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Fellow engineers, I hope this finds you and your Families doing well.

Throughout the last few months, the world has been grappling with the complex problem of the Novel Coronavirus (COVID-19). As a result of COVID-19, the U.S. Army and the Engineer Regiment have redefined normal operating procedures and continue to make significant strides in supporting the demands of the Nation while incorporating mitigation strategies to slow the spread of the virus. I would like to thank each of you for your innovative efforts and utmost adaptability to help sustain the readiness of our force. Perpetual optimism and creative ideas from junior Soldiers and senior leaders alike are vital in ensuring that our Regiment continues to evolve.

Regardless of the circumstance or challenge, the Engineer Regiment continues to embody the “Essayons . . . We WILL succeed” spirit. The U.S. Army Corps of Engineers (USACE) constructed numerous alternate care facilities to reduce the burden on hospitals and support the medical requirements of the Nation. The 1st Engineer Brigade and the U.S. Army Engineer School (USAES), Fort Leonard Wood, Missouri, train hard every day to produce quality Soldiers to fill the ranks of units in the field. Throughout the world, engineer units are competing with our adversaries and showcasing our resiliency and perseverance. In Europe, the 15th Engineer Battalion, Grafenwöhr, Germany, reinforced regional partnerships and enhanced existing infrastructure during Exercise Resolute Castle 2020. In the Pacific region, the 7th Dive Detachment, Hickam Air Force Base, Hawaii, partnered with various agencies to conduct port clearance operations through hydrographic surveys and scuba diving.

Soldiers from the 579th Engineer Battalion, Santa Rosa, California, and the 14th Brigade Engineer Battalion, Joint Base Lewis-McChord, Washington, helped fight wildfires throughout various regions in California. The 9th Engineer Battalion, Fort Stewart, Georgia, conducted an excellent wet-gap crossing during Defender 2020, highlighting the need for more engineers in order to ensure brigade and division success during future wet-gap crossings. In every facet, engineers are supporting the fight against COVID-19 and are training to ensure optimal readiness.

Throughout garrison, units continue to harness virtual platforms to stay connected. With an increase in virtual communications, I ask that subordinates, peers, and supervisors remain engaged. It is vital that Soldiers continue to communicate any additional burdens caused by the COVID-19 pandemic and that leaders continue to share creative ways to tackle problems. I look forward to seeing how various units revolutionize collective training, routine preventive maintenance checks and services, and communication efforts under the COVID-19 restrictions.

I ask that you continue to build your team and a culture that values inclusion, moral fortitude, and the Army values. Building our teams and genuinely caring for the health and welfare of Soldiers help tackle the challenges of suicide, sexual misconduct, and racism/extremism. All Soldiers and leaders are part of the solution!

Thank you again for your steadfast commitment to the Regiment and USAES. My team and I appreciate the support and commitment to mission success. “Essayons . . . We WILL succeed!”

“Perpetual optimism and creative ideas from junior Soldiers and senior leaders alike are vital in ensuring that our Regiment continues to evolve.”
I hope that this message finds each of you and yours well. It is an honor for me to have the opportunity to communicate with such an incredible and diverse group of professionals. I am humbled to be the 28th Regimental Command Sergeant Major of the U.S. Army Engineer School (USAES) and to give back to our great Regiment in this capacity. My transition into USAES was seamless, largely due to the efforts of the phenomenal team here. I want to publicly thank Sergeant Major Eric T. Arredondo, the engineer proponent sergeant major of the Engineer Personnel Development Office. He did an exceptional job of maintaining the continuity of this position during a period of transition. He is an absolute professional. Thank you, Sergeant Major Arredondo. And I would be remiss if I didn’t take a moment to acknowledge all the great work and efforts of Command Sergeant Major Douglas W. Galick during his tenure as the 27th Command Sergeant Major of USAES. Thank you, Command Sergeant Major Galick, for all that you did to advance multiple efforts for the Engineer Regiment. We wish you and your Family the absolute best during your assignment with the Pacific Ocean Division, U.S. Army Corps of Engineers (USACE), Fort Shafter, Hawaii.

The Novel Coronavirus (COVID-19) pandemic forced all of us to adjust our lifestyles, personally and professionally. From the personal aspect, many discovered new activities or learned new ways to enjoy old activities and many connected with their Families in a deeper way—potentially gaining a greater appreciation for loved ones. Professionally, Soldiers transitioned to teleworking, conducting their daily duties from a computer at their residence; many businesses and organizations implemented personnel rotations, limiting the number of personnel in the work place at any one time and offering balance while rotating personnel through the office. Remaining connected and engaged without the typical day-to-day, face-to-face interactions with Soldiers was a challenge for Army leaders. But leaders found creative ways to leverage technologies and continue the mission. Through technology, leaders maintained accountability, conducted decentralized physical training, and replicated leaders’ time training on a virtual platform. The most concerning aspect of this pandemic for the Army is the impact on individual and unit readiness. For a short period of time, institutional training ceased. The Army worked to establish a new method of operating schools and conducting classes while mitigating the potential spread of COVID-19. The analysis took time; but once again, our Army and our Soldiers demonstrated tremendous flexibility and adaptability.

Early on, Army leaders identified the need to get our professional military education (PME) system back online, with personnel requiring PME for promotion. Given the environment and challenges, this took place rather quickly. Engineer PME is back on, and leaders are training again. The biggest difference now is that most will encounter a 14-day quarantine upon arrival. Different courses incorporate virtual training into those 14 days in order to maximize efficiency. Another significant difference is that most courses are filling at 50 percent capacity and—depending on the military occupational specialty—the opportunity may only be available twice a year. This is all the more reason for our noncommissioned officers to be prepared when the opportunity arises; “no-shows” are detrimental to the Regiment. Most of the engineer functional courses are also back in session with similar limitations. I encourage leaders and units to get Soldiers scheduled for courses or use “walk-on” opportunities, where applicable.

I encourage all engineer Soldiers and leaders to seek opportunities and venues to provide feedback to USAES. Let us know what we can do to better support you. There is an incredible team of uniformed and civilian professionals here, dedicated to you and our regiment. I’m amazed by all that is done here and by all of you out there; I’m very proud to be a part of the best Regiment in the Army.

Although the COVID-19 environment presented unusual circumstances and numerous challenges, our incredible engineers continue to reinforce and personify the Regimental motto, “Essayons... We WILL Succeed.”
Greetings from the U.S. Army Engineer School (USAES).

The last several months have been very challenging due to the Novel Coronavirus (COVID-19) pandemic. COVID-19 has forced us into uncharted waters and has enabled us to grow in several areas. I would like to commend everyone in the Engineer Regiment for taking an active role in the effort to be part of the solution.

During the initial phase of the COVID-19 pandemic, USAES sent warrant officers to support several U.S. Army Corps of Engineers (USACE) districts in combating the pandemic. This effort was highly successful and highlighted the skill sets that our Military Occupational Specialty (MOS) 120A–Construction Engineering Technicians bring to the fight. Thank you to all Soldiers for their support during these trying times, and a specific thank you to Chief Warrant Officers Five Corey K. Hill and Frank O. Davis and Chief Warrant Officers Three Michael L. Keck, Daniel W. Schwab, and William S. Test for supporting these efforts and showcasing the critical role that MOS 120As serve in USACE.

There was a tremendous surge of work in the geospatial arena of the Regiment. At the Army Geospatial Center (AGC), Humphries Center, Fort Belvoir, Virginia, Chief Warrant Officers Five Stephen E. Joseph and Angel Martinez Jr. led efforts to stand up a geospatial task force to develop a visualization tool that would enable senior Army leaders to understand how COVID-19 was spreading throughout the world. The geospatial dashboards created by multiple units demonstrated the power of geospatial information and services and illustrated how it can be leveraged in a noncombat environment. Similar efforts were led by Chief Warrant Officer Three Ivan Deleon, 543d Engineer Detachment, U.S. Army North, San Antonio, Texas. He created an unclassified common operating picture with direct geospatial foundation data feeds from various organizations including the Department of Homeland Security; the U.S. Census Bureau; the Environmental Systems Research Institute; the Centers for Disease Control and Prevention; the U.S. Department of Health and Human Services; and Johns Hopkins University, Baltimore, Maryland, and other sources such as Public Health Informatics, Defense Installations Spatial Data Infrastructure, and USACE Reach-back Engineer Data integration (REDi).

Despite the pandemic, the warrant officer cohort has made great strides with the Warrant Officer Talent Management Task Force, with initiatives to change the promotion management system. Significant changes to warrant officer promotions are currently in draft form as a proposal for inclusion in fiscal year 2022 legislation. If approved, warrant officers would receive promotion flexibilities similar to those rendered to other officers. Warrant officers would be eligible for merit-based promotions and would have the ability to opt out of promotion boards. The Army would promote the top warrant officer performers based on the promotion board order-of-merit list and remaining warrant officers based on their seniority.

I would like to congratulate the warrant officer selectees for the July 2020 accessions board. Yet again, we charted unknown territory by selecting two MOS 12B–Combat Engineers to join our engineer warrant officer ranks as MOS 120As. The Regiment has been working on this initiative for more than a year. We continue to look deep into our engineer formations to find hidden talent and Soldiers with civilian-acquired skills that align with our warrant officer specialties. I am confident that our two new MOS 12B selectees and all of our current warrant officers will continue to make the Regiment proud. Thank you again for your optimism and perseverance despite our unknown circumstances. Essayons . . . We WILL succeed!

“We continue to look deep into our engineer formations to find hidden talent and Soldiers with civilian-acquired skills that align with our warrant officer specialties.”
As our Nation recently celebrated its 244th birthday and our Army—which is older than our Nation—turned 245 years of age, we reflect on our history. We are proud to be a part of the best-trained, most lethal, and most respected institution in the world.

Our Soldiers make us great. From enlistment to separation, the U.S. Army develops Soldiers and instills values, successfully transforming citizens into leaders of character and Soldiers for life. Leadership goes on 24/7 and requires engagement in order to know people, equipment, and operations. As leaders, we must visit our areas of responsibility to ensure good order and discipline—all while treating everyone with dignity and respect. To accomplish our mission, we must live by the five characteristics of the Army profession:

- **Trust.** Trust is the foundation of our profession. The American public believes that its Army will act ethically, effectively, and efficiently in order to protect the Nation and its interests. Soldiers and Army civilians trust their superiors, subordinates, and peers to be competent and reliable. To build trust and ensure mission success, we must embrace the diversity within our units and be inclusive of every person.

- **Honorable service.** Honorable service refers to the oaths of enlistment or office that all Soldiers and civilians take. Army professionals protect and defend the people of the United States—an exclusive responsibility. To gain perspective and to generate trust, we must tell our story and we must listen to those in our formations and learn why they serve. We must share their stories with the American public to inspire the next generation of Soldiers to join our ranks.

- **Military expertise.** Military expertise encompasses the expectation that all Soldiers and Army civilians become masters of their craft. Competence—in leader development, ethics, culture, and technical areas—is our watchword. Chemical, biological, radiological, and nuclear; engineer; and military police Soldiers are essential in granting our maneuver units freedom of movement on the battlefield. The Army cannot succeed without the critical maneuver support skills and capabilities developed at Fort Leonard Wood, Missouri.

- **Stewardship.** The ideal of stewardship is a reminder to respect the trust and develop the next generation of leaders. We meet this responsibility by holding each other accountable. If we notice a violation of our professional standards, we must take the opportunity to respectfully correct it. If we are on the receiving end of a correction, we must respond with “thank you” and we must fix the issue.

- **Esprit de corps.** Esprit de corps encapsulates the winning mentality of our Army. This spirit helps unify us into a cohesive group. Our units display esprit de corps by respecting traditions, maintaining discipline, and fostering a team-centric environment. Winning matters, and units that foster esprit de corps understand that. They never quit in the face of adversity, and they stand by each other during the toughest missions.

Achieving these five characteristics as individuals and teams will ensure that we are able to fight and win on any battlefield. To learn more about the Army profession, visit the website <https://capl.army.mil/>.

Major General Bonner is the Commanding General of the Maneuver Support Center of Excellence and Fort Leonard Wood. Major General Bonner was a distinguished military graduate from Southern Illinois University. He holds master’s degrees in administration from Central Michigan University and national security and strategic studies from the U.S. Naval War College, Newport, Rhode Island.
As the Novel Coronavirus (COVID-19) response continues, the U.S. Army Engineer School (USAES), Fort Leonard Wood, Missouri, has sent engineers to locations across the country to assist the U.S. Army Corps of Engineers (USACE) with the planning and building of alternate care facilities that will expand the number of hospital beds available for the treatment of patients.

According to Major Richard C. Ghinelli, officer in charge of the USAES augmentation mission, the officers and warrant officers on this mission have advanced degrees and certifications and will primarily use their skills for site assessment, mission tracking, and data management. They will also act in quality assurance roles, overseeing contractors as alternate care facilities are constructed.

“The U.S. Army engineer officer has a variety of skills that are pertinent to this support mission,” Major Ghinelli said, “The selected engineer officers all have training and experience in running a tactical operations center that conducts operations planning and tracking to accurately report the progress of the mission and recommend needed adjustments. Other officers will directly support USACE teams conducting site assessments of potential alternate care facility locations and provide quality control and assurance of contracted construction to ensure the plan comes together as rapidly and correctly as possible to provide the critical facilities to those in need.”

Additionally, Major Ghinelli indicated that geospatial engineer officers are supporting the mission by visually tracking resource distribution and by mapping project status and pandemic statistics to provide leaders with a common operating picture. “These maps enable district leaders to visualize current and projected hospital bed occupancy rates, which helps the district commander and local leaders better understand COVID-19 saturation and severity,” he said.

According to Lieutenant General Todd T. Semonite, USACE commander, USACE has built 17 facilities with a
total of nearly 15,000 beds so far. Semonite estimated that, depending on the number of COVID-19 cases that occur, 40 to 50 total facilities might be built by USACE in the next several months. Major Ghinelli added, “The scale of the emergency response required for this mission is one of the biggest reasons for USAES engineers to be supporting USACE.”

“The majority of USACE personnel is comprised of civilian employees who are not typically deployed or working from an operations center,” Ghinelli said, “So, as the size and scope of their operations increased to the level . . . required for the COVID-19 pandemic, Soldiers from USAES and the Engineer Regiment are uniquely suited to augment USACE and expand their already significant disaster response capability.”

Major Ghinelli added that, in recent years, USAES has supported other large-scale emergency response situations, such as Hurricane Katrina in 2005; Super Storm Sandy in 2012; and Hurricanes Harvey, Irma, and Maria in 2017. “In every case, these officers played a significant role in executing the National Response Plan,” he said.

Brigadier General Mark C. Quander, USAES Commandant, spoke to Fort Leonard Wood engineers before they departed on 6 April 2020. He told them that he was proud of everything they were about to do. “We’re asking you to use all the talents that you have learned in the military to date and contribute to our Nation’s efforts to win the war against COVID-19,” Quander said, “When we’ve recovered as a Nation, you will each look back and reflect on the contributions you made to help overcome the adversities that we all endured through this significant point in our Nation’s history—and you will have made a difference.”

Mr. Hill is the managing editor of the Guidon, Fort Leonard Wood. He holds a bachelor’s degree in history from Texas State University, San Marcos.
A breakout of an infectious disease in unaccompanied personnel housing (otherwise known as the barracks) can have crippling effects on unit readiness. Although good hygiene and routine disinfection remain the best practices for preventing a virus like the Novel Coronavirus (COVID-19), there are also some facilities-based recommendations that could potentially contain—or at least slow—an outbreak. We gathered recommendations from infectious-disease experts; industrial hygienists; and Army warrant officer facilities experts, Military Occupational Specialty (MOS) 120As—Construction Engineering Technicians, to compile a list of mitigating measures that unit representatives can take once a Soldier living in the barracks has tested positive for COVID-19.

First and foremost, commanders and first sergeants should establish and train unit “clean teams” to disinfect areas where COVID-19-positive Soldiers have been. These teams should be provided with proper medical-grade personal protective equipment and disinfectant cleaning products. As a best practice, our unit (the 84th Engineer Battalion, Schofield Barracks, Hawaii) relied heavily on MOS 74D—Chemical, Biological, Radiological, and Nuclear Specialists to lead and train these teams. The teams should also have the opportunity to rehearse disinfection procedures.

As an added preliminary step, unit leaders should request field-expedient assessments of the barracks through the Directorate of Public Works (DPW) or from local engineer units. Although the U.S. Army has aspired to reach a “1+1 standard” for barracks design and construction (in which Soldiers each have their own private bedrooms that open into shared common space with a bathroom and kitchen area), there are still numerous layouts and unique design features in barracks facilities across different installations. A hasty reconnaissance of the barracks can be conducted to determine some of the specifics required to emplace mitigating measures. Construction engineering technicians are assets in any formation; however, MOS 120A warrant officers can be lifesavers during a pandemic. Commanders, first sergeants, and savvy barracks managers can verify some factors over the phone, alleviating the need for in-person assessments. DPW should have a repository of blueprints for each building, which would also prove useful. Heating, ventilation, and air conditioning (HVAC) drawings would be particularly important and would greatly assist with the assessment. The location of the air intake and the way in which the bathroom fans are connected will make a difference.

By Lieutenant Colonel Lisa (Reyn) Mann, Chief Warrant Officer Three Travis W. Henning, and Warrant Officer One Maksym Zymin
Facilities Considerations for COVID-19 Assessments

Unit barracks managers should consider several factors when performing barracks assessments:

- **Carpeting.** Do the barracks contain carpet? For ease of cleaning, it is recommended that COVID-19-positive Service members be housed in rooms without carpet. During elevated health protection condition levels, it is recommended that all Soldiers roll up and store away any personal rugs and window curtains in order to ease the burden on unit clean teams.

- **Door Seals.** Do the entrance doors have good seals? Can daylight be seen under or around the closed door from either side? If the doors are not properly sealed, installing door seals or hanging plastic on the doors of COVID-19-positive Soldiers is recommended. If the door opens outward, the seals or plastic barrier should be placed on the inside. If the door opens inward, the seals or plastic barrier should be placed on the outside. Barracks managers should keep self-adhesive silicone weather stripping on hand.

- **Temperature.** Studies show that COVID-19 thrives at temperatures of 69–73°F, within the range of the temperature settings of most buildings. According to the National Academies of Sciences, Engineering, and Medicine, laboratory studies have shown a relationship between higher temperatures/humidities and reduced survival of COVID-19 but there is currently no recommendation for real-world mitigation.\(^1\) Consideration of temperatures in the barracks is worthwhile to determine whether conditions are generally more ideal or less-than-conducive for a viral outbreak.

- **Ventilation.** It is recommended that bathroom fan vents and all other return vents in the room of a COVID-19-positive Service member be closed until a filter can be installed over the vents. The average diameter of the COVID-19 virus is 0.125 micrometers,\(^2\) so high-efficiency particulate air (HEPA) filters are highly preferred. Depending on the existing construction design, the size of the filter needed can vary. Drywall screws and aluminum duct tape are needed in order to affix the filters over the vents. The installation of filters assists in creating negative pressure without contaminating the rest of the system. If HEPA filters are not readily available, standard filters can be used to provide some protection by keeping out larger droplets to which the virus can attach.
**Exhaust.** Where does the exhaust from the vents exit the building? If the exhaust exits from the roof, the preferred location for housing COVID-19-positive Soldiers is on the highest possible floor. If the exhaust exits on the ground level, the preferred location for housing COVID-19-positive Soldiers is on a lower floor. This should reduce contamination of the entire ductwork system if the HEPA filters lose their seals or otherwise fail.

**HVAC.** Does the barracks building have a centralized HVAC system, or does each room have its own dedicated unit? The housing of COVID-19-positive Soldiers in rooms with their own environmental control units that recirculate and cool or warm the interior air is preferable. If the building has a centralized HVAC system, it is recommended that exterior windows remain closed where Soldiers who test positive for COVID-19 are housed. Again, the dampers for the bathroom fans and other return vents should be closed until a HEPA filter can be installed over the vents. It is recommended that Soldiers create positive pressure in adjacent rooms by opening the windows to let in clean air. This provides uninfected personnel with an additional measure of protection—although it may be unnecessary, given that most large droplets fall out of suspension within 6 feet from the source and the separating walls already provide an excellent physical barrier.

Central HVAC systems assist with pulling in fresh air from outside and mixing it with recirculated air within a building, allowing the dilution of any potential contaminants that are floating around. Overall, increasing the air exchange enhances the dilution of the air in the building. Therefore, 20–30 minutes before sending a unit clean team in to disinfect a room, the windows should be opened to allow fresh air to dilute the contaminated air space. If negative pressure is required, additional facilities modifications will be necessary and DPW approval must be obtained.

**Deliberate Containment Options for Facilities**

Once it has been determined how an HVAC system is designed and built, one option for deliberately creating negative pressure might be to work with DPW to reprogram the digital diagnostic controls to modify fan speeds and create negative pressure in all barracks rooms.

As part of the tiered national response to COVID-19, the Army Facilities Components System Team developed a low-acuity care tent hospital solution. The design is now available through the Joint Construction Management System (JCMS) desktop software and the U.S. Army Corps of Engineers Army Facilities Components System REDi Portal at <https://uroc-redi.usace.army.mil/sites/afcs/default.aspx>. Each 125-bed module is entirely designated either for COVID-19-positive Soldiers or COVID-19-negative Soldiers, limiting HVAC and separation/isolation requirements.

**Baseline Recommendations**

These recommended measures are meant to rapidly address COVID-19-positive Soldiers in the barracks; however, it is clear that there is no way to completely mitigate risk with facilities-based solutions. The following are some baseline recommendations from an infection control specialist:

- Commanders should restrict COVID-19-positive Soldiers to their rooms. If there are shared facilities such as a kitchen or bathroom, doors should be kept closed to limit exposure. The unit should provide all basic Soldier needs including food, laundry, and mail. Personnel providing the needed supplies should have no physical contact with the COVID-19-positive Soldier and should maintain good hand hygiene (washing hands with warm, soapy water for at least 20 seconds or using an alcohol-based hand sanitizer) after interaction.

- Service members who have tested positive for COVID-19 and have a roommate should be separated from that roommate. Preferably, the infected Soldier stays in the room and the other Soldier is treated as a close contact of a known positive case and is moved elsewhere, restricted from further movement, and directed to self-monitor.
If COVID-19-positive Soldiers must share facilities with others, doors should be kept shut and Soldiers should wear masks and maintain good hand hygiene before entering the kitchen, bathroom, or other common areas. Personnel around infected Soldiers should be limited by establishing “common area time” and asking others to avoid these areas during the times allocated. Once an infected Soldier recovers, he or she can disinfect his or her own room. Alternatively, if an infected Soldier vacates a living space, unit clean teams must disinfect all living areas.

**Conclusion**

In summary, commanders and first sergeants can implement the recommended COVID-19 measures as part of a comprehensive strategy to rapidly address a COVID-19-positive Soldier residing in the barracks. In addition to medical-grade personal protective equipment and disinfectant cleaning supplies for unit clean teams, we recommend an emergency supply of materials to cover a bathroom fan or other return vent and self-adhesive weather stripping to properly seal a door. In spite of facilities-based measures that can be taken, routine disinfection of barracks rooms remains the best method for the mitigation and containment of COVID-19. Although the threat and impacts of COVID-19 have fundamentally changed the way that we do business in the Department of Defense, one thing remains constant: Engineers have risen to meet the challenge with solutions. Together with recommendations from the medical community and chemical, biological, radiological, and nuclear experts, we can and will defeat the virus.

**Endnotes:**


Lieutenant Colonel Mann is the commander of the 84th Engineer Battalion. She holds a bachelor of science degree in environmental engineering from the U.S. Military Academy–West Point, New York, and a master of science degree in environmental engineering from Missouri University of Science and Technology at Rolla. She is a licensed professional engineer and a project management professional.

Chief Warrant Officer Three Henning is a construction engineering technician with the 84th Engineer Battalion. He is pursuing a degree in construction management.

Warrant Officer One Zymin is a construction engineering technician with the 84th Engineer Battalion. He holds bachelor and master of science degrees in electrical engineering from the Kyiv Polytechnic Institute, Ukraine.
In the early months of 2020, the world as we knew it came to a screeching halt and the Novel Coronavirus (COVID-19) began to sweep the Nation. An unparalleled problem had presented itself, and the Nation needed an immediate solution; in stepped the U.S. Army Corps of Engineers (USACE). According to Lieutenant General Todd T. Semonite, Chief of Engineers and commanding general of USACE, USACE prides itself on its ability to provide “innovative solutions for our Nation’s toughest challenges," including the challenge of a COVID-19 response.

Ready and willing to provide support on a moment’s notice, Soldiers and civilians from across the Nation—myself included—were called to action to augment the emergency response.

After having completed the Engineer Captains Career Course and, subsequently, the professional development program at the Missouri University of Science and Technology, Rolla, Missouri, I found myself in the middle of an international permanent-change-of-station move when the Department of Defense implemented its first stop movement action as a result of the COVID-19 outbreak. I was on permanent-change-of-station leave in New York, which had quickly become the Nation’s epicenter for COVID-19. It was during this time that I received a call from the U.S. Army Engineer School, Fort Leonard Wood, Missouri, indicating that I would be joining USACE in the fight against an invisible enemy—a term that quickly became synonymous with COVID-19. Within 48 hours, I arrived at the Baltimore District, USACE, in Baltimore, Maryland, to support the emergency management office.

Emergency Management

The job of the Baltimore District Emergency Management Office is to plan and manage response and recovery efforts for natural and manmade disasters in accordance with Public Law 84-99, Flood Control and Coastal Emergencies, and Public Law 93-288, Robert T. Stafford Disaster Relief and Assistance Act. USACE supplements organizational efforts at all levels to save human lives and mitigate property damage.

By Captain Matthew T. Golden

Captain Matthew Golden enters the Walter E. Washington Convention Center in Washington, D.C.
Nothing about disaster response is simple; but, in short, Public Law 93-288 enables the Federal Emergency Management Agency (FEMA) to orchestrate a federal national disaster response. Through mission assignments and funding, FEMA leans on USACE and a plethora of other agencies to execute various emergency support functions to synchronize the integration of tribal, local, state, and federal partners and others during a time of crisis.

USACE is the primary organization for FEMA Emergency Support Function No. 3, Public Works and Engineering. FEMA Emergency Support Function No. 3 deals with assisting FEMA and the Department of Homeland Security in the delivery of services, including providing public works engineering and construction management expertise and other critical support to prepare for, prevent, respond to, and recover from domestic incidents like the COVID-19 pandemic.

Federal Fight Against COVID-19

In the battle against COVID-19, the USACE Baltimore District was tasked by FEMA to help augment anticipated medical surge response needs in Washington, D.C.; Maryland; and Pennsylvania. This included inspecting 45 facilities such as hospitals, schools, correctional facilities, convention centers, and hotels across the region to determine their viability to serve as alternate care sites and converting those sites that were selected by the states.

The Baltimore District assessment teams determined facility viability based on the following factors:
- Structural soundness.
- Bed capacity.
- Isolation space.
- Electrical capabilities.
- Communication capabilities.
- Plumbing capacity.
- Heating, ventilation, and air-conditioning systems.

The feasibility of creating a negative-pressure environment to contain the introduction of new pathogens, safety codes, and the Americans with Disabilities Act compliance were three important considerations. The district equipped its state partners with inspection reports so that they could determine which facilities (if any) should be converted to alternate care sites and how to proceed. Based on models that predicted when peak infection rates would most likely stress the existing healthcare facilities beyond their capabilities, state governments requested the conversion and construction of selected alternate care sites.

Nationwide, USACE leveraged expertise from local industry and the USACE Medical Center of Expertise, Huntsville, Alabama, to provide life-saving and life-sustaining services through the design and construction of the alternate care facilities. The Medical Center of Expertise developed standard work performance statements to cover the conversion of specific facilities (such as an arena) to healthcare facilities; these statements could easily be modified to address project-specific requirements across the Nation.

On 16 April 2020, at the request of the Washington, D.C., government, the Baltimore District issued a contract to convert a portion of the Walter E. Washington Convention Center in Washington, D.C., into an alternate care facility. There were several advantages to converting the convention center, including its central location and the vast utility infrastructure. The Baltimore District oversaw the contract that covered the conversion of Hall A of the convention center into a 151,000-square-foot medical treatment facility with space for approximately 450 beds—nearly half of them capable of supplying oxygen to patients. The project also included support facilities like patient registration offices, storage and staff areas, and pharmacy and laboratory rooms.

In a matter of weeks, the Baltimore District team delivered a world-class care facility. A contract of this complexity and magnitude could take years to deliver; but through standard design and a Herculean team effort, the Walter E. Washington Convention Center conversion was completed.

Captain Golden and Captain Charles P. Robitaille review initial plans for the Walter E. Washington Convention Center.
on 8 May 2020. The facility was then turned over to the Washington, D.C., government for operation.

**Volunteer Force**

What surprised me most upon my arrival at the Baltimore District Emergency Operations Center was not the massive onslaught of emergency tasks and responsibilities that existed, but the team-like approach. Successful mission execution was not the only “wow factor.” The way in which the mission was achieved was also impressive; a group of strangers had come together to tackle the COVID-19 response head-on—united by a desire to help a Nation in need.

Other than a small, permanent emergency management staff at the Baltimore District, in times of disaster, emergency operations are conducted almost entirely by a volunteer force of USACE civilians, with a few military augmentees added to the mix. These volunteers leave their day-to-day jobs within USACE and deploy for 30 days or more to fill various emergency management roles—most of which are completely unrelated to their normal duties. This includes professionals such as archeologists, engineers, logisticians, regulators, and human resource specialists. The district chief of emergency management, Ms. Doro-tha (Dorie) M. Murphy, was responsible for more than 100 emergency management volunteers/responders during the pandemic response. It was remarkable to observe people excelling at their newly assigned positions—completely committing themselves to mission success; displaying a unified sense of purpose; and working vigorous shifts, often exceeding 12 hours.

Caring and camaraderie were at the forefront of the emergency management team, breeding a culture of positivity and support—much like an extended Family. Emergency staff members frequently checked in on one another. Activities and events like “Funny Hat Day,” virtual team lunches, “Hero of the Day” recognition, and holiday and birthday celebrations introduced levity during tough times. During a period of uncertainty and isolation, this was a refreshing experience.

To best protect the entire workforce, approximately 90 percent of the district staff teleworked as staff members adhered to newly implemented social distancing measures. Despite this additional level of complexity, the district continued to deliver its other essential programs, such as flood risk management and the provision of drinking water to our Nation’s capital, while mitigating the spread of COVID-19.

USACE is an enterprise that demonstrates its commitment to its most valuable resource—its people. USACE and organizations like it epitomize what it means to be a team of teams. The COVID-19 response is just one example.

**Endnotes:**


Captain Golden is an operations officer for the 15th Engineer Battalion, Grafenwoehr, Germany. He holds a bachelor’s degree in mechanical engineering from Lehigh University, Bethlehem, Pennsylvania, and a master’s degree in engineering management from Missouri University of Science and Technology at Rolla.
During late April 2020, the U.S. Army Corps of Engineers (USACE) tasked a group of engineer captains to join the fight against the Novel Coronavirus (COVID-19) across USACE districts throughout the country. When Captain Shannon K. Peebles was informed that she would be traveling to the Jacksonville District, Florida, to aid in emergency operations, she was elated to return to serve the community where she had lived as a child. Captain Peebles arrived at the Jacksonville District headquarters on 7 April 2020 and got to work with the
district emergency operations center, tracking assessment teams that were traveling throughout Florida to evaluate potential alternate care facilities (ACFs), which were be used to treat the anticipated influx of COVID-19 patients.

Engineers from the Jacksonville District completed assessments of 26 potential ACFs in Florida, specifically in anticipated hotspots in the Miami region. Two of these sites were selected to be transformed into ACFs—the Miami Beach Convention Center (MBCC) and the Miami Medical Center. The State of Florida and the Federal Emergency Management Agency planned to use MBCC (with 400 acute- and 50 intensive-care beds) as the primary ACF and the Miami Medical Center (with a 180-bed capacity) as a secondary ACF. The MBCC construction contract was awarded to USACE, and that construction became the primary mission assignment.

As mission priorities shifted to coordination and planning with the State emergency operations center and contractors, Captain Peebles traveled to Tallahassee, Florida, to work with USACE representatives who were operating at the state level. The intent of dispatching personnel to various locations involved in the COVID-19 response was to build a shared understanding of the government/private entity dynamics involved in working together during emergency operations. This understanding was crucial for connecting the operations in Jacksonville and Tallahassee with the major construction efforts in Miami. Captain Peebles then traveled to the MBCC ACF site to work as a liaison and project engineer. Her primary role involved working with USACE project managers to maintain synchronization across the different organizations operating within the ACF, including the Florida Division of Emergency Management; the Federal Emergency Management Agency response team; the Jacksonville District incident command node; the Florida National Guard, Miami; the joint task force medical team; and supporting contractors.

While USACE work on MBCC construction was proceeding ahead of schedule, it was crucial that the primary project contractor ensure that all components of handover preparation were completed prior to 21 April 2020. Handover preparation included facility construction, equipment staging, sanitization, and preparation of the staff (by logistical and medical organizations) for receiving patients. As the peak of COVID-19 cases changed, becoming less severe during the 2 weeks of construction, the requirements for the ACF changed as well. The intent of the operating capability for MBCC shifted from treatment of a large number of nonambulatory patients to the treatment of less than 70 ambulatory “step-down” patients. This created construction design issues that needed to be addressed—specifically, the number of patient showers and restrooms required. Based on the large capacity for patient treatment at Florida hospitals, many project individuals speculated that the facility could potentially never receive a single patient. As of the writing of this article, MBCC has served as a major COVID-19 testing site for Miami residents—and Florida, along with many other parts of the country, has experienced record-breaking numbers of new cases of COVID-19.

Captain Peebles is a recent graduate of the Engineer Captains Career Course, Fort Leonard Wood, Missouri. She holds a bachelor’s degree in integrated science and technology from James Madison University, Harrisonburg, Virginia, and a master’s degree in information technology from Virginia Polytechnic Institute and State University, Blacksburg.
In April 2020, the situation in Michigan was grim. In the emergency operations center of the Detroit District, U.S. Army Corps of Engineers (USACE), I received an orientation to the crisis that was unfolding across the state of Michigan. A heat map displayed on a projector depicted a surge in Novel Coronavirus (COVID-19) infections across the state, concentrated in the Detroit metropolitan area. Stars across the map marked potential locations for temporary hospitals, termed alternate care facilities (ACFs), that might be constructed to meet the increasing demand for patients. In the weeks leading up to the orientation, USACE had partnered with officials from the State of Michigan to survey these sites and determine the feasibility of converting existing facilities into ACFs.

Two sites had been approved for construction. Transformation of the TCF Center, Detroit, into an ACF had already begun, with construction nearing completion. Meanwhile, in the suburb of Novi, Michigan, construction had just begun on the Suburban Collection Showplace convention center, which had been selected as an additional 1,100-bed ACF.

Unfortunately, COVID-19 was not the only challenge in Michigan. Mr. Patrick Kuhne, emergency operations manager for the Detroit District presented slides that showed a graph of the rising water level in the Great Lakes. Projections indicated that the rising water threatened to cause significant flooding across the state.
It was clear that an effective government response was urgently needed in order to meet the challenges in Michigan. Fortunately, the Detroit District was ready to do its part to effectively respond to the rising COVID-19 caseload as well as the rising water levels.

I was assigned to assist the project manager for the Suburban Collection Showplace ACF in Novi. The day before my assignment began, the scope of the project was revised from a 1,100-bed ACF to a 250-bed ACF, based on assessed needs from the State of Michigan. As the project team worked around the clock to update requirements and continue construction, I assisted the project manager by coordinating site visits for the project stakeholders, which included USACE personnel, the prime contractor responsible for constructing the facility, the Michigan National Guard elements supporting construction of the facility, other State of Michigan officials, and the health care team responsible for operating the ACF.

Maintaining shared understanding and a common operating picture amongst these stakeholders was key. Together with the project manager, I developed a walking tour of the site to demonstrate not only the experience of a patient receiving care in the facility, from arrival to discharge, but also the experiences of health care workers staffing the facility. Walking through the project site proved effective in synchronizing the expectations and requirements of each stakeholder as the project developed. Key insights were drawn from these visits, as each stakeholder brought his or her unique perspective and requirements to the site, confirming or refuting assumptions and providing valuable feedback to the project team. Early input from all stakeholders was critical for rapidly designing, constructing, and delivering an effective, safe ACF.

Additionally, I supported the project manager in preparing for and executing a site tour for distinguished visitors, including Michigan Governor Gretchen E. Whitmer; Senator Gary C. Peters; Congresswoman Haley M. Stevens; Oakland County executive, Mr. David W. Coutler; Federal Emergency Management Agency Region V administrator, Mr. James K. Joseph; Health and Human Services Region V director, Mr. Doug O’Brien; and Michigan’s adjutant general, Major General Paul D. Rogers. Finally, I joined the quality assurance team, which consisted of Detroit District personnel and augmentees from the Navy Facilities Command, to conduct quality assurance checks on construction ranging from plumbed oxygen systems designed to deliver oxygen to every patient to backup generators to provide the facility with an uninterruptible power source.

Toward the conclusion of the ACF project, I was assigned to assist the emergency operations center with flood prevention and recovery efforts. The shoreline of Michigan is home to public infrastructure and residential properties. The Detroit District partnered with local municipalities to protect assets by providing flood-fighting education and expertise to local governments and residents. The Detroit District flood-fighting team coordinated with local community emergency managers regarding the logistics necessary to distribute supplies across the state and advised local contractors and citizens about the proper use of sandbags, HESCO® barriers, and inflatable flood-fighting barriers.

My experience in Detroit was humbling. It was truly impressive to realize what can be accomplished when federal, state, and local governments partner with private industry to rise to the challenges of unpredictable threats. The effectiveness and speed of the USACE response to the COVID-19 pandemic and flooding in Michigan reinforced the value of, and the need for resources for, USACE. I am proud to be an Army engineer and to serve alongside the courageous men and women bringing their talents to bear on our Nation’s most daunting challenges. Essayons!

Captain Hughes was a platoon trainer for the Engineer Basic Officer Leadership Course, 1st Engineer Brigade, Fort Leonard Wood, Missouri. He holds a bachelor’s degree in electrical engineering from the U.S. Military Academy–West Point, New York.
In early April 2020, seven Army engineer officers from Fort Leonard Wood, Missouri, were mobilized in support of the Kansas City District, U.S. Army Corps of Engineers (USACE), response to the Novel Coronavirus (COVID-19) pandemic. They augmented the district and made an immediate impact by assisting with surveys of alternate care facilities (ACFs) throughout Kansas and Missouri. These ACFs were to be used to help alleviate the burden on existing hospitals due to an influx of COVID-19 patients.

The team was initially tasked with assessing a variety of locations, ranging from new facilities at the University of Kansas, Lawrence, to older, unused hospitals and clinics across the two states. The engineer officers were rapidly integrated into USACE and used USACE systems to collect data and disseminate it throughout the organization. Following the initial wave of assessments, it was determined that the most rapid transformations could be accomplished by converting hotels to hospitals. With this information, the Soldiers completed a second wave of assessments to identify the most viable infrastructure for conversion to ACFs.

The assessments included the identification of pre-existing hazardous conditions such as structural damage and mold formation. They also included the identification of functional problem areas that were expected to be encountered if the facilities were converted, such as limited

The National Geospatial Intelligence Agency-West project in Saint Louis
electrical power, inadequate laundry facilities, and undersized elevators and patient rooms. Once the assessments were completed, the team produced reports recommending the most viable locations for conversion to ACFs.

USACE was not the only beneficiary of the engineer officer mobilization. The officers gained a wealth of knowledge and experience regarding the roles that the federal government plays in responding to a crisis. The augmentation provided a valuable example of how the country operates during a national disaster. The team observed the shared responsibility and decision making that take place between the federal and state governments as well as the many factors that leaders must take into consideration when making decisions.

In addition, the engineer officers also observed some Kansas City District daily operations and other ongoing USACE missions. For example, the team learned about the levee system in the Northwest Division and the USACE role in flood management and its ability to maintain navigable waterways. The National Geospatial Intelligence Agency–West headquarters facility project in St. Louis, Missouri, is another example. The team observed the on-site construction of the facility and received a briefing on the phases of the project, which demonstrated the large scale of the projects for which USACE is regularly responsible.

The mobilization of the Army engineer officers to the Kansas City District during a time of national crisis was truly beneficial. The flexibility and hard work of the officers were of tremendous value to USACE and the local population. In addition, the augmentation was helpful in developing the engineer officers.

Chief Warrant Officer Three Keck is an instructor for the Warrant Officer Advanced Course, U.S. Army Engineer School, Fort Leonard Wood, Missouri. He holds a bachelor’s degree in computer and information science and a master’s degree in management from the University of Maryland University College (now the University of Maryland Global Campus).
In the late days of March 2020, Army Capability Manager–Geospatial (ACM-Geo), U.S. Army Engineer School (USAES), Fort Leonard Wood, Missouri, received a tasking to provide two engineer officers with geospatial training to support the Huntington District, U.S. Army Corps of Engineers (USACE), in the fight against the Novel Coronavirus (COVID-19) by providing geospatial visualization and analysis for the alternate care facility (ACF) mission. ACM-Geo answered the call with volunteers Captain Dave Truong and First Lieutenant Matthew Hain, both currently assigned to ACM-Geo as part of the Engineer Regiment Geospatial Development Program. The first week in April, they deployed to Huntington, West Virginia, to provide geospatial information and services support for a mission that was projected to last more than a month.

Upon arrival at the Huntington District Headquarters, Captain Truong and First Lieutenant Hain received a briefing on district operations related to the COVID-19 crisis, including operations related to disaster response and ACF assessments and construction. They met with district geospatial staff, verified access to the USACE network, and then got to work.

The initial task consisted of using an online portal to create a map to depict hospital bed shortages within the U.S. Army Corp of Engineers common operating picture (UCOP) in Ohio, enabling the commander of the Huntington District to advise the governor of Ohio and the Federal Emergency Management Agency about which areas were most impacted by COVID-19 and, therefore, would most need ACF construction. Captain Truong and First Lieutenant Hain were provided with data that included the number, location, and availability of intensive-care units and non-intensive hospital beds throughout Ohio. They analyzed this data and reconfigured it so that it could be input into ArcGIS Pro (the latest professional desktop geospatial information and services application from ESRI©) within UCOP.
Once configured, Captain Truong and First Lieutenant Hain loaded the data and used ArcGIS Pro to create a time lapse product that showcased which Ohio counties were most impacted by COVID-19 and which surrounding counties had hospital beds available for COVID-19 patients. They constructed three different maps based on data models that depicted the worst-case scenario, the best-case scenario, and the most likely scenario. This gave the Huntington District leadership a better understanding of impacts to the region. By the end of the process, they had mapped out the hospital beds for all 88 counties in Ohio, making critical contributions to the UCOP and helping leaders visualize and prioritize efforts in the region.

Along with mapping the response data, Captain Truong assisted with quality assurance and quality control of the incoming data on potential ACF sites from USACE teams conducting ACF site assessments within the district. He evaluated the initial data provided by the State and compared it to the final reports from the ACF assessment teams to ensure that the administrative and technical information matched before to adding it to the online UCOP.

One of the distinct advantages of using the UCOP is the ability of each USACE district to input COVID-19 ACF data directly into ArcGIS Pro, enabling USACE districts and USACE division headquarters to observe real-time data. Updates to COVID-19 patient counts, hospital bed availability, and suitability for ACF locations enabled USACE leaders to better inform and advise civilian leaders of whether to initiate the construction of ACFs within each district—and, if so, where and when the ACFs should be constructed.

After 3 weeks of supporting the USACE Huntington District (during which time, the COVID-19 situation stabilized and district operations returned to a state of normalcy), Captain Truong and First Lieutenant Hain fulfilled their mission of contributing critical data from the Huntington District to the UCOP and they received orders to return home. The Huntington District commander, Colonel Jason A. Evers, recognized these two professionals for their hard work and presented them with coins as tokens of his appreciation before they returned to Fort Leonard Wood.

Captain Truong is a geospatial development officer at USAES. He holds a bachelor’s degree in sociology from the University of California, Irvine.

First Lieutenant Hain is a geospatial development officer at USAES. He holds a bachelor’s degree in aerospace engineering from Virginia Polytechnic Institute, Blacksburg, Virginia.
In the latter part of 2019, people in Wuhan, Hubei Province, China, started becoming ill from an influenza-like virus. By early 2020, this virus had spawned a global pandemic that had infected huge portions of the world population—the likes of which had not been seen since the Spanish Influenza of 1918, more than a hundred years ago.

This pervasive and ferocious virus caused widespread fear and panic, forcing action from international leaders. By January 2020, the virus had spread to the United States and 18 other countries around the world. In February 2020, the World Health Organization declared a public health emergency of international concern—a designation reserved for catastrophic events—and assigned the name Novel Coronavirus (COVID-19). The United States began to see an increase in human-to-human cases of transmission, and the first known U.S. death from COVID-19 was recorded on 28 February 2020.1

The world watched in horror as Italy ran out of hospital beds and was forced to helplessly watch its death toll rise each day. The United States was determined to tell a different story. A lack of hospital space for those in need could be expected to directly correlate with the number of deaths, and preventive measures needed to be taken. On 13 March 2020, President Donald J. Trump declared the COVID-19 outbreak in the United States to be a national emergency,2 authorizing the Federal Emergency Management Agency (FEMA) to deploy Emergency Support Function-3 (ESF-3) (Public Works and Engineering), as stipulated under the Stafford Act.3 ESF-3 provides for the capabilities and resources to facilitate the delivery of services, technical assistance, engineering expertise, construction management, and other support to prepare for, respond to, and recover from a disaster in which the U.S. Army Corps of Engineers (USACE) is the lead coordinating federal agency.4

From canal and bridge building to natural disaster relief projects and monuments in Washington, D.C., USACE has long been tasked with engineering solutions for the American people through the collaborative efforts of a joint U.S. Army/civilian workforce. USACE is a unique organization comprised of U.S. Army leadership mixed with civilian engineers and scientists, resulting in capabilities beyond any military or civilian unit.

Many states, including Illinois, Indiana, and Wisconsin, declared states of emergency as they anticipated an overwhelming number of people becoming infected with COVID-19. As the numbers of infected continued to climb each day, state governors, based on data from the Centers for Disease Control and healthcare experts, forecasted that their medical facilities would be overwhelmed due to lack of patient care space to treat the infected and they reached out...
to FEMA. To combat the virus—and the potential for hospitals being over capacity—the federal government tasked USACE, through FEMA ESF-3, to work with the states to identify their COVID-19 requirements and submit requests to FEMA. Requirements varied from city to city and state to state, but the overarching goal for all was to create more bed space for potential COVID-19 patients.

It came as no surprise to USACE that calls requesting assistance in fighting this latest enemy began flooding in from leaders across the country. The surprise came in the form of the requested timeline; USACE had never before worked so rapidly on such large-scale projects. COVID-19 presented a situation in which hospitals were predicted to quickly reach full capacity, leaving sick patients with nowhere to go for care. Requests to immediately convert all types of existing facilities into alternate care facilities (ACFs) came in. At the start of the pandemic, USACE was unfamiliar with the term ACF, which is described by FEMA as a temporary facility that is less sophisticated than a typical hospital but has various capacity levels to care for patients. Conversion of existing facilities to ACFs was the most feasible option available to the federal government for immediately addressing the issue.

The USACE Chicago District, whose area of responsibility includes parts of Illinois, Indiana, and Wisconsin, was tasked with the survey, design, supervision, and execution of five ACFs throughout the Chicago area in a matter of a few short weeks. The new pandemic offered USACE an unparalleled set of emerging response challenges. For example, most emergency operations that involve ESF-3 are post-event (recovery) operations, while the COVID-19 mission occurred in the “during” phase and involved preparing for a worst-case scenario. However, the Chicago District team adjusted; and in keeping with the storied but dependable history of the U.S. Army, it answered the call for accelerated delivery.

The Chicago District organized a task force to support the USACE Great Lakes and Ohio River Division and executed six FEMA-issued mission assignment task orders (MATOs) to build $153 million worth of ACFs. More than 150 military and civilian personnel from around the United States arrived in support of the COVID-19 response in the Chicago District. Projects included converting arenas into hospitals and renovating old hospitals to serve as COVID-19-specific ACFs. To initiate the projects, the district completed 41 facility assessments throughout its AOR.

Of the 41 facility assessments completed by the district, five facilities were approved for conversion to ACFs:

- McCormick Place, Chicago, Illinois.
- The former MetroSouth Hospital, Blue Island, Illinois.
- Advocate Sherman Hospital, Elgin, Illinois.
- The former Westlake Hospital, Melrose Park, Illinois.
- Wisconsin State Fair Park Exposition Center, West Allis, Wisconsin.

Lieutenant General Semonite briefs the USACE Chicago District staff during his visit to ACFs.

On 28 March 2020, the Chicago District began construction to transform an arena to an ACF at McCormick Place. The contract was awarded for 3,000-patient-space capacity. The estimated cost of the project was $65.1 million. On 29 March 2020, construction was started to renovate the former MetroSouth Hospital to a 315-patient-space-capacity ACF, with a project cost of $14.9 million. Additionally, on 29 March 2020, construction started on Advocate Sherman Hospital. This 274-patient-space-capacity healthcare-to-ACF conversion cost $18.2 million. On 5 April 2020, construction started on the Westlake Hospital, a healthcare-to-ACF conversion with a project cost of $16.3 million for a 230-patient-space-capacity facility. Finally, on 7 April 2020, construction started on the Wisconsin State Fair Park Exposition Center, which was an arena-to-hospital-care space conversion with a project cost of $14.9 million for a 500-patient-space capacity.

The Chicago District works on numerous projects throughout the year and has the full-time task of managing Chicago’s largest waterways. Most projects take weeks, months, or even years to go from the initial feasibility study to design to completion. However, the Chicago District completed these projects by 24 April—less than a month after they were approved. “Most of the governors are saying their peak [confirmed cases are] projected somewhere around the middle of April. This is not ‘take all the time in the world’ to do it,” said USACE Commanding General and Chief of
USACE-Chicago personnel transferring the McCormick Place ACF to Chicago officials upon completion.

Engineers, Lieutenant General Todd T. Semonite, who added that USACE must provide a solution before the peak numbers are reached. It was generally agreed that hospitals in the Chicago District AOR would reach full capacity by 24 April 2020, making that the Chicago District “D-Day.”

Although USACE typically works on projects in a more linear and exacting fashion, the luxury of time was unavailable due to the pressing COVID-19 situation; therefore, the Chicago District “broke the mold” and got started on establishing ACFs as soon as possible. According to USACE Regulation 1180-1-9, “USACE commands will perform acquisition planning for all project acquisitions and provide project execution recommendations based upon the project’s goals and objectives for budget, functional and technical quality, and urgency-of-need date and the most feasible delivery and contracting methods at the lowest sustainable cost.”

The USACE Chicago District commander and district engineer, Colonel Aaron W. Reisinger, was responsible for the unusual task of providing quality and urgency without definitized terms at the start of the project. At the beginning of a project, local USACE leaders typically work at length with partners to define the scope, come to terms with a design, and agree to the appropriate acquisition terms. It can take weeks to cut through all the red tape, even for a single part of that process; but in this most recent case, USACE had mere days available. The task facing the Chicago District was a daunting one; nevertheless, the district tackled it head-on. When the district impressively stood up the ACF at McCormick Place, meeting the highest level of quality and safety standards within 4 weeks, Mr. David F. Bucaro, the Chicago District task force lead for the project, stated, “In order to stand up the McCormick Place ACF to address the region’s bed shortage projected at the start of the project, we utilized a contracting mechanism reserved for contingency operations that allowed for work to commence before the contract terms, specifications, or price were agreed upon. We typically utilize contracting methods where a project’s scope and specifications are defined up front. That process would have taken too long to develop and not met the needs of FEMA and the State of Illinois to increase capacity to treat acute COVID-19 patients. I’m proud of the entire team for stepping up and successfully utilizing every tool available to successfully construct the largest ACF in the Nation in less than 4 weeks!”

There are multiple project delivery methods, but the most commonly used method, by far, is the design-bid-build (DBB) method. The DBB method involves the owner, architect, and contractor working together in a chronological fashion. This method is the one most often selected because bidding is low, the owner is able to maintain control of the design, and the laws are well-defined. However, this linear process is also associated with the longest project delivery time. The design portion of the method involves an architect and engineer working together to create a complete or nearly complete design. Once the design portion is complete and approved, the parties move forward with the bidding process. The ability for firms to bid creates competition, enabling the owner to select the lowest bid or the lowest bid that maintains the quality and timeline. A drawback to the DBB method is that it is not the most efficient method in terms of rapid construction; it can be a painstakingly slow and deliberate process.

When COVID-19 entered onto the scene, it became clear that the response could be neither slow nor excessively deliberate. Lieutenant General Semonite summarized the COVID-19 bed space issue as a complex problem requiring a simple solution. He reiterated time and again that USACE would quickly create a standardized solution for the bed space issue in a way that it could be duplicated across the Nation as the need arose. As a result, the USACE team opted to employ an integrated delivery method, as opposed to the more commonly used DBB approach—requiring the team to step out of its comfort zone. The integrated delivery method allowed the Chicago District to take an aggressive approach to the problem, enabling it to deliver five projects in less than 30 days. The team did not get bogged down in details; instead, it focused on quickly and safely creating ACFs in the interest of saving American lives.

The integrated delivery method requires the simultaneous synthesis of several people and systems. It forces all parties involved to come up with creative solutions and capitalize on everyone’s greatest strengths. All stakeholders have a vested interest in the success of the project, and excessive blame does not fall heavily on one set of shoulders. This method can cause an increase in risk, but it also improves efficiency and allows the project to get started, and therefore completed, much more quickly.
Once the potential state-requested locations had been surveyed, rough estimates of the scope and cost were developed. Upon approval of the locations, the state submitted resource requirements to FEMA. FEMA then approved the MATOs, and the Chicago District initiated the performance work statements. Once the contract was awarded, the planning and execution of construction phases began, with little to no time wasted. Planning, execution, monitoring, and control then occurred simultaneously, allowing for increased productivity. The definition team worked with contractors and stakeholders to define the scope; provide proposals; analyze; and negotiate for a firm, fixed-price contract. The planning phase ended once the contract was definitized.

Throughout this process, the Chicago District central command post monitored the progress for the five projects, held daily meetings, and reported to the division headquarters each day. The central command post enabled a constant flow of communication from the field offices to the division. In this way, the projects were true joint Army and civilian endeavors that made use of Army reporting methods and civilian contractor violence of action to complete the mission.

In order to properly close out each project, representatives from the State, clinicians, and administrators were present during a preinspection and final inspection to ensure successful turnover to the owner of the ACF or the entity operating the particular site. The physical completion and turnover process required that a turnover letter for each facility be signed by the district engineer and presented to the State. A final inspection letter and computer for each facility be signed by the district engineer and turnover process required that a turnover letter, once the projects were true joint Army and civilian projects, be signed by the state representative. The closeout process was followed by fiscal closeout requirements, which included closing out government orders, following up on unpaid invoices, issuing FEMA memorandums requesting revocation of excess funds, and removing excess funds from the USACE Financial Management System upon the receipt of decreased mission assignment orders.

Between 20 March and 30 April 2020, the Chicago District—

- Designed and constructed more than 5,000 COVID-19 patient spaces.
- Completed six MATOs for five ACFs.
- Constructed $153 million worth of projects. (The district averages $100 million worth of projects per fiscal year.)

In the words of famed Army General George S. Patton, “A good plan violently executed now is better than a perfect plan executed next week.” The team from the Chicago District truly lived by those words to adequately support the people of the Chicago area and the Nation throughout the COVID-19 response mission. Colonel Reisinger was consistently quoted as saying, “Some capacity today is better than all capacity next month” in order to convey to the engineers and contractors how vital it was to execute the mission violently and urgently, as opposed to executing it with an extremely calculated, yet much slower, approach that was closer to their comfort zone.

Since the onset of the COVID-19 pandemic, USACE has showcased itself as a versatile and progressive organization that is fully capable of reinventing itself at the drop of a hat to fully deliver vital military and public engineering services in peace, war, or even a pandemic—all for the U.S. government and the American people.

Endnotes:


7David F. Bucaro, personal interview, 28 April 2020.


9Brading.

10DD Form 1354, Transfer and Acceptance of DOD Real Property, September 2009.


12Aaron W. Reisinger, personal interview, 8 April 2020.

Captain McEldowney is a student in the Engineer Captains Career Course, Fort Leonard Wood, Missouri. She holds bachelor’s degrees in English and sociology from the University of Illinois, Urbana/Champaign, and a master’s degree in political and justice studies from Governors State University, University Park, Illinois.
At the onset of the Novel Coronavirus (COVID-19) pandemic, the U.S. Army Corps of Engineers (USACE) collaborated with the Federal Emergency Management Agency to develop a plan for the rapid expansion of COVID-19 treatment spaces. USACE assigned each of its districts an area of responsibility, and the districts integrated into the local and state response agencies within their areas of responsibility. As local civil authorities conducted analysis and projected bed space requirements, USACE developed facility modification options for accommodating additional beds. Districts completed site assessments and provided project management support for converting existing buildings into alternate care facilities (ACFs). In April 2020, 3 weeks after the President declared a national emergency, the U.S. Army Engineer School (USAES), Fort Leonard Wood, Missouri, deployed more than 30 Soldiers in support of the USACE response effort; Captain Alex W. Burruss was deployed to the Memphis District, USACE Mississippi Valley Division, Tennessee, for more than 60 days. There, he assumed the role of the district operations officer.

Once on-site, Captain Burruss met with deputy district commander Lieutenant Colonel Nathan A. Molica to learn about the Memphis District mission. Next, he joined the emergency management team as the operations officer, responsible for relaying information requirements between higher headquarters and teams in the field. The Mississippi Valley Division area of responsibility includes most of the State of Wisconsin, which requested multiple site assessments and the construction of two ACFs. In addition, the Memphis District supported the Nashville District, Tennessee, by conducting site assessments and the construction of an ACF west of Jackson, Tennessee.

Shortly after arriving in Memphis, Captain Burruss deployed to Milwaukee, Wisconsin, to observe the completion and handover of the Wisconsin State Fair Park ACF, West Allis, Wisconsin to the State. That ACF followed the arena-to-health-care concept, which involved constructing 10-foot-by-10-foot patient care spaces inside the open floor of the exposition center. The project included the installation of an in-line oxygen system; modifications to heating, ventilation, and air-conditioning systems; and the construction of latrines, staff space, and a nurse call system. The facility provided the county of Milwaukee with an additional 500 nonacute-patient care spaces.
While in Milwaukee, Captain Burruss and a field team conducted a site assessment to construct an ACF at the Lotter House Correctional Facility. The rapid increase in COVID-19 cases within the prison system was a growing concern for the State, and the construction of an ACF at this facility would ease the staffing requirement created from transferring sick inmates to a traditional hospital. Captain Burruss noted lessons learned from the Wisconsin State Fair Park and Lotter House Correctional Facility ACFs and redeployed to Memphis.

Once back in Tennessee, Captain Burruss helped State officials coordinate the ACF buildout of the Commercial Appeal building, located near downtown Memphis. The State had acquired the building, which had housed an old newspaper-printing facility, with an 18-month lease. The site was ideal for ACF conversion because it was located next to the Memphis Hospital District and there was existing logistical support infrastructure. The renovation involved significant effort, requiring the demolition of industry and commercial space and its conversion into patient care spaces. The State requested that USACE design the ACF primarily for nonacute COVID-19 patients. The facility now contains 401 patient care beds across four serviceable stories and a large warehouse area. It also contains space for medical staff to stabilize acute COVID-19 patients before transferring them to a hospital.

In addition to fulfilling his operations officer duties, Captain Burruss was also integrated into the Commercial Appeal ACF project management team. He shared the lessons that he had learned from the Wisconsin State Fair Park ACF project. During construction of the Commercial Appeal ACF, he monitored progress, assisted with quality assurance, and conducted stakeholder engagements. He ensured that the Tennessee Emergency Management Agency, the State Facility Management Team, and the State Medical Team were situationally aware of the progress and features of the facility. During the first week of the project, Captain Burruss helped integrate the 484th Forward Engineer Support Team–Advance, Huntsville, Alabama, into the project management team. The 484th provided expertise and technical oversight for the project.

The construction process was intricate and impressive. More than 60 different contracting companies worked on-site; many were local to the region and state. The construction team worked 24 hours a day, 7 days a week, for 30 days—without any lost time due to injuries. To save time, construction activities were completed in parallel, rather than according to the typical sequential schedules. Normally lengthy contract processes took days instead of months. By the end of the 30 days, nearly 200,000 project work hours had been amassed.

As the project neared completion, the State medical team requested additional work outside the original project scope. Consequently, the design team modified the original performance work statement, which had been based on the arena-to-health-care concept. However, because the multifloor concept is more complex than the standard model, the Commercial Appeal ACF required additional capabilities to meet medical staff requirements. The staff needed clean or “cold” space for breaks during shifts, and the space needed to be near the patient spaces and needed to include high-efficiency particulate air filtration and positive pressure, allowing staff to remove personal protective equipment. This change required a formal modification to the contract. Regardless of the additional work, the Memphis District was able to grant the State beneficial occupancy of the facility. Beneficial occupancy allowed the State to prepare the ACF for patients by stocking supplies and training staff.

The additional work was completed on 9 June 2020. This signified the end of the Memphis District role in the project and allowed for the complete turnover of the site to the State. Following the completion of his mission, Captain Burruss redeployed to Fort Leonard Wood.

Endnote:


Captain Burruss is now the operations officer for the 91st Engineer Battalion, Fort Hood, Texas. He holds a bachelor’s degree in nuclear engineering from the U.S. Military Academy—West Point, New York, and a master’s degree in engineering management from Missouri University of Science and Technology at Rolla.
In early April 2020, the Department of Defense officially tasked the U.S. Army Engineer School (USAES), Fort Leonard Wood, Missouri, to provide technical engineering assistance to the U.S. Army Corps of Engineers (USACE) in the battle against an invisible enemy, the Novel Coronavirus (COVID-19). USACE specifically requested the assistance of two chief warrant officer three Military Occupational Specialty 120A—Construction Engineer Technicians. USAES answered the call and flawlessly operationalized its pool of seasoned warrant officers, choosing Chief Warrant Officers Three Daniel W. Schwab and William S. Test. On 7 April 2020, these two warrant officers were forward-deployed to assist the USACE Saint Paul District, Saint Paul, Minnesota, in the Mississippi Valley Division.
Chief Warrant Officers Three Schwab and Test arrived at the Saint Paul District office and immediately began working in the Mississippi Valley Division emergency operations center (EOC) in conjunction with the Minnesota EOC. Their task was to compile a list of viable locations to convert hotels to alternate care facilities. The warrant officers hit the ground running, immediately working with the State EOC to provide in-depth analyses of the feasibility, constructability, and estimated duration of construction for more than 50 sites in eight medical regions, eventually reducing the number of viable sites to 34. Schwab and Test assisted the State EOC in determining a rank order structure to “rack and stack” the 34 sites by region, constructability effort, cost, and time.

Next, Warrant Officers Three Schwab and Test were tasked to assist the State Health Department representative, U.S. Air Force Major Fernando C. Nacionales, with further analyses of the 34 sites and the selection of one viable site per medical region. The assistance of Schwab and Test was vital in selecting the final eight sites, which were presented to Minnesota Governor Tim Walz. Governor Walz approved construction in the event that the sites were required. Construction was immediately executed at one of the eight sites selected, Langton Place Rehabilitation Center, Saint Paul. Although the State of Minnesota did not choose to use the Saint Paul District for the actual construction, Schwab and Test were asked to remain on the project to continue with planning and evaluation. During their evaluation of the contractor proposal, Schwab and Test identified several overcharges within the cost estimate and immediately notified the State representative. The work of Schwab and Test ultimately resulted in a dramatic overall decrease in the estimate, saving the State of Minnesota about $2 million.

“The warrant officers hit the ground running, immediately working with the State EOC to provide in-depth analyses of the feasibility, constructability, and estimated duration of construction for more than 50 sites in eight medical regions . . .”

In the following weeks, Chief Warrant Officers Three Schwab and Test continued their technical-advisor roles with the State EOC. The State EOC Commander, Lieutenant Colonel Ryan P. Kelly, personally requested that they
assess a location that had been identified as a potential mass-fatality site for housing COVID-19 victims who might, unfortunately, succumb to the virus. The facility, which had previously served as a produce warehouse, consisted of approximately 86,500 square feet of cold-storage space that was deemed suitable for the intended purpose.

The USACE Saint Paul District Deputy Commander, Lieutenant Colonel Patrick J. Sullivan, identified Chief Warrant Officers Three Schwab and Test and asked them to provide much-needed technical support for a barracks-to-health-care conversion project at the Milwaukee County House of Corrections, Franklin, Wisconsin. The warrant officers received a mission briefing from the deputy commander upon their arrival on 30 April 2020. Over the next several days, the warrant officers participated in several key leader meetings, assisting the USACE team in developing modifications to the original scope of work. The warrant officers were extremely valuable in identifying aspects of the scope that had previously been overlooked by other personnel. They continued to assist the contracting-officer representative, Robert C. Vanoer, with documentation in an effort to flawlessly execute all aspects of the project. Demolition and construction officially kicked off on 4 May 2020 and continued through 23 May 2020. The project was completed ahead of schedule and $2 million under the initial budget.

After 30 days of full-throttle planning and executing to support the USACE Mississippi Valley Division and the States of Minnesota and Wisconsin, Warrant Officers Three Schwab and Test fulfilled their mission and returned to USAES. Their diligence, hard work, and can-do attitudes were recognized, and the Soldiers were awarded the Army Commendation Medal; the Humanitarian Assistance Medal; and Saint Paul District, Mississippi Valley Division coins by district commander, Colonel Karl D. Jansen.

Chief Warrant Officer Three Schwab is an instructor for the Military Occupation Specialty 120A Warrant Officer Basic Course, Fort Leonard Wood. His certifications include Occupational Safety and Health Authorized Construction Trainer and Certified Construction Manager.

Chief Warrant Officer Three Test is an instructor for the Military Occupation Specialty 120A Warrant Officer Basic Course, Fort Leonard Wood. His certifications include Power House Electrician, Industrial Electrician, Occupational Safety and Health Authorized Construction Trainer, and Certified Journeyman Lineman.
By the time the 554th Engineer Battalion, Fort Leonard Wood, Missouri, was directed to provide augmentation personnel to various U.S. Army Corps of Engineers (USACE) districts and divisions across the country, the Great Lakes and Ohio River Valley Division (LRD), Cincinnati, Ohio, was already waist deep in its mission to provide alternate care facilities (ACFs) throughout its area of operations. The federal building in which the division was headquartered was officially closed for business, and most of the personnel within the organization had been directed to telework; yet, the projects that were to be completed within a short timeline mounted.

The 554th Engineer Battalion immediately directed its resources to meet mission requirements and prepared to deploy available personnel within days of initial notification. Captain Marcie Y. Jhong was among the group of personnel who volunteered for the mission. Captain Jhong had recently graduated from the Engineer Captains Career Course, and she felt that she had the tools and experience necessary to provide value to the mission at hand.

Upon arrival at the LRD headquarters, Captain Jhong was assigned as the battle captain of the LRD command post. Her initial responsibility was to manage project information flow within the seven subordinate districts of the division. She was in charge of division level quality control assessment for 132 site assessments in the division area of operations. As projects were initiated or redacted based on updated trends in infectiousness and the response from State officials, Captain Jhong worked to bridge the gap between resources and information from headquarters, USACE, to projects on the ground. She oversaw the completion of nine projects during the mission.

As projects neared completion, Captain Jhong conducted site visits to the TCF Center, Detroit, Michigan; McCormick Center, Chicago, Illinois; Sherman Medical Facility, Elgin, Illinois; and MetroSouth Medical Facility, Blue Island, Illinois, to ensure that the contracts were held to standard and that the facilities handover to the State authorities went without issue.

In conjunction with ongoing ACF projects, Captain Jhong helped plan and assess conditions for the reopening of the LRD headquarters to its employees. Additionally, she accompanied the LRD command team on multiple site visits—to a lock and dam, a fleet repair station, and two flood response sites.

On 29 May 2020, more than 7 weeks after deploying to Cincinnati, Captain Jhong oversaw the completion of her last project and returned to her original duty station at Fort Leonard Wood. She viewed her experience as an extremely positive one that has allowed her to serve her country during an unprecedented time and to gain a valuable perspective on the Engineer Corps scope of capabilities.

**Captain Jhong is a recent graduate of the Engineer Captains Career Course, Fort Leonard Wood. She is now the assistant operations officer assigned to the 14th Brigade Engineer Battalion, 2d Stryker Brigade Combat Team, 2d Infantry Division, Joint Base Lewis-McChord, Washington. She holds a bachelor’s degree in chemical engineering from the U.S. Military Academy–West Point, New York, and a master’s degree in engineering management from the Missouri University of Science and Technology at Rolla.**
Annually since 2018, the Maneuver Support Battle Laboratory, Fort Leonard Wood, Missouri, and the Sustainment Battle Laboratory, Fort Lee, Virginia, have executed the Maneuver Support, Sustainment, and Protection Integration Experiment (MSSPIX) and oversight for the experiment has been provided by the Joint Modernization Command, Fort Bliss, Texas. However, 2020 has been unlike any previous year; it has presented us all with numerous challenges and has forced us to adapt, professionally and personally.

Live experimentation is a crucial component of modernization; yet in the past, it has required travel and mass gatherings. Novel Coronavirus (COVID-19) control measures forced Maneuver Support Battle Laboratory planners to grapple with how they would conduct MSSPIX 20. For the portion of MSSPIX executed by the Maneuver Support Battle Laboratory, the solution came in the form of flexibility with regard to the timeline and location.

Initially scheduled to take place from 7 to 25 September 2020 at Fort Leonard Wood, MSSPIX 20 was divided into five different phases occurring at two different locations. This decision was made, in part, to accommodate the training schedule of experimentation forces while also minimizing the size of gatherings associated with MSSPIX 20. Other control measures used to mitigate the risk from COVID-19 included isolating the work cells where technologies were being used, allowing limited personnel to have access to multiple work cells, and recording cell entry and exit for all personnel.

MSSPIX 20 provided a venue for a better understanding of military problems and potential Army modernization solutions through experimentation in a multidomain-operation environment. The 2020 iteration focused on operational aspects of the tactical support area and close area and on supported reconnaissance, breaching, and sustainment capabilities. In addition, MSSPIX 20 provided the Army with an opportunity to shape research and development priorities necessary for defining requirements. While MSSPIX 20 included technologies addressing maneuver support, sustainment, and protection, this article addresses only the portion of MSSPIX 20 that was executed.
Activities for MSSPIX 20 started with a call for technologies, which went out through Army distribution channels and on the Contract Opportunities website in November 2018. The call for technologies explained experiment objectives, identified capabilities desired for inclusion in the experiment, and prescribed the proposal process. After the closing date for proposals had passed, the focus shifted to technology selection. In order to be selected, a technology needed a sponsor from the Army Modernization Enterprise. To be a sponsor, an organizational representative was required to have interest in a technology, identify what was to be learned through experimentation with the technology, and specify how that learning would likely be applied.

The planning phase was next. During this phase—
- Vignettes to execute the technologies were developed.
- Required clearances were obtained.
- Experiment and analysis plans were created.
- Soldier support was requested.

Following the planning, the experiment was executed. The first phase of the experiment, which was executed from 17 to 20 August 2020 at Fort Leonard Wood, involved engineer Soldiers from the 5th Engineer Battalion, 36th Engineer Brigade, Fort Leonard Wood. During this phase, the Soldiers used three technologies currently being developed by the U.S. Army Engineer Research and Development Center (ERDC), Vicksburg, Mississippi. The first technology used was the Protection Planning, Visualization, and Analysis Tool. For this technology, a combination of commissioned and noncommissioned officers planned and validated a protection scheme for an occupied urban area. The Soldiers received an operations order that provided...
information on mission, simulated enemy composition, and available construction assets. The Soldiers then collaborated on constructing a protection scheme using a preloaded satellite image of the terrain. The tool contains embedded protection decision support tools that guided Soldiers to employ doctrinally supported best practices when selecting protection measures. Once the protection scheme was designed, the Soldiers ran an analysis of the site with selected protection measures to determine risk and vulnerability to critical assets. Finally, the tool provided a bill of materials required to construct/emplace the measures selected. The next technology that was employed involved an expedient retrofit for existing buildings. This technology is comprised of a modular, lightweight ballistic with a blast wall retrofit that provides a rapidly deployable and recoverable system that requires no anchoring, tools, or equipment for setup or operation. The expedient retrofit for existing buildings was erected by an engineer squad in different rooms of varied sizes. All parts of the retrofit system are designed to be hand-transported, and the technology provider has designed a backpack system that allows a single Soldier to transport the E-glass panels and support structure components over distances and up stairways. The final technology used during the first phase was Ready Armor Protection for Instant Deployment (RAPID), which is part of the Modular Protective System. This technology consists of a quickly deployed wall designed to provide blast and ballistic protection to prevent intrusion and to deny line of sight.
in an urban setting. Additionally, the technology includes a scalable and recoverable tool that can be tailored to meet specified threats. During the first phase, the RAPID system was used to control or block avenues of approach (paved roads) within a simulated urban area. A forklift was used to position a container express box containing the technology. To deploy the system, the Soldiers manually pulled the accordion-like structure into its full deployed length. Once positioned, the hydraulic pressure was released and the system was lowered onto the ground, creating a solid barrier. The Soldiers then attached the E-glass ballistic panels to the exterior to increase the protective capability.

The second phase of MSSPIX 20 was executed from 8 to 18 September at Fort Leonard Wood. Soldiers who participated in this phase originated from various organizations across Fort Leonard Wood, including the Maneuver Support Capability Development Integration Directorate; the Combat Training Company, 31st Engineer Battalion; the 35th Engineer Battalion; and the 169th Engineer Battalion. The first technology assessed during this phase consisted of a mobility system for crossing off-road and urban terrain. This technology, also developed by ERDC, is mounted in a ground vehicle and consists of a prototype warning system that displays obstacle information collected on board an unmanned aerial vehicle. The live data is combined with mobility models to update routes and provide situational awareness to ground forces. A combination of three noncommissioned officers and one lower-enlisted Soldier with Military Occupational Specialty 12B–Combat Engineer or 12T–Technical Engineer were used for the technology assessment. Next, Federal Resources© provided two technologies manufactured by Holmatro© Incorporated for assessment. First up was the Holmatro Door Blaster. This tool is designed to allow fast breaching of doors and offers remote operation when outfitted with the Door Blaster Pack. The MSSPIX 20 planning team identified installation buildings that were slated for demolition, and the tool was employed to breach several doors on those buildings. The Holmatro backpack kit provided to the Special Operations Command, MacDill Air Force Base, Tampa, Florida, contains cutting and prying tools with a quick-disconnect system. The operator wore a lightweight, electrically-driven hydraulic pump and had the option to quickly switch tools based on mission requirements. The Soldiers were also able to use the cutting capability of the system to breach a car door. Additionally, the tools were used to cut locks in a subterranean environment. The TYR Tactical Shield® with TYR Tactical Shield Dolly®, provided by TYR Tactical®, was also assessed. The TYR Tactical Shield Dolly was used with two TYR Tactical Shields to provide greater ballistic protection. These technologies were employed in concert with the Holmatro breaching tools to provide cover for the breach team as it moved toward the breach site.

The third phase of MSSPIX 20 was executed on 6 November 2020 at Fort Leonard Wood. A copper linear shape charge, provided by Accurate Energetic Systems, LLC, was assessed. This technology consists of varying sizes and configurations of premanufactured charges, designed to reduce obstacles. Working in concert with the USAES Counter Explosive Hazard Center, Fort Leonard Wood, MSSPIX 20 planners leveraged Soldiers attending the 1st Engineer Brigade Urban Breacher Course. To ensure that Soldiers could achieve their learning objectives, they first used current doctrinal procedures to build linear shape charges to cut two sides of a steel plate. The Soldiers then used the copper linear shape charge to cut the other two sides of
the plate, allowing the Soldiers to observe the differences by minimizing the variables and keeping the material cut constant.

In mid-November 2020, ERDC hosted Soldiers from the 412th Theater Engineer Command, Vicksburg, Mississippi, in assessing two technologies developed to meet potential future applications with multiple cross-functional teams—remote assessment of infrastructure for ensured maneuver, which is designed to provide persistent monitoring of infrastructure, and subterranean detection software, which is a capability for imaging subterranean anomalies. The remote assessment of infrastructure for ensured maneuver focused on the user interface. Classroom discussions included conversations about potential modifications to the way in which the system displays the information, filter options, cross-system utility, and data manipulation for common operating picture creation to better inform commanders. Soldiers assessing the subterranean detection software used the analytical software to interpret subterranean void data collected from the Active Seismic Imaging System. This system included multiple improvements made based on Soldier feedback from a previous assessment during MSSPIX 19. The final MSSPIX 20 event, held in mid-December 2020, did not include technologies requiring engineer Soldiers.

MSSPIX 21 is scheduled to be executed from 7 to 24 September 2021. Maneuver support and protection capabilities will be assessed at Fort Leonard Wood; sustainment capabilities will be concurrently assessed at Fort Picket, Virginia. There is currently a total of 30 technologies scheduled for assessment during MSSPIX 21.

The technology call for MSSPIX 22 is scheduled to be posted to the Contract Opportunities website at <https://beta.sam.gov/> March–May 2021.

Endnote:


Mr. Evans is a retired general-engineering supervisor. He provides contract support as a senior military analyst for the Maneuver Support Battle Laboratory. He holds an associate's degree in technology from Pierce College, Puyallup, Washington, and a certificate in project planning and management from the University of Virginia, Charlottesville.

Mr. Hutchinson is a capability development experimentation analyst for the Maneuver Support Battle Laboratory. He holds a bachelor's degree in business administration from Columbia College, Missouri; a master's of business administration degree from Webster University; and a master's degree in project management from Western Carolina University, Cullowhee, North Carolina.
At 10:00 a.m. on 27 July 1953 in Panmunjom, Korea, the Korean War Armistice Agreement was signed under the authority of the Commander in Chief, United Nations Command (UNC), the Supreme Commander of the Korean People's Army, and the commander of the Chinese People's Volunteers. The first article of the Armistice Agreement created a military demarcation line and the Korean Demilitarized Zone (DMZ). Approximately 4 kilometers wide, the DMZ separates North and South Korea—from the Yellow Sea (on the west) to the Sea of Japan (on the east). The UNC retained administrative authority of the 2-kilometer strip of the DMZ south of the military demarcation line, and the Democratic People's Republic of Korea (DPRK) retained control of the 2-kilometer strip of the DMZ north of the military demarcation line. Although the armistice called for the retreat of all combat forces from the DMZ, continued skirmishes after 1953 served to transform the area into a fortified barrier running the width of the Korean peninsula.

Through manmade fortification, revegetation after massive bombing during the Korean War, and inclement weather that has reshaped the terrain, the DMZ has become a large obstacle belt, developed and modified for more than 67 years, creating significant safety hazards to demining. The area of the DMZ south of the military demarcation line comprises 100.3 million square meters and contains a significant number of landmines (estimated at more than 1 million) as well as a significant amount of unexploded ordnance. Beyond the sheer number of explosive devices present, three factors increase explosive-hazard risks in the DMZ—time, mine drift as a result of weather, and a lack of detailed documentation on minefield locations.

By Colonel John P. Lloyd and Major Mark S. Born

Korean DMZ

Overview of the Panmunjom Declaration and the CMA

On 27 April 2018, an inter-Korean summit was conducted between President Moon Jae-in of the Republic of Korea (ROK) (representing South Korea) and Chairman Kim Jong Un of the DPRK (representing North Korea). The summit took place in the Joint Security Area (JSA) at the historic South Korean Panmunjom Peace House. The two leaders publically declared a plan for the establishment of a “peace regime” for the Korean peninsula; the historic meeting resulted in signing the Panmunjom Declaration for Peace, Prosperity, and Reunification of the Korean peninsula.

The Panmunjom Declaration paved the way for a second summit between the leaders in Pyongyang, North Korea, in September 2018. There, delegates from the two governments signed the “Agreement on the Implementation of the Historic Panmunjom Declaration in the Military Domain,” otherwise known as the Comprehensive Military Agreement (CMA) on 19 September 2018. Among the provisions of the agreement is a call for the transformation of the DMZ into
a peace zone and the establishment of consultation on military assurance measures for—

■ The mutual withdrawal of guard posts.
■ JSA demilitarization.
■ Inter-Korean joint remains recovery.

With the support of UNC, the ROK government has proceeded with its implementation of the CMA.

Vision

At the 74th Session of the United Nations (UN) General Assembly, on 18 October 2019, President Moon Jae-in proposed the idea of transforming the DMZ into an international peace zone to the UN and its member states. “The DMZ is the common heritage of humankind, and its value must be shared with the whole world,” said President Moon. His words generated a sense of urgency among the ROK peace supporters as well as the momentum necessary to begin the historic process of demining within the DMZ for the first time since 1953. He also created an opportunity for global support, stating, “Cooperation with the international community, including the UN Mine Action Service, will not only guarantee the transparency and stability of demining operations, but also instantly turn the DMZ into an area of international cooperation.”

Arrowhead Hill

The location that was agreed upon by a trilateral body comprised of ROK, UNC, and DPRK officials for the construction of a connecting road for conducting mine clearance was Arrowhead Hill, also known as Hill 281. Arrowhead Hill, located in Cheorwon Valley, was a site of considerable fighting between UNC forces (namely, the United States, France, and South Korea), China, and DPRK during the Korean War. It is estimated that the north side suffered 6,700 losses, while the south side lost 14,332. Over 9 days of fighting, it is estimated that the U.S. Air Force dropped 2,700 bombs, China fired 55,000 shells, and South Korea fired 185,000 shells. In 2019, ROK military engineers located 455 mines and 5,754 unexploded ordnance items at the Arrowhead Hill.

Recovery Operations

On 1 October 2018, soldiers from the ROK and DPRK armies began clearing operations in both JSA and Arrowhead Hill, in accordance with the CMA. (According to ROK law, only the military is authorized to conduct demining operations.) In the JSA, both sides focused on clearing areas of potential mines and unexploded ordnance.

Although the CMA included a requirement for the verification of cleared areas, it did not specify the standard for clearance or who would conduct the verification. Due to the absence of agreed-upon demining standards between ROK and DPRK, comprehensive minefield documentation, mine action programs, and an organization that represented mine action within the international community, UN command engineers and U.S. Forces Korea, Camp Humphreys, South Korea, engineers agreed to support ROK mine action program development and to utilize the UN International Mine Action Standards (IMAS) as the foundation for mine action development.

To achieve IMAS-compliant mine clearance, UNC enlisted the help of a U.S. Army Corps of Engineers quality control team from the Engineering Support Center, Huntsville, Alabama. The U.S. Army Corps of Engineers provided on-the-job training for ROK engineers, monitored ROK quality control operations, supplied external quality assurance measures, and provided certification for surface area clearance.

Clearance of the north side of the JSA, administered by the DPRK, was never verified to the same IMAS. Verification (or lack thereof) proved extremely critical, as two low-metallic box antipersonnel mines were detonated on the DPRK side of the JSA following the claimed clearance of mine hazards. Luckily, there were no injuries in those cases; however, these incidents, coupled with continued UNC insistence on clearance to the IMAS, served to highlight the lack of documentation on exact mine placement.

Upon completion of the first demining season in 2018, UNC learned multiple critical lessons on mine actions in Korea. The first lesson learned regarded the value of published National Mine Action Standards, which are...
standards that are developed by countries based on IMAS—but are more specific than IMAS. They also provide a cradle-to-grave process for demining, from planning to disposal to land turn-over. The next lesson learned focused on the development of an internationally recognized National Mine Action Authority (NMAA) and a National Mine Action Center (NMAC). The creation of a National Mine Action Authority and National Mine Action Center established international legitimacy for countries’ mine action policies, procedures, and coordination with international governmental and nongovernmental organizations. A final lesson learned was that the U.S. military does not execute demining operations unless they are deemed operationally essential—which can lead to gaps in demining knowledge and experience. As a learning organization, it became critical for the UNC to understand this limitation and seek subject matter experts from the field.

UN command engineers and U.S. Forces Korea engineers focused on developing opportunities to increase knowledge, learn from international governmental/non-governmental agencies, and provide a mine action plan with support and oversight from subject matter experts in the mine action field. These actions support the achievement of a safe, transparent, and effective South Korean mine action program. Successful mine action initiatives have built a foundation to ensure that, in the future, the DMZ can indeed be transformed into a peace zone, as envisioned in the CMA and in President Moon’s UN General Assembly speech.

UN command engineer initiatives over the past year have included—

- Hosting a UNC demining workshop.
- Attending the National Directors of Mine Action Conference in Geneva, Switzerland.
- Visiting national mine action centers.
- Standing up a U.S./ROK/UNC demining steering committee.
- Visiting nongovernmental mine action organizations.
- Providing state engineers with mine action experience for the UNC staff.
- Enforcing standards for demining operations in the DMZ.

Even as a small engineer staff, UNC engineers were able to use available resources to help transform national policies and standards, which resulted in a successful 2019 Korean DMZ demining season.

**Conclusion**

For the past 67 years, the DMZ has been one of the most densely mine-laden and dangerous areas in the world. The CMA created an opportunity to facilitate change in the DMZ and ignited a spark that initiated the historic acts of strategically removing combat-related obstacles and recovering the remains of fallen heroes. These small steps led to immense results.

Peace is a process. UNC and ROK head into the 2020 demining season with great anticipation for continued success in reshaping the DMZ. For 2020 and 2021, UNC and ROK allies are planning to clear areas where the potential for remains recovery exists and to help advance president Moon’s vision. UNC engineers and the Multinational Demining Committee continue to work across multiple lines of effort to socialize with countries affiliated with UNC, to send subject matter experts to observe and participate in demining efforts, and to continue working closely with ROK on creating mine action policies in accordance with international standards. These efforts include upgrades in the

(continued on page 69)
As I sat, deafened and shivering in the doorway, I could barely make out the black silhouette of the treetops and the reflection of the green and red aircraft position lights from the lake somewhere beneath my dangling legs. The rotor wash from the UH-60 Blackhawk helicopter was whipping at my feet, when I suddenly felt the cast master hit my back and heard the command—“Go!” I gave my waterproofed rucksack a shove out into the night, and I followed after it. The frigid water immediately drained my lungs of oxygen on impact. I blindly swam in the dark until I felt my head break the surface of the water, exposing it to the roar of the helicopter. Turning toward the biting spray, I located the glowing Cyalume ChemLight® and waved it to signal to the cast master and pathfinder team, located somewhere in the darkness, that another castor was fine and headed for the shore.

After chasing down my rucksack, identified by the soft green glow of a submerged ChemLight, I began towing the equipment toward the dim light of the pathfinder, located on the shore. Between the oscillations of the waves, I could make out other glowing objects, bobbing and headed in the same direction. It was at this moment that I noticed the growing rumble from the second UH-60 helicopter coming to drop the next lift of castors. I rolled...
over into a backstroke just in time to receive a cold spray to the face and see the familiar faint green dots drop out of the slowly drifting silhouette of a Blackhawk. This was the final helocast of the cold night for the paratroopers of the 57th Sapper Company (Airborne).

From 17 to 18 March 2020, the 57th Sapper Company successfully executed 2 days of waterborne operations, which culminated in the first helocast operation conducted at Fort Bragg, North Carolina, in more than a decade. As an extension of their insertion mission in an austere environment, the sappers conducted hundreds of low-altitude (10 feet-above-surface-level) casts into Mott Lake from two UH-60 Blackhawks from the 2d Battalion, 82d Combat Aviation Brigade, Fort Bragg.

The company remains the premier organization for rapid engineer insertion into remote and undeveloped environments. The rough-terrain mission provides unique and valuable training for commanders. Reconnaissance, disaster relief, and battlespace development are just a few of the applications that the 57th Sapper Company provides through its ability to simplify logistics and quickly insert combat engineers directly where they are needed to accomplish their mission. Waterborne insertion is a natural supplement to the historical tree jumps that the sappers conducted late in 2019—and is just as effective, if not more so, under the right conditions. Helocast operations differ from traditional airborne operations in that they do not require parachutes; only an appropriate water depth and skilled personnel are required for execution.

Preparation was critical to the success of the training and safety of the Soldiers in the weeks leading up to the operation. A pathfinder team internal to the company initiated the process when it determined the minimum required dimensions of the cast zone by mixing size and safety buffers from helicopter landing zones with time/distance air assault planning factors based on the known airdrop speed of 10 knots. Next, divers from the 569th Engineer Dive Detachment, Joint Base Langley-Eustis, Virginia, conducted a hydrographic survey of the newly designated drop zones to ensure that they met a safe depth and were free of any subsurface hazards. Detailed coordination was conducted between the UH-60 crew and the pilots of the 2d Battalion, 82d Combat Aviation Brigade, since piloting during this type of event would be a first for the vast majority of them—especially with the finale of the operation consisting of a multiaircraft night cast. Multiple safety boats were requested from Fire and Emergency Services, Fort Bragg, to oversee the drops, and three rubber raiding crafts were requested from the 3d Special Forces Group, Fort Bragg, for small-boat training. Previous Sapper Leader Course instructors certified and rehearsed with
the new cast master teams, final updates were made to the company precast script and procedures, and Soldiers of the 57th Sapper Company conducted combat water survival assessments and rehearsals for the tasks of the following week.

The training days, modeled after the infamous Sapper Leader Course Lake Day, were designed to instruct the sappers on all aspects of waterborne operations. Most of Day 1 consisted of the platoons rotating through the following three stations: one-rope bridge over a finger of the lake, poncho raft construction and sappers swimming, and small-boat operations training. This culminated in a platoon competition, with the winner being rewarded by being excluded from physical training with the boats the following morning. The early risers completed a Sapper School-inspired boat physical training session, while the pathfinders emplaced drop zone markings, linked up with the safety boats, and established their ground-to-air communication position. All Soldiers were then transported to Campbell’s Crossroads Landing Zone to execute precast rehearsals.

The overall goal of the operation was for all strong-swimming sappers to progress from the basic daytime Hollywood (equipment-free) cast, through a daytime combat-equipped cast, and finally, to a nighttime combat-equipped cast. At 12:30 p.m., on a very clear and calm day, two UH-60s came into sight of the first several lifts of castors. The pilots conducted their final briefings, and the first lift of sappers was quickly headed to the lake; they were followed shortly thereafter by the second and then the third. By 5:00 p.m., 15 lifts (each carrying 6–8 castors)—for a total of 220 casts of 86 different castors—had been conducted at the southern end of the lake, all without issue or injury. The helicopters refueled while the cold, wet sappers were provided with two ChemLights each—one to attach to their life vest and one to attach to their rucksack. Darkness fell; and by 8:00 p.m., the sound of the first lift of night combat castors disappeared behind the tree line. In just under an hour and a half, six additional lifts delivered 60 combat-equipped castors into Mott Lake, bringing the training to a close.

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The success of the heliocast event was undeniable. Thanks to deliberate risk mitigation and a focus on shaping the training to be realistic and repeatable, the 57th Sapper Company can continue to expand on its knowledge base and refine its skills during future operations.

We must work to maintain expert readiness regardless of the unique nature of the skill set required in our modernizing Army. We will continue to maintain our competencies and expand our insertion capabilities so that we will succeed at any mission for which we are called upon. Rough Terrain!

Endnote:

1The term Hollywood is derived from the way in which military divers are portrayed in movies—without equipment.

First Lieutenant Pinkerton is the assistant training officer, 20th Engineer Brigade, Fort Bragg. He holds a bachelor’s degree in physics from the University of Nebraska–Lincoln.