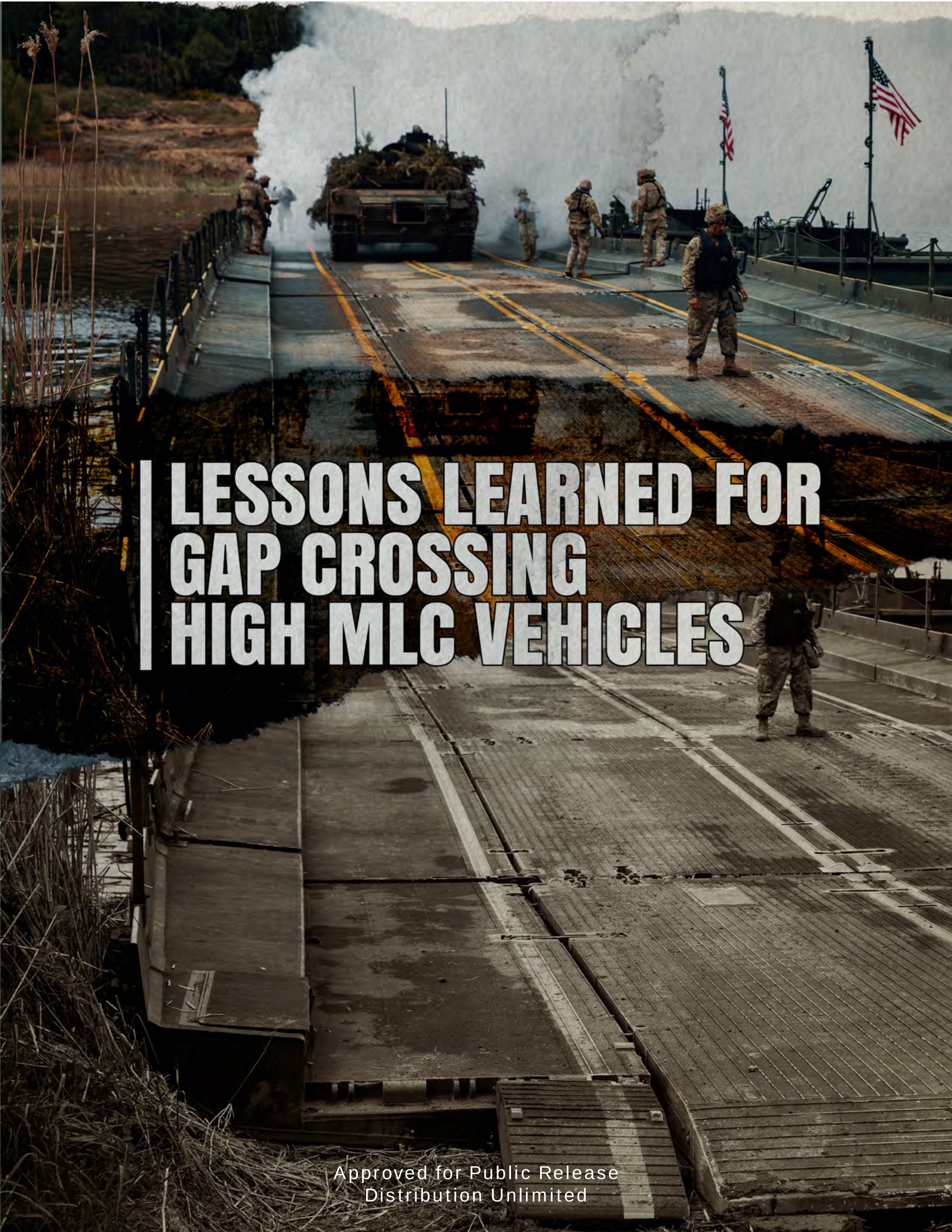


LESSONS LEARNED FOR GAP CROSSING HIGH MLC VEHICLES

Approved for Public Release
Distribution Unlimited

Center for Army Lessons Learned

The Center for Army Lessons Learned leads the Army Lessons Learned Program and delivers timely and relevant information to resolve gaps, enhance readiness, and inform modernization.

CONTACT US

10 Meade Ave.
Bldg 50
Fort Leavenworth
KS 66027

DSN: 552-9533
913-684-9533

DIRECTOR
COL Scott Allen

ANALYSTS/AUTHORS
CPT Jay Carmody
Stephanie Robert

PUBLIC AFFAIRS OFFICER
Michael Hagen

INFORMATION DIVISION CHIEF
Eric Hillner

CHIEF, PUBLISHING AND DIGITAL MEDIA
Diana Keeler

EDITOR
Paige Cox

ILLUSTRATOR
Jorge Sainz

SECURITY
Sandra Griffin

PHOTO CREDITS
SGT Tamie Norris
SPC Alison Strout

Introduction

On 24 January 2024, the 502nd Multi-Role Bridge Company (MRBC) partnered with the U.S. Army Engineer Research and Development Center (ERDC) to execute testing of the Improved Ribbon Bridge in a rafting configuration that was subjected to high Military Load Classification (MLC) vehicles. This test was intended to confirm the M1A2 SEPV3 Abrams Main Battle Tank's maximum load in realistic conditions. A surrogate vehicle, constructed out of concrete and steel, represented the M1A2 SEPV3 uploaded to a maximum weight configuration, which corresponds to an approximate MLC of 120. The site for the testing was the Ohio River at Pilcher's Landing, which abuts Fort Knox, KY. While ultimately successful, this test provided several lessons to the 502nd and ERDC for wet-gap crossing operations.

Lesson Learned: Upstream Hydrology Plays a Significant Role in Wet-Gap Crossings

Success or failure in a wet-gap crossing operation always involves a variety of factors. These range from tangibles, such as quantity of bridges, to intangibles like motivation. One factor that has always affected operations is the weather. Although this has long been a planning factor for conditions on and around the battlefield—so much so that it has its own place in the situation paragraph—the impact of natural and created hydrological factors is often ignored in planning. Structures such as locks and dams, river pollution, and weather shifts far outside of the area of operations could impact a wet-gap crossing. The impact of natural and created factors throughout the watershed of a proposed crossing site has a significant impact in the success or failure of a wet-gap crossing.

Upstream Infrastructure

During the test period, the 502nd coordinated with Louisville District of the U.S. Army Corps of Engineers (USACE) to monitor upstream river conditions and barge traffic. The research boat had sonar and short-range communications for contacting these vessels. On the day of testing, a heavy fog pervaded, making it impossible to see oncoming traffic or the far shore. The rafts maneuverability were also limited with a maximum MLC load. Although the McAlpine Lock in Louisville does not dramatically impact water levels, there are more than 50 locks and dams along the Ohio River. An unplanned for release of a retention lake or heavy river traffic would delay the test. <u>When executing a wet-gap crossing, control and coordination with upstream infrastructure is key to success.</u>

The U.S. Army can use existing forces and techniques to mitigate the risks associated with upstream control measures. Using unconventional forces—such as special operations forces (SOF) divers or friendly militias—in the deep area to recon or seize key terrain before a crossing would mitigate the impact of this risk. Additionally, existing assets such as the Streamflow Prediction Tool (through the ERDC and satellite coverage of the structures) will provide engineer planners the information they need to determine if the conditions will allow for a successful crossing.

Significant Weather Shifts

During the overnight of 24-25 January, the level of the river increased close to six feet. The estimate derived from a constant review of the stream-flow prediction models and communicating with USACE personnel the day prior was a maximum of four feet over a 24-hour period. Ultimately, these predictions were based on the upstream lock at McAlpin, not at Pilcher's Landing. Additionally, the total rainfall surpassed weather forecasts. The increase in water level and inability to move the crane without the civilian contractor resulted in nearly losing the asset to the river. When executing a wet-gap crossing, avoid using stationary loading and unloading assets. After recovering and removing the crane, an excavator was used to remove the load from the raft. This presented new challenges related to load capacity. Despite having dragon's teeth concrete mesh embedded, the slip lost most of its traction. This reduction in capacity from a crane to an excavator, coupled with the decreased traction by the water, doubled the time required to unload the raft from four hours to eight hours. A fully stocked equipment section that includes excavators, dozers, and graders are required at the Engineer Equipment Park (EEP) to constantly improve the approach and to facilitate smooth unloading and loading. Soil stabilization features, such as hand-emplaced matting, keep traffic moving.

River Debris

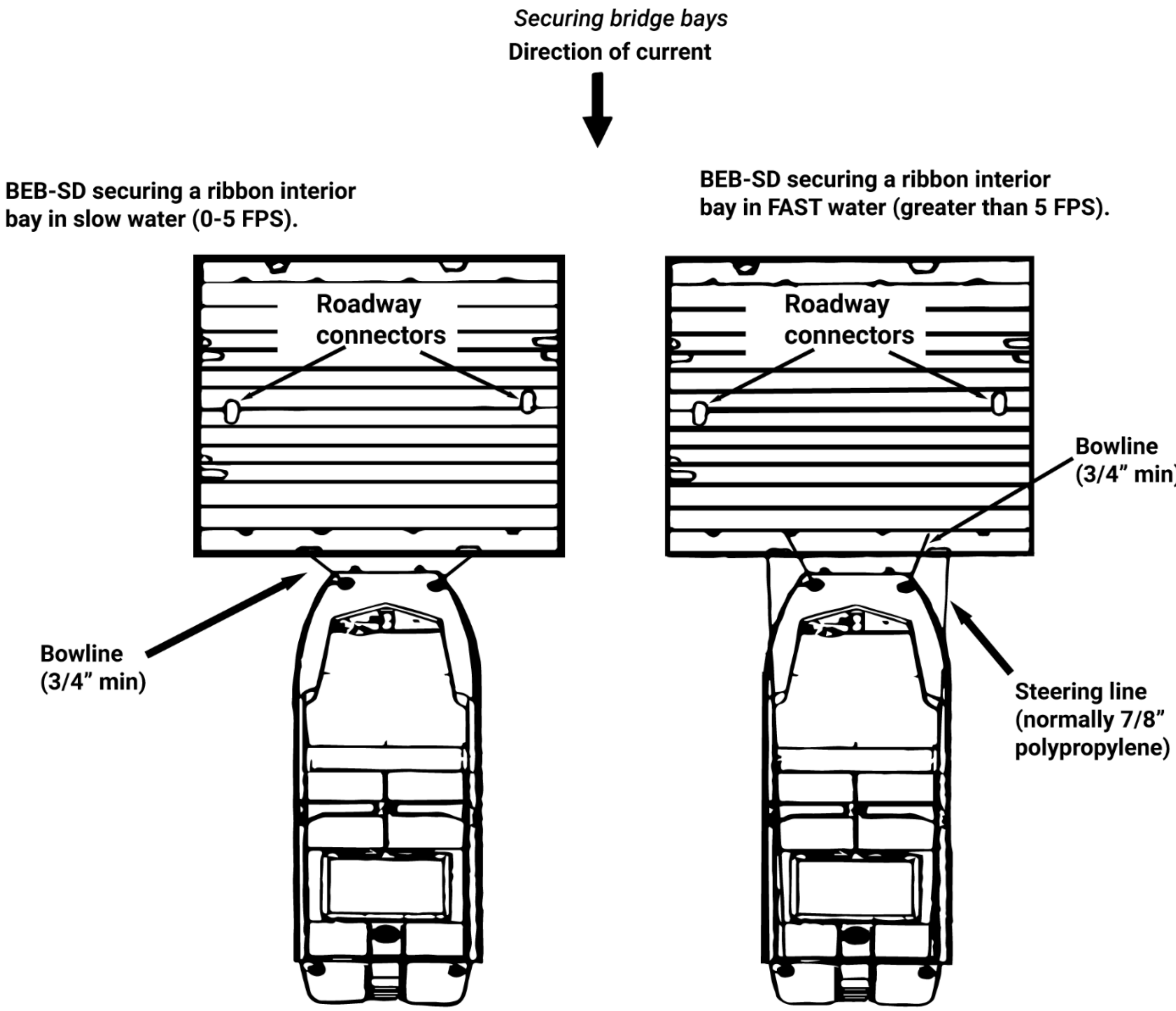
The impact of debris washing into the river proved insurmountable. Heavy rain throughout the watershed caused trash and ice from the previous week's freeze to flow into the river. Tires, downed trees, and large ice pieces were observed as operations began. One boat was sent out and within minutes, the scoops clogged with sticks. The mechanically complex design of the Bridge Erection Boats (BEB) jets and scoops are susceptible to debris in the water. Additionally, the large ice chunks and logs have a greater impact on the raft when rafting at maximum MLC, causing the front end to rock. These factors, combined with the unavailability of a crane operator to adjust to weather conditions, forced the cancelation of subsequent testing. Consider upstream sources of debris and their impact when planning a wet-gap crossing.

Debris and water conditions will always be a factor during wet-gap crossing operations. Engineer planners, in conjunction with local authorities or civil affairs, can analyze local environmental regulations and use of waterways to determine the likelihood of having debris. While these factors are often buried in an engineer assessment or civil annex, they must be brought to the forefront during a wet-gap crossing operation. Executing a crossing downstream from a landfill or poorly regulated factory could cause more problems than anticipated.

Lesson Learned Two: High MLC Means Revisiting the Doctrine and Rewriting the TTPs

Higher MLC

The original plan for the rafting event involved two fully mission capable BEBs to conduct the conventional rafting iteration. Through a progressive increase in revolutions per minute (RPM), the boats made it up to five minutes at 2,500 RPM without reaching the maximum velocity hoped for. A raft utilizing three BEBs is seldom utilized, as the third BEB in a section often serves as the safety boat or contingency boat. A third BEB pushing is required to reach maximum speed. Plan for three BEBs per raft when planning a high-MLC wet-gap crossing.



CAUTION

If the roadway/bow ponton bridge latches are not engaged, the bow ponton will fold up when a vehicle crosses the bridge.

Training Circular 5-210L Military Float Bridging Equipment[1]

[1] Training Circular 5-210L Military Float Bridging Equipment. Washington D.C. December 27, 1988.

When task organizing assets, the doctrine states that each MRBC platoon can field three, MLC 70 rafts. In a high-MLC rafting scenario, three boats are needed per raft, reducing the total number of rafts from three to two. This leaves minimal redundancy in the event of a boat malfunction. For engineer planners organizing a high-MLC crossing, keeping company integrity instead of dividing platoons across centerlines would provide maximum redundancy that is not required for other wet-gap crossings.

Use of All Doctrinal Ropes

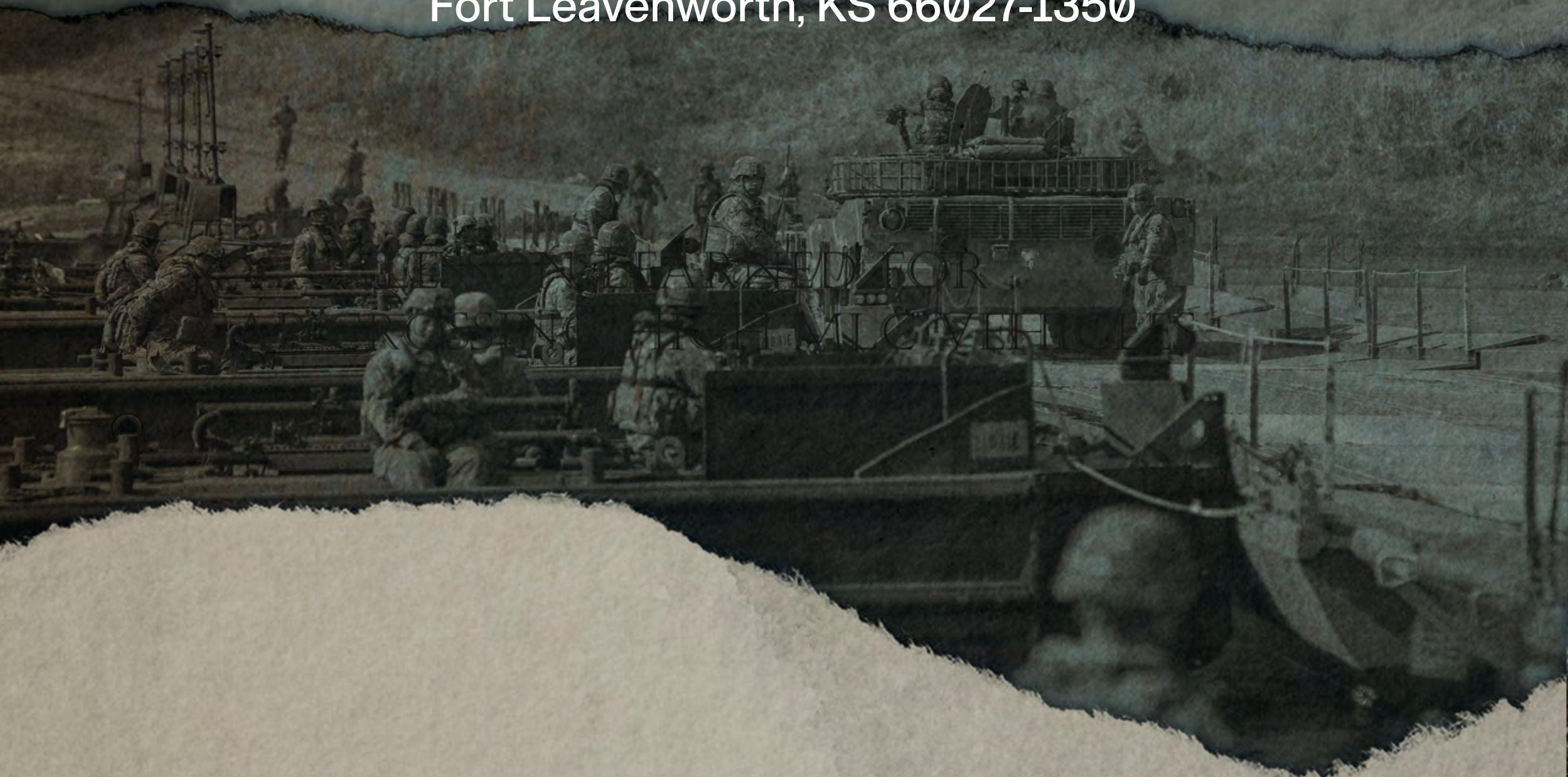
Like the three-boat challenge, for a high-MLC conventional raft configuration, all four doctrinal ropes are required: two bowlines (minimum 3/4" inches) and two steer lines (7/8" inches). For a streamflow under 1.5 meters per second (m/s), only the bowlines are needed. Most rafting operations conducted by the 502nd are well under the maximum MLC and current velocity. The steering lines should be used for a streamflow over 1.5 m/s. The common tactics, techniques, and procedures (TTPs) for most bridge crew members is to use the bowlines since higher stream flows with heavy weight are seldom operated. When using only bowlines, the lines began to break when attempting to move the raft off the shore. Utilize the steering and bowline ropes for the BEB when conducting a high-MLC wet-gap crossing. Reinforcing doctrinal-based TTPSs is key to future success with high MLC rafting. Additionally, through pre-combat inspections of the ropes, units can verify that they have redundant ropes in the event of a break. Training on lower load classes using all four ropes would enforce the TTPs for when high-MLC loads come into play.

Conclusion

Every wet-gap crossing operation provides the opportunity to reinforce old TTPs and learn new ones. The 502nd MRBC learned that a constant review of doctrine, the impacts of weather on wet-gap crossings, and a thorough analysis of civil infrastructure upstream are required to successfully execute a high-MLC rafting operation. This test effort provided the 502nd MRBC and the ERDC these opportunities to learn and improve and to ensure each wet-gap crossing is more successful than the last.

CENTER FOR ARMY LESSONS LEARNED

10 Meade Avenue, Building 50
Fort Leavenworth, KS 66027-1350



U.S. ARMY COMBINED ARMS CENTER

COMBINED ARMS CENTER - TRAINING

NO. 25-900
December 2024