

# Bridging through Time

## *From River Crossing in World War II to Wet-Gap Crossing Today and in the Future*

by Major Aditya Iyer, U.S. Army



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## **In Brief**

- The Russo-Ukrainian War has demonstrated the advancement of military technologies and the challenges for wet-gap crossing operations; the U.S. Army must be prepared to conduct such operations.
- The U.S. Army has not conducted contested wet-gap crossing operations against near-peer threats since World War II. That time period provides well-documented lessons learned about doctrinal, organizational and materiel changes required to adapt to emerging conditions and threats.
- Wet-gap crossing is a combined-arms operation that requires immense support from higher echelons. Although the current doctrine, organization and materiel also require change, leaders are the key to success.
- Leaders' knowledge of the challenges and the historical actions taken to overcome these challenges will greatly aid in future transformations and ensure that we do not repeat past mistakes.

## **Bridging through Time: From River Crossing in World War II to Wet-Gap Crossing Today and in the Future**

*A large river that crosses the direction of the attack is always very inconvenient for the assailant: when he has crossed it, he is generally limited to one point of passage, and therefore, unless he remains close to the river, he becomes very much hampered in his movements.*

—Carl von Clausewitz, *On War*<sup>1</sup>

### **Introduction**

Crossing a river defended by an enemy force puts any attacker at a disadvantage; the attacker must take all precautions and utilize all resources to cross the obstacle successfully. Since the Napoleonic Wars, river-crossing equipment and doctrine have evolved. The current U.S. Army doctrine refers to river crossings as *wet-gap crossings* and defines them as “crossing an inland water obstacle, requiring extensive planning and detailed preparations.”<sup>2</sup> Wet-gap crossings have evolved from building expedient wooden landing craft to the metal float bridges used by modern militaries. They include the employment of various resources as military organizations have grown in size, weight and complexity. This increased complexity also increases the challenge for the leadership to synchronize and control operations. Most recently, the Russian forces in Ukraine were confronted with the difficulty of conducting a wet-gap crossing operation in the modern environment.

On 9 May 2022, the Ukrainian forces successfully disrupted the Russian attempt to cross the Siverskyi Donetsk River and undermined their ability to encircle the Ukrainian forces in the region.<sup>3</sup> This was the third failed attempt by the Russians to cross this river. Several mistakes on their part led to the failure, but the Ukrainian capabilities provided insights into the technological advances of the modern battlefield.

The Russians’ first mistake was that, although they had identified three crossing sites, they only used one site during each attempt, never taking advantage of the opportunity to cross

simultaneously on a broad front. Second, their crossing was conducted in the daytime; they were literally moving in plain sight. Third, the Russian forces failed to properly reconnoiter the area to gather the Ukrainian disposition and composition. Lastly, due to a lack of understanding of this Ukrainian composition and disposition, the Russians failed to secure the near- and far-side bridgeheads or to employ any combined-arms effects to set the conditions for crossing. In contrast, the Ukrainian forces had accurate intelligence that showed the Russian troops massing along the river. The Ukrainian engineer reconnaissance teams had also identified potential river crossings and had pre-coordinated artillery targets on the crossing sites, and they were right; Russian forces did indeed use those sites. The precise imagery showing the massing of Russian forces and the Ukrainian familiarity with the terrain allowed them to correctly predict the most likely courses of action.

The successful Ukrainian defense of this river against one of the greatest global military powers should be concerning to the U.S. Army as it considers the feasibility of accomplishing a wet-gap crossing operation in the current and future operating environment. The Russians' attempt, in this instance, shows that the advances in modern war technology make it harder for an attacker to move stealthily while synchronizing multiple assets across various echelons. Ultimately, this failed Russian attempt at wet-gap crossing has caused the U.S. Army to evaluate its own capability.

We are at an inflection point. Following the invasions of Iraq and Afghanistan, the Army transitioned to Counter-Insurgency (COIN) operations. But after two decades of COIN operations in Iraq and Afghanistan, the United States faces emerging threats in Russia and China as they possess comparable, if not superior, technology—and the ability to conduct large-scale combat. The Army must be prepared for large-scale combat operations (LSCOs) against these near-peer threats. The Russo-Ukrainian War has highlighted that military technologies have evolved in recent decades and that the U.S. military must be prepared to conduct wet-gap crossing operations against a well-organized and technologically advanced force. The Army has not conducted such an operation since World War II. And in fact, World War II provides comparable case studies for these operations, given that the Army was at war against peer threats with similar capabilities at that time.

Toward the end of World War II, the Army conducted one of the largest ever contested river-crossing operations when Soldiers crossed the Rhine to enter the heartland of Germany and bring the war to its conclusion. It crossed three massive Army Groups, including the 21st British Army Group. Its preparation and its ability to mass combat power were two reasons for its success. However, it was not flawless in its execution, especially not initially. It faced the challenge of transitioning from the static trench war of World War I, primarily composed of infantry forces, to the mechanized maneuver war of World War II. Today, it is in a similar situation as it transitions from the COIN conditions of Iraq and Afghanistan to face the emerging peer threats in LSCO, and it must overcome several challenges to be prepared for such a war. Wet-gap crossing operations is one of these challenges.<sup>4</sup>

### **Historical Case Studies: The Moselle and Rhine Rivers**

In this essay, we will look at one corps and two division operations to inform our understanding. First, we will analyze the 80th Infantry Division's river crossing at Dieulouard within the XII Corps' Moselle crossing plan, and then we will look at the 7th Armored and 5th Infantry Division crossing at Dornot and Arnville within the XX Corps' Moselle crossing plan. Finally,

we will analyze the XII Corps' Rhine crossing at Oppenheim. These case studies validate that the divisions in World War II were not suited for river-crossing operations; because of this lack of suitability, they required planning and resourcing assistance from the Corps. Further, this research analyzes these case studies through the lens of the institutional considerations of the DOTMLPF-P domains of doctrine, organization, materiel and leadership. A thorough understanding of the environment of the river crossing, focusing on the enemy and terrain, must be in place before conducting the DOTMLPF-P analysis. Ultimately, this case study analysis aims to compare various trends and patterns to determine similar or contrasting evidence that can validate or invalidate the proposed theory. The cross-study analysis chart (table 1) on the following page shows the findings from each case study.

The analysis shows similar conditions in the two Moselle crossings by two different units, while the Rhine crossing provides a contrasting condition. Through the DOTMLPF-P analysis, we see several similar conclusions and some differences that help to build a comprehensive understanding of the case studies. Additionally, it shows that understanding both the terrain and the enemy is paramount to the success of a river-crossing operation; without that, there can be no assurance that a crossing force has adequate resources to neutralize the enemy while navigating the terrain.

The width of the Moselle at Dieulouard and Dornot is approximately 100 meters.<sup>5</sup> The width of the Rhine averages from 700m to 1200m and upward of 2000m in some areas.<sup>6</sup> The river's width provides a data point to estimate the required bridge length for the crossing.

The Moselle crossings provide a look at very advantageous terrain for defenders, as it severely constricted attackers' movements. But simultaneously, subtle differences required the respective commanders to execute their moves differently. The XII Corps' crossing at Dieulouard presented the commander with the dual challenges of islands within the river and steep exit banks as his troops left the river. The XX Corps' crossing presented the commanders with the challenge of conducting three crossings at the Rupt-de-Mad, the Moselle Canal and the Moselle itself. Despite the different river conditions, both Corps were required to conduct detailed reconnaissance to determine adequate crossing sites and to use multiple bridging assets. In contrast, the Rhine crossing demonstrated a favorable terrain to the attacker in that the near side consisted of key terrain that masked their movements, and the flat plains of the far side provided accurate observation of defensive enemy movements. The critical impact of favorable or unfavorable terrain is that it enables—or disables—the correct use of resources and forces that shape the terrain to potentially deceive the enemy and therefore enhance favorable conditions.

The terrain can also impact the mobility of troops and the employment of different types of forces. Both Moselle crossings, for XII Corps and XX Corps, experienced constricted movement on both sides due to the densely forested areas. These forested areas limited the movement of mechanized vehicles to the roads. In a positive contrast, however, the terrain provided excellent cover for the infantry forces to maneuver. The Rhine crossing, on the other hand, was characterized by flat, open plains that were favorable for maneuvering mechanized forces.

Understanding the enemy's composition and disposition enables the crossing force's success. During the Moselle crossings, both Corps operated based on faulty intelligence that showed the German forces in withdrawal, posing minimal defense in the vicinity of Nancy and Metz. Therefore, the commanders operated without properly understanding the enemy's composition and disposition. In contrast, the Third Army dedicated months of preparation



Table 1  
**Cross Study Analysis**

	Moselle River		Rhine River
DOTMLPF-P Domain	80th Infantry Division at Dieulouard	5th Infantry and 7th Armored Divisions at Dornot and Arnville	XII Corps at Oppenheim
<b>Enemy</b>	<ul style="list-style-type: none"> <li>• Occupied key terrain on the far side</li> <li>• Possessed effective artillery</li> <li>• Mechanized forces</li> <li>• Conglomerate of forces under one command</li> </ul>	<ul style="list-style-type: none"> <li>• Occupied key terrain on the far side and near side</li> <li>• Possessed effective artillery</li> <li>• Mechanized forces</li> <li>• Conglomerate of forces under one command</li> </ul>	<ul style="list-style-type: none"> <li>• Disintegrated forces</li> <li>• Unconventional capabilities</li> <li>• Possessed some artillery and mechanized forces</li> <li>• Artillery and air capability</li> <li>• Mines in the river</li> </ul>
<b>Terrain</b>	<ul style="list-style-type: none"> <li>• Moselle River is 100m wide</li> <li>• The Moselle Canal is 25m wide</li> <li>• Strong river current</li> <li>• Hilly areas with sporadic towns and forests</li> <li>• Favorable to defender</li> <li>• Fortified city</li> <li>• Multiple tributaries</li> <li>• Canalizing river approaches and exits</li> </ul>	<ul style="list-style-type: none"> <li>• Moselle River is 100m wide</li> <li>• The Moselle Canal is 25m wide with 180m of marshy ground requiring bridging</li> <li>• Strong river current</li> <li>• Hilly areas with sporadic towns and forests</li> <li>• Favorable to defender</li> <li>• Fortified city</li> <li>• Multiple tributaries</li> <li>• Canalizing river approaches and exits</li> </ul>	<ul style="list-style-type: none"> <li>• Averaging 700m to 1200m, 2000m in some areas</li> <li>• Strong river current</li> <li>• Favorable terrain to the attacker</li> <li>• Multiple road networks</li> <li>• Natural obstacles in the river</li> <li>• Lacked fortified position</li> </ul>
<b>Doctrine</b>	<ul style="list-style-type: none"> <li>• Hasty crossing on the first attempt; deliberate on second</li> <li>• Utilized armor as an exploitation force</li> <li>• Flexible planning</li> <li>• Utilized deception</li> <li>• Methodic objectives</li> <li>• Lacked structured training</li> </ul>	<ul style="list-style-type: none"> <li>• Hasty crossing on the first attempt; deliberate on second</li> <li>• Utilized armor as a penetration force</li> <li>• Flexible planning</li> <li>• Utilized deception</li> <li>• Methodic objectives</li> <li>• Lacked structured training</li> </ul>	<ul style="list-style-type: none"> <li>• Deliberate planning with hasty crossing</li> <li>• Flexible planning</li> <li>• Utilized armor as the exploitation force</li> <li>• Implemented training</li> <li>• Utilized deception</li> <li>• Methodic objectives</li> </ul>
<b>Organization</b>	<ul style="list-style-type: none"> <li>• Triangular division</li> <li>• Augmented by Corps</li> <li>• Enablers at Corps</li> <li>• Lacked engineer capabilities at the division</li> <li>• Did not include any joint enablers</li> </ul>	<ul style="list-style-type: none"> <li>• Triangular division</li> <li>• Augmented by Corps</li> <li>• Enablers at Corps</li> <li>• Lacked engineer capabilities at the division</li> <li>• Incorporated counter-mobility assets</li> <li>• Included air support</li> </ul>	<ul style="list-style-type: none"> <li>• Weighted triangular division and corps</li> <li>• Corps and divisions augmented by Army</li> <li>• Enablers at the Army level</li> <li>• Joint enablers (Navy and Air support)</li> </ul>
<b>Materiel</b>	<ul style="list-style-type: none"> <li>• Utilized multiple assets</li> <li>• Use of bank repair assets</li> <li>• Logistics requirement</li> <li>• U.S. Army bridging assets</li> </ul>	<ul style="list-style-type: none"> <li>• Utilized multiple assets</li> <li>• Use of bank repair assets</li> <li>• Use of smoke</li> <li>• Logistics requirement</li> <li>• U.S. Army bridging assets</li> </ul>	<ul style="list-style-type: none"> <li>• Auxiliary equipment for bridge protection</li> <li>• Use of naval landing crafts and Army bridging assets</li> <li>• Bank repair assets not needed</li> <li>• Significant logistic requirement</li> </ul>
<b>Leadership</b>	<ul style="list-style-type: none"> <li>• Lacked a structured command and control node</li> <li>• Lacked a common operating picture</li> <li>• Miscommunication</li> <li>• Confusion at the crossing site</li> </ul>		<ul style="list-style-type: none"> <li>• Established mission command nodes</li> <li>• Effective traffic control</li> </ul>

Figure 1  
**4th Armored Division**  
 11–14 September 1944



Figure 2  
**XX Corps**  
 Situation, Noon 6 September 1944

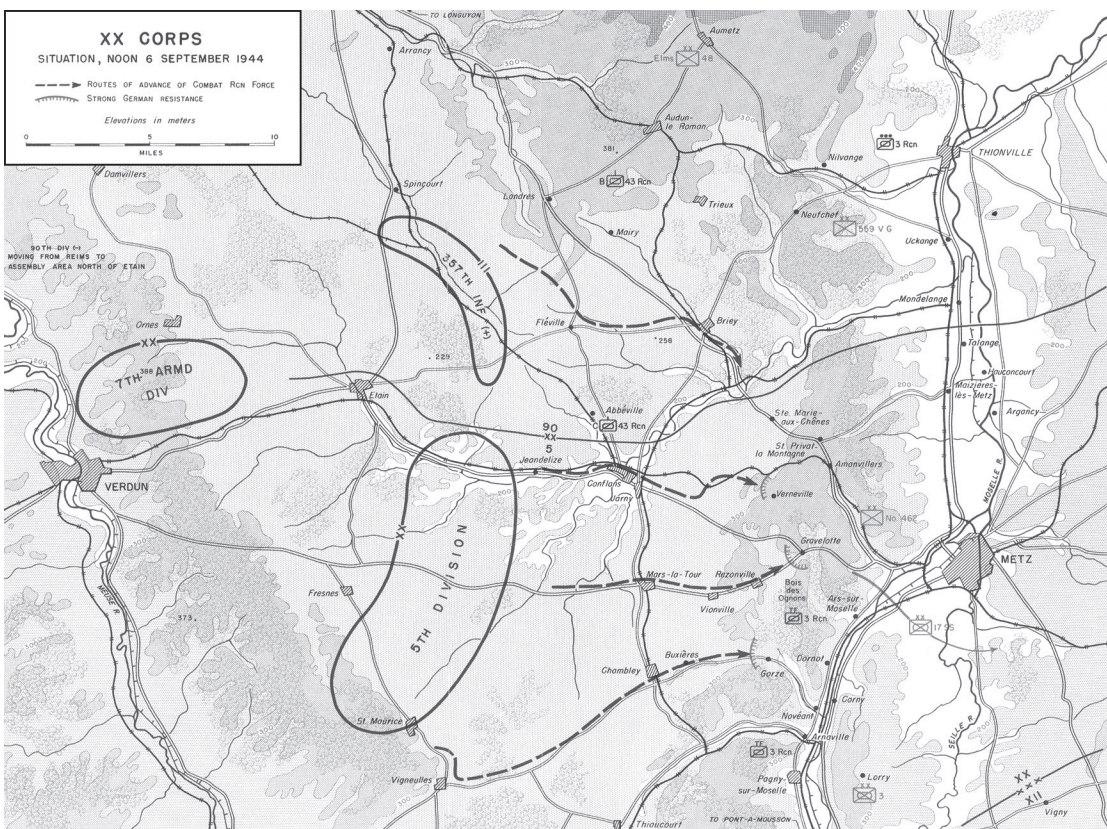
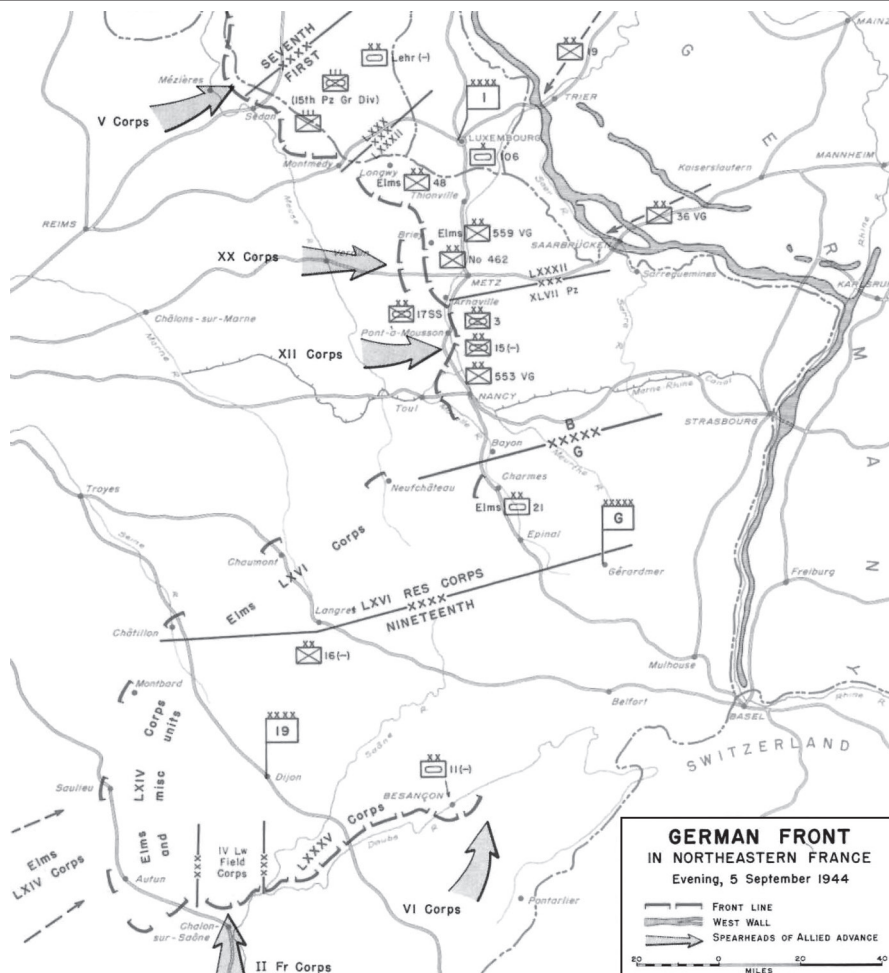


Figure 3  
**German Front in Northeastern France**  
 Evening, 5 September 1944



and reconnaissance to gather an accurate picture of the enemy composition and disposition at Oppenheim. This understanding enabled the Third Army to find a crossing site that masked their movements and surprised their enemy.

Distinct from the Rhine crossing, the Moselle crossings show the impact of similar enemy assets on the terrain. The German forces possessed artillery during both the Moselle and the Rhine crossings. They even had air support at the Rhine. However, at the Moselle, the German forces could operate from a fortified city and could occupy key terrain that increased fire effectiveness and protection.

The Moselle crossing enables the analysis of a failed crossing and the evaluation of the subsequent actions taken to achieve success. XII Corps and XX Corps attempted a hasty river crossing that failed. The failure in both attempts stemmed from a lack of preparation and reconnaissance of the enemy and terrain, which led to the improper allocation of resources. Following their respective failures, both Corps Commanders conducted extensive planning and

preparation to achieve success. In the deliberate crossings, each commander utilized doctrinal principles to cross at night, to prepare the bridgehead with artillery fire, and to utilize deception and the series of objectives that would enable bridging operations and seizure of the final objective.

In executing the deliberate crossing, each Corps utilized doctrinal principles similarly, with some resource differences. However, they utilized their armored forces differently. The XII Corps used the 4th Armored Division as the exploitation force, while the XX Corps used the 7th Armored Division as the penetration force. These case studies are insufficient to make a definite determination. Still, they show that armor forces in the crossing must be used cautiously and that their proper employment can result in success. The 4th Armored Division successfully exploited the far side bridgehead and objective due to their timely employment following the 80th Infantry Division's crossing. In contrast, the 7th Armored Division, utilized as the penetrating force to conduct the crossing, was fixed at the crossing site and pushed back. The division was exhausted and could not adequately support the 5th Infantry Division's successful crossing at Arnaville. In contrast, the Rhine crossing demonstrates that deliberate planning and preparations can result in opportunities that can be exploited. During Third Army's crossing, they realized that the German forces had been diverted to contest the First Army Group crossing at Remagen. This diversion allowed the Third Army to cross with XII Corps at Oppenheim.

Crossing operations seldom go according to plan; the crossing force must incorporate flexibility. The XII Corps and XX Corps encountered challenges during their respective crossings, but they were flexible and able to adapt to overcome them. The XII Corps built flexibility using multiple crossing sites and various crossing means. In contrast, the XX Corps developed flexibility through continuous reconnaissance and by finding fording sites that enabled the armor forces to cross at Arnaville. Similarly, at the Rhine, XII Corps had flexibility due to their vast crossing assets, including the naval landing crafts.

The divisions were not organized to conduct river-crossing operations independently. They lacked the adequate combined-arms capability to conduct an opposed river-crossing operation against a well-organized enemy. The Army was organized into triangular divisions that were lean and mobile and could accommodate augmentation. These divisions consisted of an organic engineer battalion, primarily used for road construction and some fortifications. River-crossing assets were held at corps and above echelons. In addition to the engineer assets, the corps supported the divisions with tank and artillery battalions. The tank and artillery assets were critical in the river crossing in all three case studies, demonstrating that it is a combined-arms operation. The divisions of World War II lacked the engineer bridging assets and the other enablers. In the XX Corps' Moselle crossing, the division could not reinforce the infantry forces on the far side with armor forces and relied heavily on their indirect fire capability. The XIX Tactical Air Force provided the additional support that was the difference through which the XX Corps was able to neutralize the German counterattack. In this instance, we see how joint capabilities augment and enhance the success of the river-crossing operation; the XX Corps' crossing at the Moselle and the XII Corps' crossing at the Rhine shows the crucial role of joint enablers in river-crossing operations.

The requirement for forces is equally accompanied by the requirement for materiel. Each river crossing demonstrates the use of multiple assets and shows how innovative materiel use greatly enhanced the execution of the crossing. The XX Corps' crossing at Arnaville employed

smoke generators to mask it from the German defenders. At the Rhine, the U.S. Army designed and deployed anti-mine booms to prevent the underwater mines and divers from destroying the bridges or the naval landing crafts. These innovations were great enhancements that ensured the efficiency of the crossing, but the crossing assets and artillery support were the critical enablers.

In World War II, the U.S. Army did not possess a multi-purpose bridge that could cross all types of forces. Therefore, the units employed multiple assets to cross the division successfully. During the Moselle crossings, both corps utilized assault boats, footbridges and pontoon bridges to enable the crossings. Similarly, at the Rhine, the XII Corps utilized upward of 500 assault boats, naval landing craft and pontoon bridges to cross the entire corps. In addition to the numerous river-crossing assets, the divisions required additional artillery support to neutralize the German defenders.

At the Moselle, the 5th Infantry Division used nine artillery battalions to enable the crossing. This artillery support enabled the emplacement of the bridges while suppressing the direct fire threat from impeding crossing operations. River-crossing operations are extremely resource-intensive and place an enormous logistical strain on the corps and divisions. Based on these case studies, divisions in World War II lacked the required logistical capability and found that they had to rely on the corps to support these operations.

The U.S. Army was a learning organization as it improved its river-crossing methodologies. The leadership domain is the best way to demonstrate the development of this expertise. During the Moselle crossings, the XII Corps and XX Corps lacked a structured command node to control the crossing operation, which, naturally, had significant negative impacts on the crossings. During both Moselle crossings, the Corps and Division Commanders lacked an accurate operating picture, making uninformed decisions that resulted in confusion and poor traffic management. In contrast, each echelon established a command node during the Rhine crossing, enabling an efficient river-crossing operation.

This detailed study of the river-crossing operations from World War II provides implications for the U.S. Army's current ability to conduct large-scale wet-gap crossing operations in today's operating environment. The means of wet-gap crossing, the combined-arms methods and the multi-domain considerations may differ, but the fundamentals remain the same. Reconnaissance of the crossing sites, the associated terrain and the enemy is paramount to understanding the mission variables. Establishing a secure bridgehead to facilitate bridge emplacement is still just as essential. When conducting the crossing, we must still be able to range fires on the enemy's defensive positions. We must employ the infantry as the initial force to secure a bridgehead and to enable the armored force to penetrate and exploit the far-side objectives. The study shows that the language in our doctrine may be different, with different terminologies, but our concepts remain the same. Above all, despite the changing environment and technologies, our leaders plan, synchronize and execute, and we will continue to rely on these leaders to accomplish the mission.

The Russo-Ukrainian War provides a glimpse into the nature of future wars and the validity of river-crossing implications from World War II. The Russian forces' failed attempt to cross the Siverskyi Donets River in May 2022 demonstrates the validity of these implications. The Russian forces' lack of reconnaissance and their inability to secure a bridgehead or employ fires directly led to their failure.

## Findings and Conclusions

When the United States entered World War II in 1941, the military's contested river-crossing doctrine was inadequate. It had been written primarily to enable technical engineer planning for river-crossing operations by the division engineer with the assistance of the engineer group commander. This was due to the Army's decentralized approach to doctrine development, with each branch tasked with specific topics. In short, the doctrine was a tactics manual that provided prescriptive actions to accomplish the mission. However, this doctrine evolved over the course of the war due to the lessons learned in cases such as the Moselle crossing. Toward the end, at the Rhine crossing in 1945, the doctrine was significantly more comprehensive than it had been in 1941. At the operational level, it incorporated the focus on sustainment and joint integration. At the tactical level, it emphasized the importance of preparation, reconnaissance and combined-arms integration.

Despite the division-level doctrine of the time, the reality revealed that a division's organizational structure was unsuitable for river-crossing operations and that it relied heavily on the corps for support. The engineer organizational structure was designed for corps-level operations. The engineers with the bridging assets were organized at the corps under the engineer group headquarters. This organization enabled the corps to plan and allocate engineer bridge assets across the area of operation as needed.

In addition to the engineer bridge assets, the triangular divisions lacked enablers such as antitank, antiaircraft artillery, smoke and military police; therefore, they required corps augmentation. The triangular divisions were designed to be lean and mobile to facilitate rapid deployment and maneuvering on the battlefield. However, the division operated much more robustly than originally intended.

The river-crossing materiel effectively crossed a limited force during the assault crossing phase, but it could not cross the heavy tank. In other words, the engineer groups were equipped with a breadth of bridges that provided flexibility and redundancy during the crossing, but they could not sustain the heavier loads due to the engineer materiel board's lack of foresight and budgetary constraints. They failed to account for the growing weight of the mechanized equipment. The heavy pontoon was the most capable bridge in the arsenal, but even that could only support medium tank variants, such as the M4 Sherman.

The case studies also demonstrated the significant logistics requirement for transporting bridges, ammunition and fuel for the crossing force. The division lacked the capability and capacity to execute river crossings while coordinating support requirements. It did not have any organic bridging assets, and it lacked the logistical assets to sustain crossing operations. It relied heavily on the engineer group for bridging assets and the corps to provide logistical support. Overall, World War II highlighted the heavy logistics requirement for ammunition, fuel and bridging replacements during river-crossing operations. The XX Corps crossing at the Moselle in particular demonstrated that the logistics system could not meet the ammunition and bridge replacement requirements.

Despite the lack of organic bridging assets and organizational structure for river-crossing operations, the divisions ultimately conducted them successfully. The engineer group commander was the critical integrating element in ensuring success. He was designated as the controlling authority and assisted the division engineer in planning the operation. However, despite this, the divisions did lack a central command node to control the tactical operation.

The difficulties of the Moselle crossings greatly highlighted the need for a central command node to control the overall tactical operation. The lack of it led to poor decisionmaking, poor traffic control and confusion at the crossing site. But later, the U.S. Army efficiently crossed the Rhine with these lessons learned.

How do the current Army doctrine, organization, materiel and leadership compare to the ones from World War II? In looking at various doctrinal publications and the current organizational structure and materiel, we can conclude that wet-gap crossing remains a corps-level operation.

Army Techniques Publication (ATP) 3-90.4, *Combined Arms Mobility*, is the primary wet-gap crossing doctrine for division-level operations. This publication is adequate for division-level wet-gap crossing operations, but it fails to address the number of crossing lanes and associated multi-role bridge companies (MRBCs) required. It specifies that a division wet-gap crossing consists of more than one brigade combat team (BCT), but it does not specify the number of crossing lanes to be constructed to support those BCTs. This information is critical as the number of crossing lanes directly impacts the allocation of MRBCs and bridging equipment. Although ATP 3-90.4 addresses division-level wet-gap crossings, the publication falls under the umbrella of brigade-level operations. ATP 3-91, *Division Operations*, describes division-level operations, as the name indicates, but it does not include wet-gap crossing operations. The Combined Arms Doctrine Directorate is revising ATP 3-91 to address this issue; the revision will include Appendix B, which covers division-level wet-gap crossing operations,<sup>7</sup> describing division crossings as two BCTs each establishing two crossing lanes for a total of four crossing lanes in the division-crossing area. It will codify the problem as determined by the Combined Arms Center and further highlight the overall misalignment among the other DOTMLPF-P domains.

Despite the updates to the previously described ATPs, the current doctrine does not provide a comprehensive solution to wet-gap crossing operations. It has transitioned from a prescriptive tactical manual to a descriptive, principle-based publication. However, publications remain technically focused on engineer considerations and calculations to execute a crossing. Based on the lack of tactical incorporation in the doctrine, the Army continues to have a decentralized approach toward wet-gap crossing doctrine that does not effectively incorporate all warfighting considerations.

The Combined Arms Center states that “divisions require the capability to cross a 400-meter wet gap with a minimum of four MRBCs and one additional for rafting.”<sup>8</sup> Under the current organizational structure, the division remains unsuitable for river-crossing operations. The divisions are organically allocated a brigade engineer battalion (BEB) within each BCT. The BEB does not possess wet-gap crossing capabilities. The MRBC is organized under the corps headquarters in the echelons-above-brigade (EAB) engineer brigade. Divisions rely on the corps augmentation for wet-gap crossing operations, including other enablers, such as military police and smoke.

Furthermore, the Army lacks sufficient MRBCs to support all divisions. Currently, it has four MRBCs in the active component. Each MRBC can provide one crossing lane across a 213-meter gap. Additional MRBCs are required to conduct simultaneous crossings. The corps headquarters is needed to manage the allocation of limited resources across the area of operations.

What all of this means is that the division lacks bridging capability in LSCO.<sup>9</sup> The current bridging equipment has the same capability shortfalls that we had in World War II. The

M1 Abrams exceeds the weight capacity of the Improved Ribbon Bridge (IRB). The IRB can support tracked vehicles with a Military Load Class (MLC) up to 70 and wheeled vehicles up to MLC 96.<sup>10</sup> Table 2 shows that a combat-loaded, fully armored M1 Abrams significantly exceeds the IRB’s weight capacity.

Table 2

### Military Load Class Comparison

M1A2 V2	MLC	M1A2 V3	MLC
Combat loaded	72	Combat loaded	79
Combat loaded with: <ul style="list-style-type: none"> <li>• ARAT I</li> <li>• Heavy underbelly</li> <li>• APS</li> <li>• Ballast</li> <li>• Hull ARAT II</li> </ul>	99	Combat loaded with: <ul style="list-style-type: none"> <li>• ARAT I</li> <li>• Light underbelly</li> <li>• APS</li> <li>• Ballast</li> <li>• Hull ARAT II</li> </ul>	104
Combat loaded with: <ul style="list-style-type: none"> <li>• ARAT I</li> <li>• Heavy underbelly</li> <li>• APS</li> <li>• Ballast</li> <li>• Hull ARAT II</li> <li>• Mine roller mount</li> <li>• Mine roller</li> </ul>	130	Combat loaded with: <ul style="list-style-type: none"> <li>• ARAT I</li> <li>• Light underbelly</li> <li>• APS</li> <li>• Ballast</li> <li>• Hull ARAT II</li> <li>• Mine roller mount</li> <li>• Mine roller</li> </ul>	135

In addition to this shortfall in weight capacity, the Army lost the variance in bridging assets that was prevalent in World War II. The variance was critical to the success of the Moselle crossings. The Regionally Aligned Readiness and Modernization Model (ReARMM) seeks to increase power-projection capability by standardizing unit types (Stryker, light and armored) in each division.<sup>11</sup> The IRB is the sole means of crossing wheeled and tracked vehicles across a wet gap. The Army cannot simultaneously cross various platforms in a contested wet-gap crossing to secure the bridgehead and set conditions for the bridge’s construction.

In LSCO, heavy divisions lack the engineer brigade headquarters to command and control a wet-gap crossing operation.<sup>12</sup> This stems from the design of the current organizational structure in which the engineer brigade remains as an attached unit of the division. This concept can be suitable for tactical purposes, but it does not address the human dimension.

In an LSCO environment, a division will likely enter a contested and denied environment. In this contested environment, divisions must be prepared to operate in a commander-centric operations process to quickly analyze information, make decisions and direct operations while keeping pace with the tempo of the environment.<sup>13</sup> The commander-centric operations process requires trust and a shared understanding to operate in an ambiguous and dynamic environment. That trust and shared understanding are developed through habitual relationships and training. The current organizational structure does not support such a habitual relationship.

Overall, the current wet-gap crossing doctrine, organization, materiel and leadership are ineffective for division-level wet-gap crossing operations independent from the corps. The doctrine requires the divisions to provide four crossing lanes in the division area, yet the Army does not have sufficient MRBCs to support the doctrinal requirement, and the bridging equipment does not support the weight capacity of the M1 Abrams. Additionally, the lack of variance



in the bridging equipment does not enable simultaneous crossing operations to transport various combat power platforms. Lastly, the lack of a habitual relationship between the division and the engineer brigade can result in untimely and poor decisions in a fast-paced environment.

### **Implications and Recommendations**

Russia's attempted crossing at the Siverskyi Donets River in May 2022 illustrates that wet-gap crossing is a significant challenge that has been further complicated by technological advancement. These advancements have increased the importance of the use of deception, ground-force reconnaissance, materiel superiority, and the training and education of our leaders.

Ukraine's use of small drones and satellites for intelligence gathering demonstrated the ability to detect the precise location and actions of the crossing force. Deception during wet-gap crossings is critical to achieving surprise and a successful operation. However, using smoke or a feint will not be sufficient to achieve deception. Planners must incorporate deception into the planning process from the beginning, and it must be significant enough to compel the enemy to act.

As the use of technology increases, it will be much harder for crossing forces to mask their signals as the enemy will increasingly use cyberattacks to disrupt command and control systems. The use of ground force reconnaissance will be crucial in an electronically degraded environment to gather accurate intelligence on the terrain and enemy. The engineer reconnaissance teams must be incorporated into the reconnaissance teams to analyze the river and terrain thoroughly. Through the two decades of COIN operations, adversaries such as China and Russia have outpaced the United States in technological advancement. The U.S. Army must continue modernizing and investing in the materiel capacity to challenge such adversaries.

## Notes

- <sup>1</sup> Carl von Clausewitz, *On War*, trans. and eds. Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1984), 532.
- <sup>2</sup> Department of the Army, Army Techniques Publication (ATP) 3-90.4, *Combined Arms Mobility* (Washington, DC: Government Printing Office, June 2022), 4-1.
- <sup>3</sup> Katerina Stepaneko and Frederick W. Kagan, *Russian Offensive Campaign Assessment* (Washington, DC: ISW Press, 2022).
- <sup>4</sup> Wet-gap crossing is one of the 17 large-scale combat operation (LSCO) challenges that the Combined Arms Center identified: Combined Arms Center, “17 Critical LSCO Gaps as related to MDO,” PowerPoint presentation, acquired during the Commanding General Staff Officer Course, Fort Leavenworth, KS, 2022–23.
- <sup>5</sup> S.J. Argersinger, *The Moselle River Crossing, 5th Infantry Division, September 1944* (Fort Leavenworth, KS: Army Command and General Staff College, 1983), 18.
- <sup>6</sup> P.H. Timothy, *Rhine Crossing: Twelfth Army Group Engineer Operations* (BiblioGov, 18 January 2013), 5.
- <sup>7</sup> As part of the Art of War Scholar program at the Command and General Staff College, the students engaged with doctrine writers at the Combined Arms Doctrine Directorate. The draft ATP 3-91 was acquired from the primary doctrine writer of Appendix B.
- <sup>8</sup> Combined Arms Center, “17 Critical LSCO Gaps as related to MDO.”
- <sup>9</sup> Combined Arms Center, “17 Critical LSCO Gaps as related to MDO.”
- <sup>10</sup> ATP 3-90.4, D-19.
- <sup>11</sup> James C. McConville, “Army Multi-Domain Transformation: Ready to Win in Competition and Conflict,” (Thesis, Headquarters, Department of the Army, 2021), 24.
- <sup>12</sup> Combined Arms Center, “17 Critical LSCO Gaps as related to MDO.”
- <sup>13</sup> As part of the Art of War Scholar program at the Command and General Staff College, the students observed the 1st Cavalry Division’s After Actions Review (AAR) at the conclusion of Warfighter 23-04. In this AAR, General Richardson, Division Commander, stated that they had to switch to a commander-centric operations process from staff-centric operations to quickly analyze information, make decisions and direct operations.



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