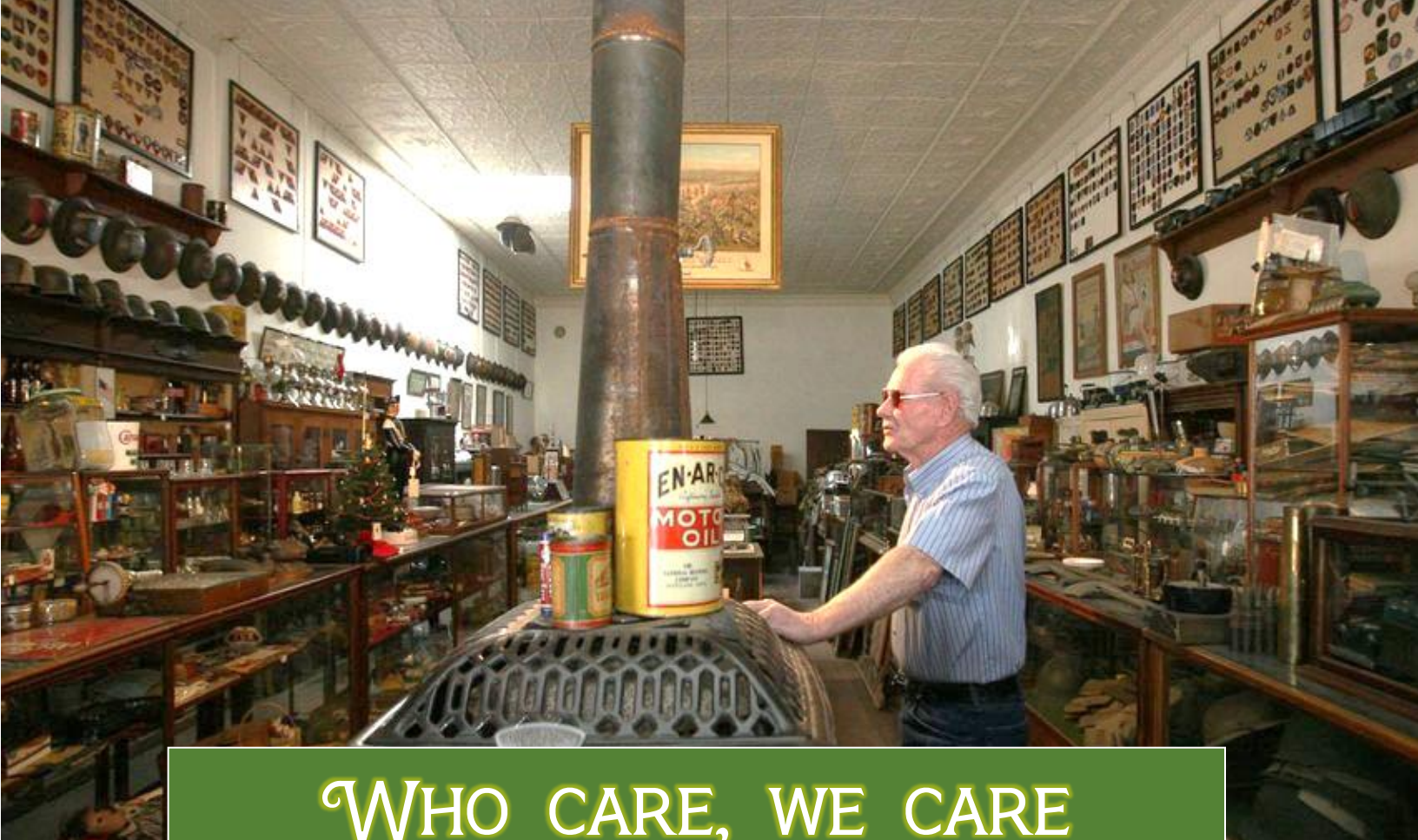
## A VALUE-BASED ORGANIZATIONAL CULTURE

This FED's objective is to ensure that each project meets the quality requirements in the scope of work and is turned over within budget and on time. "This includes the quality assurance of each project component from the foundations up to the roof, all the interior work, and even landscaping," said McLeod. "Once the contractor has completed the work, the Resident Office and stakeholders will conduct their final inspection. Then keys are turned over to the customer and the ribbon cutting is planned."

Customer value, quality performance and exceptional results are the foundation of the Far East District's organizational culture. Allowing each division to operate within their robust and unique cross-sections of expertise has created a secret sauce few engineering providers have been able to mimic. As such, the US Army Corps of Engineers have made a successful business of bringing diverse groups of construction and engineering professionals together to continue their longtime trend as the agency of choice in Korea.

COL Christopher Crary and Mr. Richard Byrd, Deputy District Engineer and Chief of the Program and Project Management Division visit a local jobsite. Photo Courtesy of Far East District.





# WHO CARE, WE CARE SAVING PRIVATE HEGWOOD

By Frederic A. Drummond, Jr.



In June, a devastating fire took years of military WWI/WWII helmets and memorabilia from Ken Hegwood. Ken started painting trench and war art on helmets when he was 14 years old and served as a Citizen Soldier in the Nebraska National Guards in the 1940's. He is an exceedingly rare Citizen Soldier from Hansen, Nebraska with a deep hearted passion about painting and restoring memorabilia. At 88 years old, his life and dedicated passion came crumbling down due to a fire in his workshop. He lost thousands of military items, to include two vehicles and a host of other military memories. It was not the totality of the monetary lost but the loss of all the military history that concerned Ken.

Soldiers for life, is a term that is used often but rarely acted upon with tangible deeds and action. This devastating fire was a call of action for me. It was more about getting Ken back to his passion of painting so the greatest generation's history could continue to be discussed and shared with future generations. Ken is a quiet professional who has a very specific niche in restoring our military history unlike anyone else I have met, not only does he paint very detailed memorabilia, but he understands all aspects of our military history – he is a walking history book.

After being contacted by a high school classmate Steve Gerritsen, who unknown to me had a young age connection to Ken, I was thrust into a sense of duty, patriotism, and obligation to act. I flew back to Hansen Nebraska, population ~260 and was able to see the devastation but also to reassure Ken that Steve and I would get him back to painting.

As I departed Hansen, my plan was already being formulated to design and build a new building, almost like an "old fashioned" barn raising event in the 21<sup>st</sup> century. With COVID going on, and restrictions across the country; the development, organizing and execution of the plan started to come to light with a local investor from Industrial-Irrigation, Justin Osborne, whose father served in WWII and who Ken has painted many detailed helmets for. I reached out to several national home improvement retailers and the first to respond was Home Depot with overwhelming and enthusiastic support, I was quickly contacted by the local Home Depot Store which was 8 miles away and a plan was developed to reuse the existing foundation and to build a 30x40 structure 6/12 roof pitch to match the building décor on his property.



## The Concept Sketch

As travel restrictions eased with COVID, the plan was developed over the course of 4.5 months, I made the decision that the building would be raised in 4.5 days (Monday – Friday, ribbon cutting at 12:00 noon). Steve Gerritsen started a GoFundMe site to raise money to replace his vehicle and paint supplies while I reached out via LinkedIn and Facebook to garner volunteer assistance in building the structure starting on Columbus Day. The local American Legion was called in to assist with tax write offs for larger donations to ease the financial burden of those who wanted to make larger donations. Home Depot developed a bill of materials and bent over backwards to ensure the building was being developed with safety in mind, building, electrical, fire permits were reviewed and approved, now it was time to act before Nebraska's winter sets in.

## The Plan of Action

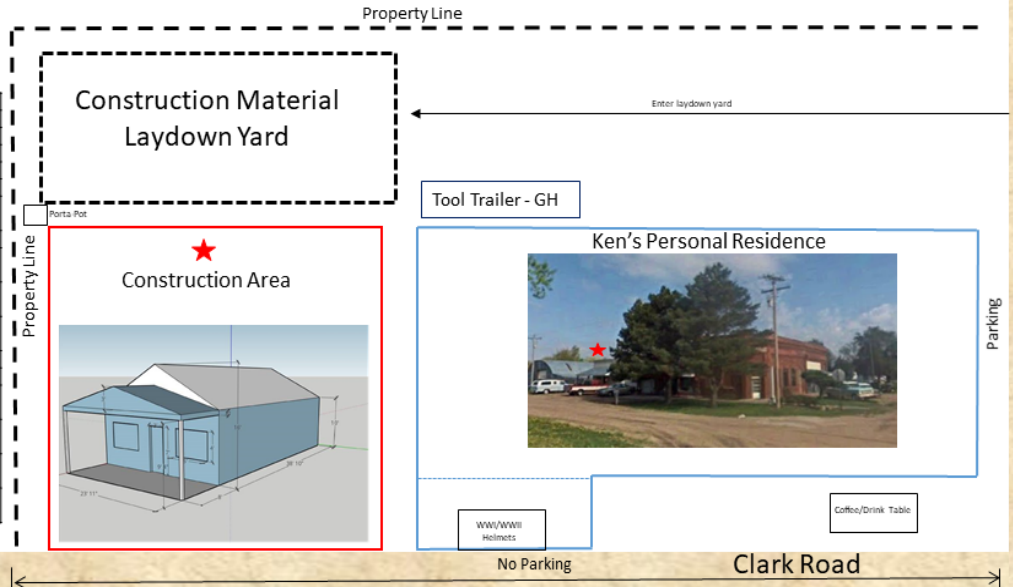
The plan of execution: Faced with an extremely limited construction window to execute this project and planning it from 1554 miles away in Tampa, FL volunteers would be a key aspect of a successful conclusion. With COVID, many states in lock down, protests going on and all the political polarization consuming our daily lives, I was skeptical, yet optimistic the request for volunteer support would come. Being from Nebraska, born and raised in the area my intuition was there are people who care, and will act. As my request for support made its way around, the positive responses flooded in. We had donations from all over the country via

# Rebuilding Private Hegwood's Trench Art Building

Point of Contact  
Frederic A. Drummond Jr

## Time-Line (12-16 OCT, 2020)

Date	Action
083120	Prep foundation and area for build
080120	Design complete/Commitment with Home Depot
081820	Building and Electrical Permits
083120	Send out Volunteer/ equipment requests
	Survey and Prep Area for material delivery
12 OCT - 0800	Welcome/Safety brief (Daily 0800) * Key personnel 0730
12 OCT	Framing - Build and Stand Walls
12/13 OCT	Framing - Stand Roof Trusses and Frame Eaves/Fasda/Awning, Start Electrical install
12/13 OCT	Exterior Framing - Roof, Tyvek wrap, install walls, Awning, and windows
13/14 OCT	Interior Framing - install electrical/lights, insulation and doors (front) and Garage door
13/14 OCT	Interior - Utilities connection and inspection
15 OCT	Interior - Paint the garage floor - demob/clean site
16 OCT - 0800	Outfit-table and painting supplies prep for Opening Ceremony
16 OCT - 1200	Ceremony - Media /American Legion /Others
16 OCT - 1300	Volunteer Luncheon
16 OCT - 1400	Closeout with Home Depot and American Legion/Others Finalize punch list plan



### Prep day 6-11 OCT

- ✓ Building Permit
- ✓ Electrical Permit
- ✓ Laydown Yard
- ✓ Foundation prep
- ✓ Volunteer e-mails
- ✓ Equipment needs
- Hotel or Room/Sponsor

### Day 1 (Mon, 10/12)

- Home Depot
- ✓ Laydown yard
- ✓ Foundation prep
- ✓ Concrete prep
- ✓ Cut Yard
- High lift
- Skid steer
- Electrical Supplies

### Day 2 (Tues, 10/13)

- 0800: Welcome
- Safety brief
- Develop Teams
- Rough Framing
- Roof Trusses
- Install Roof Trusses
- Start Electrical
- Sponsor: Food/Drinks

### Day 3 (Wed, 10/14)

- 08:00 Welcome
- Review Teams
- Moose Roofing
- Windows
- Doors
- Siding
- Garage door
- Sponsor: Food/Drink

### Day 4 (Thur, 10/15)

- 08:00 Welcome
- Review Teams
- Install lights
- Complete Insulation
- Plywood install
- Electrical Inspection
- Building Inspection
- Sponsor: Food/Drinks

### Day 5 (Fri, 10/16)

- 0730: Set up
- Tables / Cabinets
- 12:00: Ribbon Cutting
- 13:00: Volunteer BBQ Luncheon
- Sponsor: Food/Drinks

**Lunch (12:00-13:00)**  
**MON:** Harvard United Church of Christ  
**TU:** Freddy's Frozen Custard /Steaks  
**WED:** Pam's Pub and Grub (GI)  
**THUR:** Freddy's Frozen Custard /Steaks  
**FRI:** BBQ Gregg Hueske (1300)

Drinks sponsored by Pepsi Cola -Hastings NE

GoFundMe and more importantly we had Home Depot and 12 local sponsor's dedicated commitment.

I arrived late on 10 Oct and immediately went to work grinding the old concrete pad. Eight hours of hard and dirty work, but it needed to be done before day one, to get the foundation ready the following week for paint, Home Depot also started to prep the construction site with materials in order of build. We took time to hang banners from sponsors to ensure deserving recognition on the construction site.

**ON 12 OCT AT 0800, DAY 1** - a very brisk and windy day - we had about 20 personnel, two local contractors and some general labor who answered the call. After a safety and COVID precaution brief, the two local contractors divided into team leads, one for framing and other for truss rafter development. Each was walked through the design sketch and quickly conveyed this design and would be modified as needed. Flexibility was key to making this aggressive construction schedule work. Minutes later, as the construction started, Ken Hegwood asked me to change the front entrance gable design to a shed roof to match the rest of his facilities and that he would prefer to have a 126-year-old wooden oak door in the front versus a new door - so we adapted from the very start.

The framing team (Trent Meyer Construction) completed the outer walls, and the roof truss team (Craig Hubbard Repair and LLC) completed the hand developed truss rafters (no easy feat). Stats: 364 wooden gusset plates, 488 miter joints at 72 cuts per hour. In the afternoon as the frame was erected, the decision was made that rather than emplacing 2x6 vertical bracing on the walls and install the rafters on day 1 to stabilize the frame, it was best, given the Nebraska winds, to install the wooden outer sheeting to make the building more rigid for truss rafter installation the next day, given the winds would be significantly lower.

**DAY 2** - Moose Roofing out of Omaha (150 miles to the east) arrived with several personnel. A local farmer with a 1952 International tractor with a homemade truss rafter lift arrived and we started the rafter installation exhibiting Nebraska farm equipment at its finest. The installation was tedious and very time consuming but safety to our volunteers was paramount. This building had 10-foot sidewalls and 6/12 pitch roof, so everything was either arranged on a ladder, scaffolding or by a 1952 truss-lift tractor. By mid-day, the roof was complete, and Moose Roofing started shingling the roof and completed late in the evening. Meanwhile, our one dedicated electrician started to work on the inside

late at night to ensure the wiring was ready for inspection for day 3 interior insulation and sheathing install. Everything Jim Schuyler touched as an electrician was done to perfection and per the local electrical code.

**DAY 3** - after the heavy lifting was constructed all the contractors had to return to their local customers and our numbers dropped to 8-10 throughout the day. This day was primarily spent on installing the interior insulation, wooden paneling, and ceiling. Everything was glued, stapled, and required a great deal of ladder movement and hole cutting for the various electrical outlets, ceiling fans, exhaust fans and heaters. By the end of day 3 we had run out of paneling with nearly 90 percent of the interior complete. We determined that the reason we ran out of interior sheathing was because we used several 4x8 sheets of plywood for plywood gussets on the hand-built rafters versus the metal gussets provided by Home Depot. Although the metal gussets would have worked, the 2x6 rafters were sturdier using the wooden gusset overall. The interior had to be complete along with all electrical on day 3 because day 4 the floor was going to be painted.

This day was also filled with news reporters and two state senators. Sen. Steve Halloran and Sen. Tom Brewer, Purple Heart Recipient, AFG who were very dedicated state senators dedicated to helping our Warriors and citizen Soldiers.

**DAY 4** – was another full and busy day as the roofing contractor came back and several of the local contractors were in and out to help where they could. Several volunteers answered the call as it was a heavy metal paneling day. All the outer metal sheathing and soffits had to be installed. It was then it was noticed not all the soffit material was on-hand to ease the 10-foot-long metal sheathing insulation. A quick decision was made to move on, and the soffit, fascia and gutters would be installed later by Hubbs Repair & LLC and Moose Roofing.

A painful decision but time was not on our side and many of these items had to be ordered. So, with two teams, 90 percent of the metal siding was installed while the electrical connection was made by southern power to the building and the floor was painted twice. On this day, the temperature dropped below 40 degrees so we had to block all windows and entrances so the paint would affix to the concrete floor per specifications. All construction debris was removed from the site in preparation for Friday's activities.

**DAY 5** – started early. I was in extreme home make over mode and was like a drill sergeant reminding everyone that we would be cutting the ribbon at 12:00 sharp and all actions needed to be complete. On the inside the floor now complete, the last two feet of paneling was installed, all lights installed, the 126-year-old front door, which a custom frame had to be made, the back door, the garage door and the back metal sheathing were installed. Late on Day 3 as I reviewed the remaining material, I discovered the metal sheathing would be short 4ea 10-foot sheets for the peak of the back roof, our original design was for a 4/12 pitched roof versus the 6/12 pitched roof which was why we fell short. I made the decision to focus on the front and sides while the back would be left for final punch list items. At two hours out, there was not one person moving around the building that was not cutting, sawing, cleaning, or installing something – everyone was engaged, the inside was nearing completion and the metal sheathing in the back was 75% installed and the front entrance paneling was starting to get sheeted while the 126-year front door was being installed. Everyone was focused on the front entryway.

I was approached by one of the volunteers who said, “we are short two 4x8 sheets of paneling” because it was used elsewhere – a drastic plea to Home Depot and a truck sent on the road was able to get the last two pieces of paneling back and installed with two minutes remaining. One of the lasting benefits of this project, was local contractors, who normally are in competition with each other, realized they had more in common than previously realized and lasting friendships were formed while bringing Ken's building out of the ashes.

As the site was going through the final cleaning and preparation for the ribbon cutting and BBQ, I could not help but notice a sense of pride and accomplishment by those who made the call to action. The ceremony, shortly after 12:00pm as everyone gathered, I started with a short speech about “who care”. Our country is moving fast, political polarization, COVID and the wildfires fill our nightly news networks and social media postings. Vehicles and on-lookers roll down the local highway and keep going on with their daily activities. But as I explained to the 50+ people who came for the ribbon cutting, it is “YOU who CARE”, it is people from across the country who donated money to this outstanding cause, “that care”. We were graced with a young 12-year-old singer who sang for the assembled group,

*This project would not have happened without the contributions and sponsorship of: Home Depot-Grand Island, Industrial Irrigation, Trent Meyers Construction, Moose Roofing of Omaha, Hubbs Repair and LLC, Hubbard Insulation, Pepsi-Cola of Hastings, Barrel Bar of Hastings, Freddy's Frozen Custard, Harvard First United Church, Ricky George Machine/Woodworking, Dutton-Lainson Company, Hastings American Legion Post 11, My Place Hotel of Hastings, Big G and ACE Hardware of Hastings, Raynor Door Central Nebraska and Dave Wærneke, Decorative Concrete Coatings of Lincoln*

then Steve Gerritsen talked about the dedication and commitment of everyone involved this week and ended by saying on October 20, 1944, a few hours after his troops landed, MacArthur waded ashore onto the Philippine island of Leyte. That day, he made a radio broadcast in which he declared, "People of the Philippines, I have returned!"

I enjoyed the fact I could return to make a difference (it was not a landing but a good old barn raising) and garner support from so many to take on such a worthy cause to help a Citizen Soldier in need, it was a call to action to live the ethos of caring for our Warriors – Soldiers for life, we must take care of our own and ensure their legacy goes on. For Ken, it is about getting him back to painting WWI/WWII helmets to share with future generations. As I departed back to Tampa the next day, it was humbling as my small American Airlines Aircraft flew over the building, we raised for Ken out of ashes.

Like many construction projects, there were adjustments and punch list items to complete after the fact our project punch list was minimal given the construction timeline and myriad of volunteers who answered the call to complete this project when the metal sheeting, fascia, soffit, and gutter materials arrive. Ken is in the building and over the next month will start painting again. So, who care, We care.



COL (RET) Frederic A. Drummond Jr, USACE, Project Manager of Saving Private Hegwood Building and Senior Engineer-Leidos is the Defense Threat Reduction Agency's Remote Technical Support (RTS) for the Target Assessment Technologies Division (RD CXA) for the U.S. Central Command (CENTCOM) at MacDill Air Force Base in Tampa, FL. He provides a full range of engineering subject matter expertise, planning experience and advice in characterizing conventional and hardened structures with weapons effect strategies in support of CENTCOM's area of responsibility. His functional responsibilities include operational implementation of Integrated Munitions Effects Assessment/Underground Targeting & Analysis system into strategic planning priorities synchronized with the Hard Target Research and Analysis Center and various DOD agencies.

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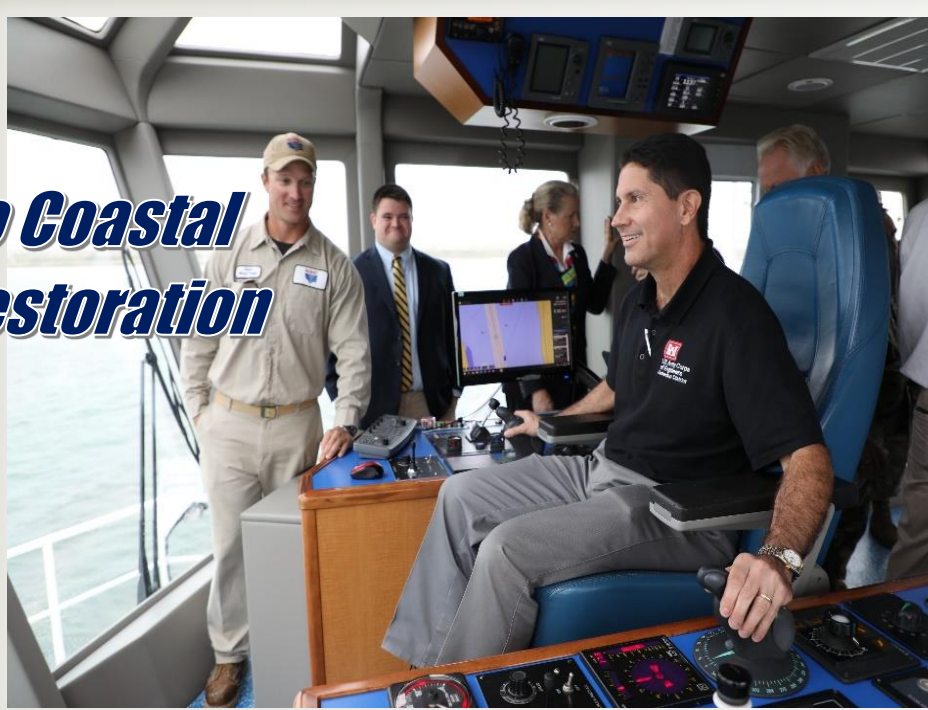


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# *Incorporating EWN into Coastal Texas Resilience and Restoration*

**D**r. Edmond Russo is a former deputy district engineer for Planning, Programs, and Project Management, Galveston District, and current director, Environmental Laboratory, U.S. Army Engineer Research and Development Center, USACEA, and 27-year veteran of USACE. Dr. Russo has a passion for innovation, especially identifying and pursuing new ways to improve water resource management efficiency and effectiveness. In his work at the Galveston District, he led a team that is developing a 50-year plan to protect and restore the Texas Gulf Coast. Galveston District's 50,000-square-mile area of responsibility spans over 360 miles of the Texas coast, from Louisiana to Mexico, extending inland 150-200 miles, and includes world-scale ports, container terminals and the Houston Ship Channel. The region's fragile coastal shorelines, ecosystems and infrastructure are vulnerable to sea level rise and extreme storms.

The District has correspondingly big challenges and opportunities in the areas of navigation, flood risk management, coastal storm risk management and ecosystem restoration. The Galveston team is currently working on navigation channel improvement projects on the order of approximately \$3.9 billion. When Dr. Russo arrived at the Galveston District in 2014, he faced significant organizational and collaboration challenges. Under his leadership and driven by his Fierce Urgency of Now (FUN) approach, the district became the first EWN Proving Ground, which inspired and enabled the Galveston team to collaborate and innovate to effectively address pressing water resource management challenges. The team's work led to the integration of nature-based solutions into their traditional water management processes. For example, in one project, the sediment that was dredged from the Houston Ship Channel an activity that was required to expand the channel and improve shipping safety was used to construct wetlands and



*Dr. Edmond Russo in the pilot seat while touring the Ellis Island hopper dredge. Photo by Mr. Francisco G. Hamm, public affairs specialist, USACE, Galveston District.*

dikes in Galveston Bay. By using the dredged sediment instead of more expensive rock for the lining of the dikes, the team was able to achieve extended ecological benefits, while meeting its navigation safety and reliability mandates and reducing costs by about 30% compared to more traditional approaches. What was learned from initial EWN projects is being incorporated into larger projects in the District, including the "Coastal Texas Protection and Restoration Feasibility Study," which recommends infrastructure construction along the coast of Texas on the scale of \$22 billion to \$32 billion and spanning a 50-year timeframe. Part of the proposed plan is to construct a 40-mile-long barrier of beaches and vegetated dunes across Galveston Island and Bolivar Peninsula.

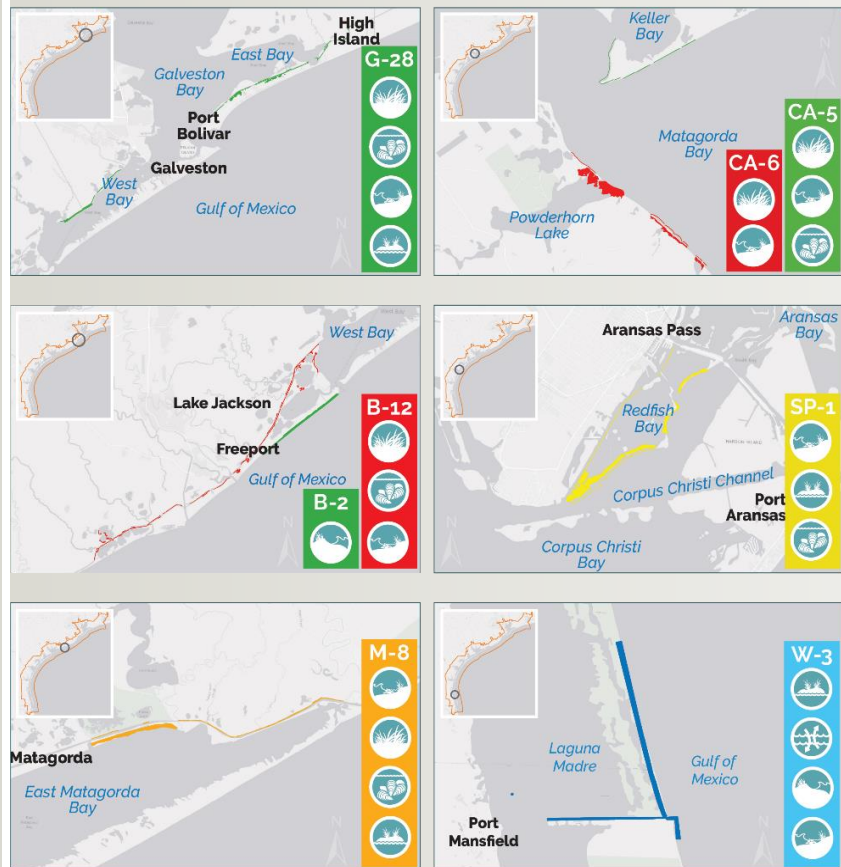
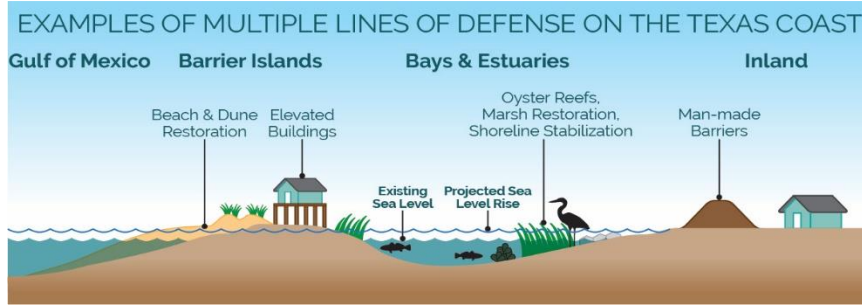
A key objective is to reduce coastal storm surge from the Gulf of Mexico into Galveston Bay. This will reduce the risk of property and infrastructure damage and protect and restore fragile ecosystems. Dr. Russo believes this will be critical to achieving long-term resilience and sustainability of coastal communities and ecosystems, especially along the Houston Ship Channel where billions of dollars of energy sector and other economic assets are located. Dr. Russo talks about the importance of one of the core EWN principles the team has applied to the development of the Feasibility Study enhancing communication and collaboration with decision-makers, agency partners, academics, and public stakeholders, through a variety of activities, including community work groups. A key finding has been that early and frequent engagement with clear and transparent explanations of the process, progress,



and intent of each stage, plus enabling stakeholders to influence the process and outcomes, is helping to achieve shared understanding and unity of purpose. He notes this spirit of collaboration will be critical in the future planning and implementation phases of the long-term “Coastal Texas Protection and Restoration Plan.” When envisioning the Texas coast over the next 50 years, Edmond believes the application of EWN in the Galveston District will enhance understanding of the complex performance of integrated coastal storm risk management and ecosystem restoration features at a landscape scale. The integration of robust field observation, data collection and analysis, leap-ahead biophysical process modeling and simulation, machine learning and artificial intelligence will significantly improve decision-making, project performance and outcomes especially during significant storm events. He notes that as the Galveston District continues to innovate, the lessons learned in applying EWN principles and practices and those associated outcomes will be shared with other USACE districts to extend value to the nation.

Ecosystem Restoration – The Coastal Texas Study identifies nationally significant environmental restoration strategies along the entire Texas coast. These restoration projects are evaluated based on long-term benefits, costs, feasibility, and resiliency. Objectives for ecosystem restoration focus on:

- Restoring fish and wildlife habitat
- Improving hydrologic connectivity
- Reducing erosion to shorelines
- Creating/Restoring oyster reefs
- Implementing sediment management



Dr. Edmond Russo (left) touring the Cheniere Energy Facility and the Moda Midstream Facility, two examples of the Texas economic development opportunities as part of a two-day Corpus Christi Ship Channel Improvement Project update. Photo by Mr. Francisco G. Hamm.



# Army Corps Project Revitalizes Economy of New Jersey's Largest City

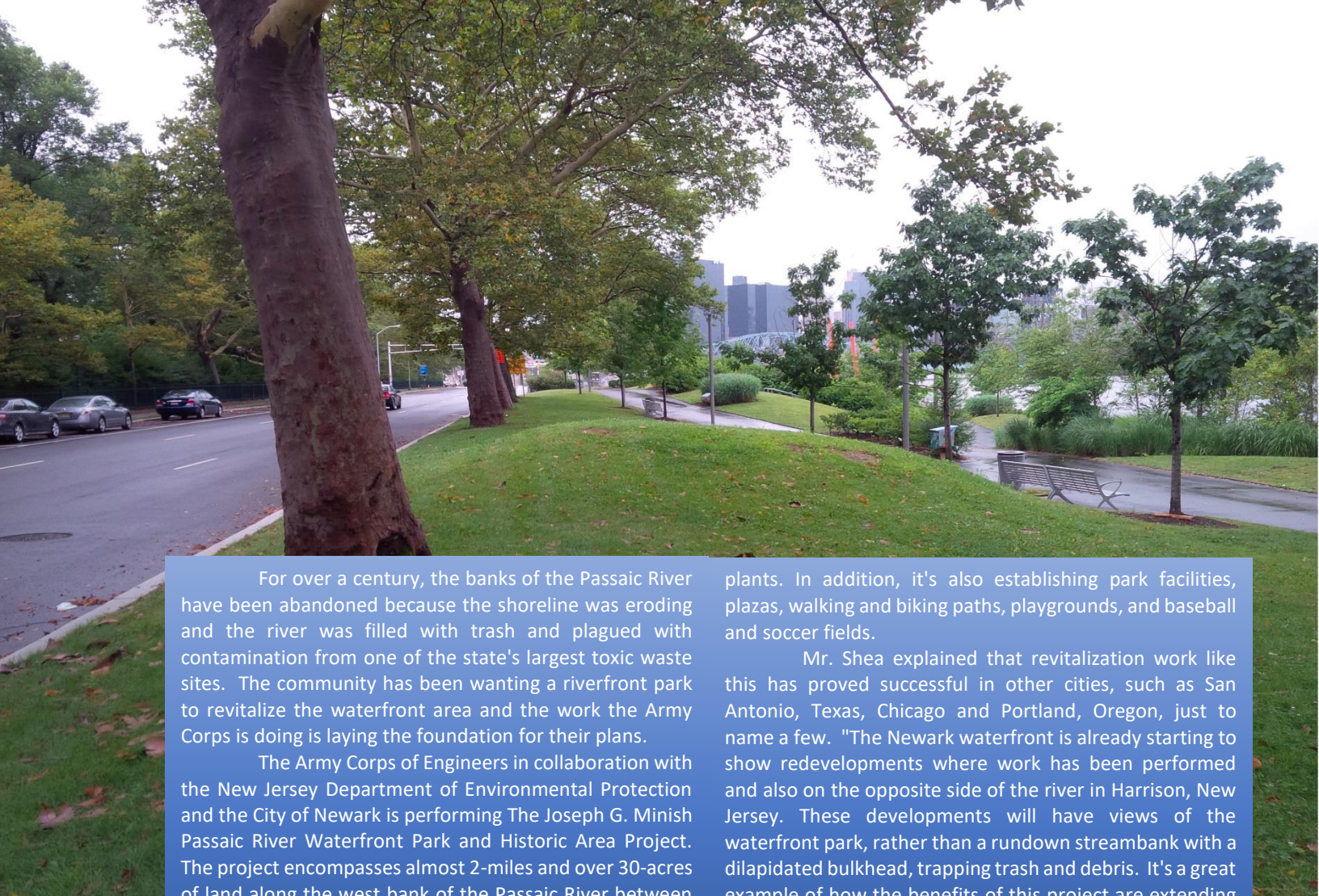
*By JoAnne Castagna, Ed.D.*



For the first time in 100 years, the residents of Newark, NJ have access to their Passaic River waterfront. This is due in large part to a construction project being performed by the USACE, New York District that is restoring the riverbank with a new bulkhead wall designed to prevent the shoreline from eroding. "It's

interesting that something as simple as a bulkhead can be the kickoff of a riverfront redevelopment project for the City of Newark, becoming a key feature in the revitalization of Newark's Downtown," said Mr. Jason Shea, project manager, New York District, USACE.

*Photo left top: For over a century, the banks of the Passaic River in Newark, NJ have been abandoned because the shoreline was eroding and the river was filled with trash and contamination. Photo left bottom: Newark's contractors, constructing a portion of the riverfront park where USACE previously completed the bulkhead. Photo top: Completed portions of the Newark, NJ riverfront park. Photo below: USACE is constructing a new bulkhead along the Passaic River in Newark, NJ that will prevent the shoreline from eroding. This work is also laying the foundation for a new riverfront park. Photo bottom: Completed portions of the Newark, NJ riverfront park.*



For over a century, the banks of the Passaic River have been abandoned because the shoreline was eroding and the river was filled with trash and plagued with contamination from one of the state's largest toxic waste sites. The community has been wanting a riverfront park to revitalize the waterfront area and the work the Army Corps is doing is laying the foundation for their plans.

The Army Corps of Engineers in collaboration with the New Jersey Department of Environmental Protection and the City of Newark is performing The Joseph G. Minish Passaic River Waterfront Park and Historic Area Project. The project encompasses almost 2-miles and over 30-acres of land along the west bank of the Passaic River between Bridge and Brill Streets in Newark, NJ, the largest city in the state.

The Army Corps is overseeing the construction of 6,000 feet of new bulkhead along the river, which entails restoring 3,200 feet of riverbank, constructing a 9,200-foot waterfront walkway and creating landscaping using native

plants. In addition, it's also establishing park facilities, plazas, walking and biking paths, playgrounds, and baseball and soccer fields.

Mr. Shea explained that revitalization work like this has proved successful in other cities, such as San Antonio, Texas, Chicago and Portland, Oregon, just to name a few. "The Newark waterfront is already starting to show redevelopments where work has been performed and also on the opposite side of the river in Harrison, New Jersey. These developments will have views of the waterfront park, rather than a rundown streambank with a dilapidated bulkhead, trapping trash and debris. It's a great example of how the benefits of this project are extending regionally, outside Newark City limits," said Shea. He added, "The park brings a welcoming feel to the area, leading to investments in commercial and residential properties. It's been great to see this happening over the past two decades in Newark." The project is expected to be completed in the fall of 2023.



Dr. JoAnne Castagna is a Public Affairs Specialist and Writer for the U.S. Army Corps of Engineers, New York District. She can be reached at [joanne.castagna@usace.army.mil](mailto:joanne.castagna@usace.army.mil).



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