



Observations for the CAF: Breaching and Crossing Operations in the Russo-Ukraine War

Major Robin French

JCSP 50

Exercise Solo Flight

Disclaimer

Opinions expressed remain those of the author and do not represent Department of National Defence or Canadian Forces policy. This paper may not be used without written permission.

© His Majesty the King in Right of Canada, as represented by the Minister of National Defence, 2024.

PCEMI n° 50

Exercice Solo Flight

Avertissement

Les opinions exprimées n'engagent que leurs auteurs et ne reflètent aucunement des politiques du Ministère de la Défense nationale ou des Forces canadiennes. Ce papier ne peut être reproduit sans autorisation écrite.

© Sa Majesté le Roi du chef du Canada, représenté par le ministre de la Défense nationale, 2024.

CANADIAN FORCES COLLEGE - COLLÈGE DES FORCES CANADIENNES

JCSP 50 - PCEMI n° 50
2023 - 2024

Exercise Solo Flight – Exercice Solo Flight

Observations for the CAF: Breaching and Crossing Operations in the Russo-Ukraine War

Major Robin French

“This paper was written by a candidate attending the Canadian Forces College in fulfilment of one of the requirements of the Course of Studies. The paper is a scholastic document, and thus contains facts and opinions which the author alone considered appropriate and correct for the subject. It does not necessarily reflect the policy or the opinion of any agency, including the Government of Canada and the Canadian Department of National Defence. This paper may not be released, quoted or copied, except with the express permission of the Canadian Department of National Defence.”

« La présente étude a été rédigée par un stagiaire du Collège des Forces canadiennes pour satisfaire à l'une des exigences du cours. L'étude est un document qui se rapporte au cours et contient donc des faits et des opinions que seul l'auteur considère appropriés et convenables au sujet. Elle ne reflète pas nécessairement la politique ou l'opinion d'un organisme quelconque, y compris le gouvernement du Canada et le ministère de la Défense nationale du Canada. Il est défendu de diffuser, de citer ou de reproduire cette étude sans la permission expresse du ministère de la Défense nationale. »

OBSERVATIONS FOR THE CAF FROM BREACHING AND CROSSING OPERATIONS IN THE RUSSO-UKRAINE WAR

INTRODUCTION

Combined arms manoeuvre is an important aspect of western armies fight to achieve effects in the land domain. As explained in the Canadian Armed Forces' (CAF) doctrine manual, *Land Operations*, combined arms groups incorporate under a single command the application of multiple arms like infantry, armour, artillery, and engineers.¹ These groupings can be formed at different levels of command, according to their mission and the tactical situation. If done so correctly, these groupings provide can benefit from their complementary strengths to cover each other's vulnerabilities² and exploit the weaknesses of a poorly balanced adversary.³

The practice and application of combined arms is nothing new. The employment of infantry, cavalry and archers has present on the battlefield since ancient times.⁴ However the concept of combined arms has also continued to evolve as new technologies are incorporated into warfare. A key moment in its evolution was during the First World War where combined arms successfully incorporated the use of closely coordinated infantry, artillery barrages, airplanes, engineers and tanks to break the defensive stalemate during the Hundred Days starting with the battle of Amiens.⁵ Commanders like the Australian General Monash and the Canadian General Currie were seen as pioneers in this effort, foreshadowing the combined arms doctrine of the Second World War.^{6 7} Combined arms continues to be a prominent part of Canadian Army training today. At the unit level, battle groups are formed by attaching additional arms and enablers as the mission dictates, such as with the enhanced Forward Presence Multinational Battle Group in Latvia.

Another constant in conflict is the presence of obstacles to movement on the battlefield. Obstacles whether natural like rivers or constructed like ditches and minefields can hinder the mobility of land-based forces and may need to be crossed in order achieve a commander's objectives. This becomes a significant challenge for a force when the obstacle is being protected by an adversary. The size and type of the obstacle and the adversary disposition factors into the problem as well. A small lightly defended minefield could be breached a company sized force with the appropriate support. Conversely, a deliberate crossing of a river, referred to as a wet gap crossing is regarded

¹ Her Majesty the Queen in Right of Canada, 'Land Operations - B-GL-300-001/FP-001' (Chief of the Land Staff by the Army Publishing Office, 2008), 1–6.

² Her Majesty the Queen in Right of Canada, 1–6.

³ Her Majesty the Queen of Canada, 'Brigade Tactics B-GL-321-003/FP-001' (Army Doctrine Centre, 2017), 1–14.

⁴ James Heap, 'The Abbreviated Evolution of Combined Arms', The Cove, 6 June 2019, <https://cove.army.gov.au/article/abbreviated-evolution-combined-arms>.

⁵ David Borys, 'Combined Arms Operations at the Canal Du Nord, September–October 1918', *Canadian Military History* 20, no. 4 (2011): 23.

⁶ Heap, 'The Abbreviated Evolution of Combined Arms'.

⁷ Borys, 'Combined Arms Operations at the Canal Du Nord, September–October 1918', 23.

as a division-level operation supported by all available enablers. It is considered one of the most complex and challenging types of operations a land-based manoeuvre force can execute.⁸

This paper will identify some recent observations from combined arms mobility operations in the Russian Ukraine. It will be demonstrated that the Canadian Army and by extension, the Canadian Armed Forces will face significant challenges if required to conduct combined arms operations against a near peer adversary, particularly operations that include obstacle breaching and river crossings. The CAF will require significant investments in equipment, training, and the implementation of the pan domain force employment concept in the context of large-scale combined arms operations to overcome this challenge.

First the paper will briefly introduce some key aspects from military doctrine related to combined arms breaching and crossing operations. Specific engagements from the war in Ukraine will be discussed to highlight some key observations that should be considered by military professionals, and lastly some of these observations will be evaluated in the context of the CAF.

COMBINED ARMS MOBILITY BASICS

This section will highlight some of the key doctrinal aspects from Canadian doctrine that will be of specific relevance to this paper relating mobility in a combined arms context and is by no means comprehensive. The content is primarily drawn from the doctrine manuals *Battle Group in Operations* and *Brigade Tactics*. Mobility support is one of the primary tasks of engineers. However, in the context of overcoming an obstacle that is defended by an enemy, it can only be achieved through a synchronized combined arms operation.⁹ The overall force attempting the crossing or breach requires the right capabilities and should be grouped correctly to support the overall operation.¹⁰ Generally they are grouped into the following forces: the force-in place, the bridgehead force, and the breakout force, each with their own responsibilities.

The acronym SOSRA is used to describe the fundamental tasks associated with a breaching or crossing operation.¹¹ It stands for Suppress, Obscure, Secure, Reduce, and Assault. Suppress, Obscure and Secure speak to the necessity of preventing the adversary from interfering with the force attempting to establish lanes through the obstacle, or forces as they transit through the established lanes. This is accomplished by suppressing enemy direct and indirect fire systems, while obscure relates to hampering the enemy's ability to observe and acquire targets in the breaching or crossing area. A physical

⁸ Tim Fish, 'Gap Crossing: The Challenges of Water Obstacles in Europe', European Security & Defence, 5 March 2024, <https://euro-sd.com/2024/03/articles/36873/gap-crossing-the-challenges-of-water-obstacles-in-europe/>.

⁹ Her Majesty the Queen of Canada, 'Battle Group in Operations B-GL-321-005/FP-001' (Canadian Army Doctrine and Training Centre, 2012), 4B2-4.

¹⁰ Her Majesty the Queen of Canada, 4B2-6.

¹¹ Her Majesty the Queen of Canada, 4B2-5.

presence is required to secure the area immediate to the obstacle on both the near and far side. Reduce is related physical creation of the lanes through the obstacle, whether that be overcoming mines, ditches, barriers or rivers, as examples. This requires specific specialized equipment to be accomplished. Lastly, assault is the manoeuvre force that continues the fight on the enemy on the far side of the obstacle, destroying or neutralizing the adversary in the area that could interfere with the continued movement of forces through the established lanes. Neglecting any of these could lead to the failure of the overall enemy. These tasks are divided amongst the forces, each of which should be equipped, and task organized to achieve the required effects.

The other key considerations worthy of mention from *Battle Group in Operations* are intelligence, mass and synchronization. Intelligence assists with understanding the nature of the obstacles, where they could be located, what resources would be required to defeat them, the enemy disposition, and any possible bypasses. These are key details to understand when planning and coordinating in advance of the obstacle to maintain the forces momentum. Mass relates to having adequate assets dedicated to the operation. This includes combat power distributed amongst the forces and the specialized equipment to complete the reduce the obstacle. In particular, the number of lanes or crossings attempted should be double that which is required, due to the high probability that half of the attempts will fail whether due to enemy action or the obstacle itself. This is highlighted by the fact that some statistics from the study of 180 brigade battles at the United States' National Training Center show that losses from breaching efforts can be more than 50%.¹² To further this point, an Australian source states that engineers attempting a breach can expect casualties of 60-70%.¹³ Clearly breaching and crossing activities can be costly from a personnel and equipment perspective, even when the operation is a success. Synchronization relates to orienting resources and activities in a complementary fashion to achieve the desired effect.¹⁴ Careful planning and coordination is required to synchronize and operation.

Brigade Tactics lists the following principles for crossing and breaching operations: maintenance of momentum, surprise, security, deception, redundancy, simplicity and C2 (command and control).¹⁵ These are complementary to those listed above and somewhat self-explanatory.

Through its history, the Canadian Army has conducted several operations which are examples of combined arms mobility operations that include breaching and gap crossing. Examples that will briefly be discussed in this paper include the battle of Canal du Nord in September 1917 and Operation Vitality in October 1944. Both are examples

¹² James Marapoti, 'The Breaching of Simple and Complex Obstacles', *The Marine Corps Gazette*, January 1991, 20.

¹³ Jass Zarlenga, 'Engineer Reconnaissance within a Mechanised Squadron in 2030 | The Cove', 17 September 2019, <https://cove.army.gov.au/article/engineer-reconnaissance-within-mechanised-squadron-2030>.

¹⁴ Her Majesty the Queen of Canada, 'Battle Group in Operations B-GL-321-005/FP-001', 3-9.

¹⁵ Her Majesty the Queen of Canada, 'Brigade Tactics B-GL-321-003/FP-001', 6I - 3.

of large-scale crossing operations where a Canadian combined arms force needed to fight through a defended obstacle to complete their objectives.

As mentioned in the introduction, an evolution of combined arms tactics was necessary to break the deadlock defensive lines on the western front. The Canadian Corps had perfected the “set-piece attack”, a deliberate closely coordinated attack that followed behind a rolling artillery barrage.¹⁶ During the last hundred days of the Second World War, the Corps’ last major deliberate set-piece attack would take place at Canal du Nord, a partially constructed canal that created a formidable obstacle.¹⁷ The use of surprise and unorthodox corps tactic of crossing the canal on a narrow front which then widened out of the bridgehead like a fan led to great success.¹⁸ The attack started without warning as the massed Canadian artillery rolling barrage and counter-battery fire that was closely followed by the infantry that established the bridgehead. The counter battery fire was so effective that it that 80 percent of the German guns were destroyed within the starting moments of the attack.¹⁹ The engineers followed creating hasty canal crossings allowing the artillery to cross the canal and keep pace with the advancing infantry. It was a highly synchronized action using limited objectives and lines that denoted a specific rate of advance, as well as limits of exploitation that prevented the overextension leaving them vulnerable to counterattacks without artillery and logistic support.²⁰ As the Chief of Staff of the 1st British Army, Major-General Anderson later described it, “The co-operation of artillery, engineers, machine guns, infantry, tanks, aeroplanes, smoke and gas, make it a typical example of a modern battle at the end of 1918.”²¹

Canada would continue to conduct combined arms mobility operations in the Second World War. For example, during the Scheldt Estuary Campaign in 1944, the 2nd Canadian Corps was responsible for clearing the German held approaches to the port of Antwerp and allowing vital sustainment to into Europe.²² During this campaign, the 2nd Canadian Division’s task was to clear the South Beveland isthmus in order to establish a force in place for the assault on Walcheren Island²³, the final stronghold preventing the allies from using the vital port and Antwerp. Crossing their advance was the South Beveland canal, which was recognized as a formidable obstacle that would

¹⁶ Ian M. Brown, ‘Not Glamorous, But Effective: The Canadian Corps and the Set-Piece Attack, 1917-1918’, *The Journal of Military History* 58, no. 3 (July 1994): 422.

¹⁷ Ian M. Brown, 441.

¹⁸ Borys, ‘Combined Arms Operations at the Canal Du Nord, September–October 1918’, 37.

¹⁹ Borys, 36.

²⁰ Ian M. Brown, ‘Not Glamorous, But Effective: The Canadian Corps and the Set-Piece Attack, 1917-1918’, 437.

²¹ W. H. Anderson, ‘The Crossing of the Canal Du Nord by the First Army, 27th September, 1918’, *Royal United Services Institution. Journal* 67, no. 466 (June 1922): 236, <https://doi.org/10.1080/03071842209420203>.

²² Her Majesty the Queen, ‘Part VI: Canadian Operations, 1 Oct - 8 Nov The Clearing of the Scheldt Estuary.’, *Canadian Participation in the Operations in North-West Europe, 1944*. P (Ottawa: Historical Section Canadian Military Headquarters, 1986), 1.

²³ J.L. Granatstein, *The Best Little Army in the World: The Canadians in Northwest Europe, 1944-1945* (Toronto: Harper Collins, 2015), 163.

likely be held by the German defenders.²⁴ On the 27th of October, the 6th Canadian Infantry Brigade reached the canal and found that the majority of the bridges were destroyed. Supported by engineers and artillery they were able to cross the canal using assault boats and establish a bridgehead allowing the engineers to construct crossings despite German shelling.²⁵ These crossings were vital in getting the follow on force composed of 4th and 5th Canadian brigades across with their vehicles and equipment to their following objectives.^{26 27} This crossing could not have been completed without the combined arms cooperation and having adequate crossing resources positioned to complete the task. It was also vital the infantry to create the bridgehead that would allow the engineers to work without threat of enemy direct fire.

Admittedly, these are somewhat dated examples. However, the Canadian Army has not conducted large scale opposed crossing operations against a peer adversary since the Second World War. Some may cite Operation Medusa in Afghanistan as an example, though when considering the adversary type and the scale of forces involved, it provides limited benefit when considering combined arms operations in a future war. Canada is not alone in this respect, the United States last time conducting operations of this nature was also the Second World War.²⁸

Breaching and crossing operations could once again be important for the CAF. With Canada's increased commitment to contribute to the expansion of the enhanced Forward Presence Battle Group to a Brigade in Latvia, the Brigade needs to be equipped and proficient as a force to conduct combined arms mobility operations, which includes breaching and crossings. At a 2022 RUSI conference, a 1965 Soviet report was referenced that highlighted the extent of problems that waterways alone would cause a manoeuvre force. A water obstacle at least 100 m wide could be expected for every 35 km travelled, and an obstacle at least 100-300 m for every 100-150 km travelled.²⁹ Therefore an advancing force must be able to surmount these obstacles, as well as any additional obstacles that may be emplaced by an adversary.

In the interim between the Second World War and now, military technology and capabilities have evolved. It is for this reason we should look to the conflict in Ukraine to understand the impacts of these changes on breaching and crossing operations.

²⁴ Her Majesty the Queen, 'Part VI: Canadian Operations, 1 Oct - 8 Nov The Clearing of the Scheldt Estuary.', 7.

²⁵ Thomas Graham, *Attack on the Scheldt: The Struggle for Antwerp 1944* (Pen & Sword Books Limited, 2020), 144.

²⁶ Graham, 164.

²⁷ Terry Copp, *Cinderella Army: The Canadians in Northwest Europe, 1944-1945* (Toronto: University of Toronto Press, 2006), 164.

²⁸ Major Aditya Iyer, 'Bridging through Time From River Crossing in World War II to Wet-Gap Crossing Today and in the Future' (The Association of the United States Army, February 2024), 2.

²⁹ Tim Fish, 'Gap Crossing'.

COMBINED ARMS MOBILITY OPERATIONS IN UKRAINE

This section will be limited to exploring the Siverskyi Donets River crossing operation which took place in May 2022 and the breaching operations during Ukrainian counter offensive of summer 2023.

Before discussing the specific cases from the Russo-Ukraine conflict, the limitations, and pitfalls of drawing lessons from an ongoing conflict. William Owen in an article of the *British Army Review* presents the perspective that there are limited lessons to be learned based firstly based on the fact that much of it is not revolutionary or a surprise to western forces.³⁰ He continues in stating that the context of the participants should be considered since their equipment, doctrine, and training may not be equivalent to other armies and therefore any attempted lessons may be problematic. As Chase Metcalf counters in a post on the topic, “Military professionals have an obligation to study this conflict, but they should do so deliberately and through engagement with a broad range of perspectives.”³¹ It is for this reason that the paper will first make some observations from these specific cases in the war, and then highlight some of the implications for the CAF.

Another limitation with studying the ongoing conflict is the lack of information. As noted in one of their Royal United Services Institute reports, Jack Watling and Nick Reynolds remark that the overall plans of an action are sensitive information. The detailed accounts and compiled information are sensitive because they can provide information that could be exploited by Russia.³² As a result, analysis is limited to using information that is known from outside observations and what little information is provided in the unclassified realm. It is important that observations and analysis should be cognizant of this and avoid making assumptions regarding what information is not known. This could include aspects like the intent or objectives of commanders on both sides of the conflict.

Siverskyi Donets River Crossing

This section will explore Russia’s failed Siverskyi Donets River crossing operation which took place in May 2022. This was a part of a Russian operation to attempting to isolate the Ukrainian held Severodonetsk and Lysychansk from the north by crossing the river that was approximately 80 m wide utilizing pontoon bridging.³³ Open source accounting of UAV images of the aftermath, provided an approximate total of 70 Russian vehicles were damaged or abandoned as a result of Ukrainian indirect fire and

³⁰ William F. Owen, ‘The False Lessons of Modern War: Why Ignorance Is Not Insight’, *The British Army Review*, no. 185 (2023): 24.

³¹ Chase Metcalf, ‘IS THERE ANYTHING TO LEARN FROM UKRAINE?’, *War Room - U.S. Army War College* (blog), 30 November 2023, <https://warroom.armywarcollege.edu/articles/learning-lessons-1/>.

³² Jack Watling and Nick Reynolds, ‘Stormbreak: Fighting Through Russian Defences in Ukraine’s 2023 Offensive’ (Royal United Services Institute, September 2023).

³³ Kateryna Stepanenko and Frederick Kagan, ‘Russian Offensive Campaign Assessment, May 14’, Institute for the Study of War, 14 May 2022, <http://dev-isw.bivings.com/>.

aviation during the attempted crossing.³⁴ This demonstrates the perils of combined arms crossing operations, in that equipment of in excess of a Battalion Tactical Group was lost.

As David Johnson in his commentary wrote, it can be easy to attribute this failure to inadequate preparation, and poor leadership.³⁵ It is certainly evident that this failed crossing is in violation of many of the principles and fundamentals of crossing operations that have been discussed. A failure to secure the far bank to prevent and obscure observation, and a failure to suppress Ukrainian indirect fire and aviation. The poor organization, synchronization, drills, and loss of momentum led to a densely packed Russian force in both the near and far banks that only enhanced the effectiveness of the Ukrainian attacks. However, as Johnson points out, if one only looks at these aspects, it would be easy to think that a Western professional army would not stumble in a similar fashion.

Having adequate doctrine is only one aspect of the problem. Having sufficient forces, equipment and training are also aspects key aspects to successfully completing a crossing. For training specifically, it is not merely the training of the individual arms at their individual roles within the operation. The overall integration and synchronization of the operation facilitated by higher headquarters is key. It would appear that the Russian force was not adequately prepared to conduct this hasty crossing. If overall training, planning, and rehearsal were completed it was certainly not evident in the execution.

Another significant aspect to note was that it was a small UAV that confirmed the location of the of the float bridge, despite Russian troops attempts to obscure using smoke.³⁶ It is no longer enough to secure a bridgehead that eliminates the presence of ground observation or establishing limited air superiority that precludes observation by aircraft or aviation. A new challenge is being presented, with the wide variety of remote sensors that proliferate the battlefield, how can a force effectively obscure an adversary's observation of a crossing or breach?

Summer Offensive 2023

In the lead up to the much-anticipated 2023 Ukrainian summer offensive, Russia undertook a significant effort emplacing extensive networks of obstacles. A Center for Strategic & International Studies (CSIS) report stated that "Russia has designed one of the largest defensive systems in Europe since World War II."³⁷ These defensive works were an effort to retain the territory Russia has gained in Ukraine and presented dilemmas for commanders. For instance, in southern Ukraine, to either fight through layered

³⁴ Howard Altman, 'Debacle On The Donets: How Russian Forces Got Obliterated Trying To Cross A River', The War Zone, 12 May 2022, <https://www.twz.com/debacle-on-the-donets-russian-forces-got-obliterated-trying-to-cross-a-river>.

³⁵ David Johnson, 'Would We Do Better? Hubris and Validation in Ukraine', War on the Rocks, 31 May 2022, <https://warontherocks.com/2022/05/would-we-do-better-hubris-and-validation-in-ukraine/>.

³⁶ Altman, 'Debacle On The Donets'.

³⁷ Seth G Jones, Alexander Palmer, and Joseph S Bermudez Jr, 'Ukraine's Offensive Operations' (Center for Strategic and International Studies, June 2023), 3.

defensive positions with obstacles over 10 km deep in Zaporizhzhia and or cross the Dnipro river, a wide river that was reinforced with Russian positions on the far bank.³⁸

There was much anticipation and speculation regarding Ukraine's summer 2023 counteroffensive. Articles and posts predicting objectives and outcomes were quite common.³⁹ Some were quite optimistic citing the previous performance of Ukraine and the increased training and equipment that were now available for the counteroffensive. However, as witnessed by the international community in the following months, progress was slow. CSIS analysis showed that in some cases, advances were limited to an average of 90 metres per day.⁴⁰ There were many opinions as to why this might be and whether it should be regarded as a failure, some of which will be explored below.

It is important to understand that while Ukraine's rates of advance were much slower than some of their previous offensives like that of 2022 in Kherson, there is a key difference with respect to the degree of preparation and fortifications that Russia had completed.⁴¹ As pointed out, slow progress does not indicate a failure it merely shows that taking terrain in which a defender has had time to prepare is difficult.⁴² This is well known and a part of doctrine, breaching operations are difficult and costly as outlined in the doctrine section of this paper. This aspect should not be underemphasized. With ample time to prepare, the obstacles and fortifications that Russia was able to emplace is staggering. In the process they made Ukraine one of the most mined countries in the world. Russia also adapted their practices increasing the depth of some minefields from the doctrinal 120 m to 500 m in some cases.⁴³ This extended the minefield depth well past the capability of expedient explosive breaching methods.⁴⁴ As a result, breaching these obstacles becomes much more equipment and time intensive, increasing the breaching force's exposure. This speaks to the quantity of enablers required, and in this case engineers and specialized equipment required to conduct sustained breaching operations, since the losses can be expected to be high. Engineers are not the only enablers that are key.

It was noted that in vicinity of Robotyne on June 8th, 2023, Ukrainian vehicles slowed and or disabled by mines came under effective attack from Russian attack aviation, forcing a retreat.⁴⁵ This indicates that the breaching area was not adequately secured by air defence, and that Russian aviation was not suppressed in the area. With a shortage of fighter aircraft⁴⁶, Ukraine appears to have been unable to generate limited air

³⁸ Jones, Palmer, and Jr, 3.

³⁹ David Leonhardt, 'The Counteroffensive Is Coming', *The New York Times*, 26 May 2023, sec. Briefing, <https://www.nytimes.com/2023/05/26/briefing/ukraine-counteroffensive.html>.

⁴⁰ Seth G Jones, Riley McCabe, and Alexander Palmer, 'Seizing the Initiative in Ukraine' (Center for Strategic and International Studies, October 2023), 2.

⁴¹ Jones, McCabe, and Palmer, 3.

⁴² Jones, McCabe, and Palmer, 3.

⁴³ Jones, McCabe, and Palmer, 10.

⁴⁴ Watling and Reynolds, 'Stormbreak: Fighting Through Russian Defences in Ukraine's 2023 Offensive', 15.

⁴⁵ Jones, McCabe, and Palmer, 'Seizing the Initiative in Ukraine', 10.

⁴⁶ Jones, McCabe, and Palmer, 11.

superiority over the breaching area, making traditional mechanized combined arms breaching tactics at risk of even higher losses. This is not limited to this area; Russia's attack aviation was a persistent threat to Ukrainian forces in the counteroffensive.⁴⁷ There is also the added challenge of protecting forces from the threat of UAVs that have become prevalent on the battlefield in Ukraine. In many cases Ukraine is trending towards small unit dismounted tactics to lower the ability to be targeted.

Furthermore, it was reported Ukraine has removed the U.S donated Abrams armour from their front lines due to their struggles with drone attacks.⁴⁸ Without effective countermeasures to these drones, mechanized breaching will continue to struggle.

Attrition ratios have from summer 2023 counteroffensive have shown that Ukraine has suffered more losses than the previous offensives.⁴⁹ Some have pointed out that attempts at rapid breakthrough resulting in equipment losses that are unsustainable for Ukraine.⁵⁰ With Russia's relative force size it is able to sustain losses which Ukraine cannot afford to.⁵¹ Ukraine deliberately chose to reduce its losses accepting slower territorial gains.⁵²

It has also been noted that Ukraine's training and skill in mechanized combined arms manoeuvre at scale is lacking.⁵³ The ability to execute combined arms manoeuvre effectively at scale takes time to train. As an article pointed out, several of the units taking place in the summer offensive were newly formed, western equipped battalions that were being thrown into complex operations with limited training and experience.⁵⁴ It would be unrealistic to expect an exceptional breakthrough given the situation. Also, staff capacity at the battalion and brigade level, specifically operations and plans staff are limited, and this was impacting the Ukrainian's capacity to combine arms in offensive operations with compressed planning timelines.⁵⁵

A CSIS report speculates however, "There is little reason to believe that more effective combined arms tactics would have been sufficient to achieve the breakthrough

⁴⁷ Watling and Reynolds, 'Stormbreak: Fighting Through Russian Defences in Ukraine's 2023 Offensive', 17.

⁴⁸ 'Ukraine Pulls US-Provided Abrams Tanks from the Front Lines over Russian Drone Threats', AP News, 25 April 2024, <https://apnews.com/article/ukraine-russia-war-abrams-tanks-19d71475d427875653a2130063a8fb7a>.

⁴⁹ Jones, McCabe, and Palmer, 'Seizing the Initiative in Ukraine', 5.

⁵⁰ Watling and Reynolds, 'Stormbreak: Fighting Through Russian Defences in Ukraine's 2023 Offensive', 1.

⁵¹ Charles McEnany and COL Daniel S Roper, 'The Russia-Ukraine War One Year In' (Association of the United States Army, March 2023), 5.

⁵² Jones, McCabe, and Palmer, 'Seizing the Initiative in Ukraine', 11.

⁵³ Jones, McCabe, and Palmer, 14.

⁵⁴ 'Franz-Stefan Gady and Michael Kofman on What Ukraine Must Do to Break through Russian Defences', *The Economist*, accessed 5 May 2024, <https://www.economist.com/by-invitation/2023/07/28/franz-stefan-gady-and-michael-kofman-on-what-ukraine-must-do-to-break-through-russian-defences>.

⁵⁵ Watling and Reynolds, 'Stormbreak: Fighting Through Russian Defences in Ukraine's 2023 Offensive', 22.

[...] without the advantages of surprise and air superiority.”⁵⁶ This implies that training alone would not have been a so called silver bullet for Ukraine’s attempted breakthrough in 2023.

SO WHAT FOR THE CAF?

Although Canada has not conducted these operations at scale since the Second World War, breaching and crossing combined arms operations are still activities that the Canadian Army and the CAF as whole must be ready to accomplish. Obstacles will always be present on the battlefield, and adversaries will seek to use them to their advantage. As seen in the current conflict in Ukraine this continues to be the case. So how are these observations relevant to the Canadian Army? This section will provide some select implications. Although many areas could be discussed this section will focus on equipment, training and the integration of pan domain operations.

First, it may seem self-evident, but the Canadian Army must be properly equipped to conduct combined arms mobility. Without the suitable types and adequate quantities of engineer equipment, the obstacles in question cannot be crossed. With the almost ubiquitous presence of rivers in all theatres and particularly in Europe, the CAF must be prepared to conduct multiple river crossings. Existing infrastructure may not have sufficient load capacity to cross modern heavy military vehicles and may also be damaged beyond use.

The gap crossing capabilities of the CAF have required replacement for several years. The current gap crossing capabilities although tried and true, face deficiencies due to service life and insufficient military load classification that is unable to cross newer heavier vehicles.⁵⁷ Canada’s Defence policy, *Strong Secure Engaged*, recognized the importance of gap crossing capabilities as war-fighting capabilities and made a commitment to investing in them.⁵⁸ Furthermore, *Advancing with Purpose*, the Canadian Army’s modernization strategy states that capital investments are necessary for pan-domain combat enables that include capabilities that assure freedom of action which mobility supports.⁵⁹

The Bridge and Gap Crossing Modernization and Close Support Bridging System projects aim to remedy the CAF’s gap crossing capabilities. Despite progress being made, it may be years before much of the equipment is procured and fielded. Portions of the project are projected to be at full operating capacity in 2030.⁶⁰

⁵⁶ Jones, McCabe, and Palmer, ‘Seizing the Initiative in Ukraine’, 12.

⁵⁷ DLR, ‘Bridge and Gap Crossing Modernization Info Brief’.

⁵⁸ Her Majesty the Queen in Right of Canada, *Strong Secure Engaged: Canada’s Defence Policy* (Ottawa, ON, CA: National Defence, 2017), 36.

⁵⁹ Her Majesty the Queen in Right of Canada, ‘Advancing with Purpose: The Canadian Army Modernization Strategy’ (HQ Canadian Army, December 2020), 54.

⁶⁰ DLR, ‘Bridge and Gap Crossing Modernization Info Brief’.

The CAF is somewhat in a better position for breaching equipment with the replacement of the Armoured Engineer Vehicle (AEV) to the Leopard 2 chassis and procuring minefield breaching implements for the Leopard 2s. However, the CAF still lacks an expedient mechanized explosive breaching option such as the U.S. Mine Clearing Line Charge (MICLIC).

Furthermore, improved rapid solutions for breaching and crossing operations need to be sought. More agile solutions will reduce the time to create lanes through obstacles and reduce the time available for the adversary to react. An example of this is the UK Defence and Science Technology Laboratory's, Mind the Gap competition which is seeking to exploit remote systems to conduct rapid gap crossing reconnaissance faster while limiting the risk to personnel.⁶¹ It has also been proposed that algorithmic image analysis could be utilized using UAVs to map minefields.⁶² Novel breaching and crossing techniques should also be developed.

Overall, the problem is more than just an engineer issue. Without all arms and enablers, breaching and crossing operations become immensely more difficult, if not impossible. As shown in the Siverskyi Donets crossing attempt, air defence, counter-drone, and indirect fires can all play a critical role in suppressing enemy attempts to interfere with a combined arms mobility operation. Furthermore, electronic warfare can also play a critical role, not to mention air support. Many of these capabilities also require significant investment, leading to the valid question to how the CAF can manage to field all of it with its current resource, infrastructure and personnel constraints? It probably cannot, leading to the requirement to make informed decisions and offset gaps with multinational partners similar to what is being done within the Latvia eFP. However, without all its own capabilities, this presents challenges for CAF training domestically with all arms and enablers integrated.

As alluded to in both the Siverskyi Donets crossing and Summer Offensive 2023 studies, collective training is critically important for conducting mobility operations. It is crucial part of setting the conditions for synchronization and maintenance of momentum. The CAF must incorporate for large scale breaching and crossing scenarios for brigade level training to ensure that the force is prepared to conduct them on operations. As new capabilities are brought into the CAF such as new bridging, air defence, counter-drone, indirect fires, to name a few, they must be incorporated into collective training to ensure they are being employed to their utmost potential. Opportunities for computer assisted training at the division level should also be exploited to provide more opportunities for commanders and staffs to train and within the higher division level context that a wet gap crossing would require.

⁶¹ 'Industry Works with Defence to Help Army Engineers Survey Water Crossings', accessed 5 May 2024, <https://www.army.mod.uk/news-and-events/news/2022/04/industry-and-defence-help-army-engineers-survey-water-crossings/>.

⁶² Watling and Reynolds, 'Stormbreak: Fighting Through Russian Defences in Ukraine's 2023 Offensive', 21.

It is safe to say Canada will not be fighting a near peer adversary on its own. Sending significant contingents to multinational exercises that conduct large scale crossing or breaching operations will be critical to ensuring the CAF is ready to be a contributor in this context. NATO exercises like Saber Guardian 2023 provide excellent opportunities to achieve this.⁶³

Close Engagement, the Canadian Army's land operating concept describes empowered dispersed operations. It dictates that land forces will need to operate in a dispersed posture but maintain the ability to rapidly aggregate and mass effect.⁶⁴ Combined arms breaching and crossing operations are cases where massing will be required. Firstly, mass and concentration are required to establish the initial lanes and bridgehead. Sufficient forces are required to suppress the enemy and secure a large enough area to allow specialty equipment to establish the breach or crossing. Secondly, once the lanes in the obstacle have been opened, there is also a concentration of forces as the follow on or breakout force is required to funnel itself through these lanes.

However, now as it has been demonstrated in Ukraine, UAVs of all sizes and other systems create an almost transparent battlefield. This combined with rapid targeting and precision guided long range munitions means that it becomes increasingly difficult to obscure and suppress an adversary in such a manner that hinders them in effectively targeting forces in a breach or crossing area.

The Siverskyi Donets crossing attempt by the Russians in 2022 provides an example of how this can go wrong. Granted that this case could easily fall prey to what William Owen cautioned⁶⁵, in that much of what the Russian force demonstrated was contrary to western crossing doctrine, and even their own. This only made the Ukrainian exploitation of this crossing achieve even greater results. However, even if this crossing was attempted in a doctrinal fashion with better command and control, traffic discipline and camouflage, it would still would have provided opportune targets for the Ukrainians, just yielding a less spectacular result.

This provides the dilemma as to how a western force could mitigate this problem. Dispersed forces cannot achieve the effects required when faced with obstacles, but when massed, they become a target. Mick Ryan referred to this as the “massing vs. dispersion predicament” and stated that forces must be massed in a manner that provides an improved chance of surprise and landing a decisive effect against their adversary.⁶⁶

⁶³ ‘NATO Multimedia - NATO Allies Demonstrate River-Crossing Prowess during Exercise Saber Guardian 23’, accessed 10 April 2024, <https://www.natomultimedia.tv/app/asset/691115>.

⁶⁴ Her Majesty the Queen in Right of Canada, ‘Close Engagement-Land Power in an Age of Uncertainty’ (Army Publishing Office, 2019), 37.

⁶⁵ Owen, ‘The False Lessons of Modern War: Why Ignorance Is Not Insight’.

⁶⁶ Mick Ryan, ‘Mobilizing Intellectual Capacity for Ukraine’s Big Five Operational Challenges of 2024’, Modern War Institute, 8 February 2024, <https://mwi.westpoint.edu/mobilizing-intellectual-capacity-for-ukraines-big-five-operational-challenges-of-2024/>.

Deception could be the part of the solution, however with persistent surveillance systems that saturate the modern battlefield, and the development of machine learning to rapidly process and classify information, deception in the classic sense is becoming more difficult. However, a change in deception is required. U.S. Army Lieutenant Colonel Stephan Pikner, highlighted in an article that a multi-domain approach must be employed to achieve deception.⁶⁷ A multi-domain deception could warp the adversary's understanding of the situation and lead them to reveal high value assets such as reconnaissance, electronic warfare, radar, and long-range strike capabilities.⁶⁸ Although the article's context relates to an anti-access area denial problem, it still applies to supporting a breaching or crossing operation. By forcing the adversary to reveal key components that could interfere with the operation, they can then be struck as a part of the effort to suppress and obscure. The Canadian Army with support of joint and more significantly pan domain enablers needs to consider how large-scale combined arms operations such as breaching and crossing operations can be supported in this manner. Commanders should be able to exploit layered effects coordinated across the domains creating windows of dominance and synchronizing them high risk operations like breaching or crossings.⁶⁹ Pan domain aspects must also be incorporated into training and exercises in order to be effectively integrated with the army's combined arms operations to not only deceive, but suppress, obscure, secure and assault.

CONCLUSION

This paper has shown that the CAF will face significant challenges conducting combined arms breaching and crossing operations against a near peer adversary. If Canada wants to field a serious army, it will need to be properly trained and equipped to conduct combined arms operations, up to and including breaching and crossing operations. It will also need to adapt and integrate new methods to maintain the fundamentals and principles of breaching and crossing doctrine in the face of challenges that are being demonstrated in the Russo Ukrainian war. This requires not only a joint approach, but also the pan domain needs to be leveraged. The feats accomplished in the First and Second World Wars demonstrate that Canada could achieve significant victories in combined arms operations. However, this was after years of build up, training, and hard lessons. The luxury of time might not be afforded in the next major conflict.

⁶⁷ Stephan Pikner, 'Leveraging Multi-Domain Military Deception to Expose the Enemy in 2035', *Military Review*, April 2021.

⁶⁸ Pikner, 86.

⁶⁹ Michael Cassie, 'If the Boot Fits: Considering the Multi-Domain Operations Concept for Adoption by the Canadian Armed Forces' (Toronto, Canadian Forces College, 2019), 76.

BIBLIOGRAPHY

- Altman, Howard. 'Debacle On The Donets: How Russian Forces Got Obliterated Trying To Cross A River'. *The War Zone*, 12 May 2022. <https://www.twz.com/debacle-on-the-donets-russian-forces-got-obliterated-trying-to-cross-a-river>.
- Anderson, W. H. 'The Crossing of the Canal Du Nord by the First Army, 27th September, 1918'. *Royal United Services Institution. Journal* 67, no. 466 (June 1922): 236–54. <https://doi.org/10.1080/03071842209420203>.
- AP News. 'Ukraine Pulls US-Provided Abrams Tanks from the Front Lines over Russian Drone Threats', 25 April 2024. <https://apnews.com/article/ukraine-russia-war-abrams-tanks-19d71475d427875653a2130063a8fb7a>.
- Borys, David. 'Combined Arms Operations at the Canal Du Nord, September–October 1918'. *Canadian Military History* 20, no. 4 (2011).
- Cassie, Michael. 'If the Boot Fits: Considering the Multi-Domain Operations Concept for Adoption by the Canadian Armed Forces'. Canadian Forces College, 2019.
- Copp, Terry. *Cinderella Army : The Canadians in Northwest Europe, 1944-1945*. Toronto: University of Toronto Press, 2006.
- DLR. 'Bridge and Gap Crossing Modernization Info Brief'. April 2023.
- Graham, Thomas. *Attack on the Scheldt : The Struggle for Antwerp 1944*. Pen & Sword Books Limited, 2020.
- Granatstein, J.L. *The Best Little Army in the World: The Canadians in Northwest Europe, 1944-1945*. Toronto: Harper Collins, 2015.
- Heap, James. 'The Abbreviated Evolution of Combined Arms'. The Cove, 6 June 2019. <https://cove.army.gov.au/article/abbreviated-evolution-combined-arms>.
- Her Majesty the Queen. 'Part VI: Canadian Operations, 1 Oct - 8 Nov The Clearing of the Scheldt Estuary.' *Canadian Participation in the Operations in North-West Europe, 1944*. P. Ottawa: Historical Section Canadian Military Headquarters, 1986.
- Her Majesty the Queen in Right of Canada. 'Advancing with Purpose: The Canadian Army Modernization Strategy'. HQ Canadian Army, December 2020.
- Her Majesty the Queen in Right of Canada. 'Close Engagement-Land Power in an Age of Uncertainty'. Army Publishing Office, 2019.

Her Majesty the Queen in Right of Canada. 'Land Operations - B-GL-300-001/FP-001'. Chief of the Land Staff by the Army Publishing Office, 2008.

Her Majesty the Queen in Right of Canada. *Strong Secure Engaged: Canada's Defence Policy*. Ottawa, ON, CA: National Defence, 2017.

Her Majesty the Queen of Canada. 'Battle Group in Operations B-GL-321-005/FP-001'. Canadian Army Doctrine and Training Centre, 2012.

Her Majesty the Queen in Right of Canada. 'Brigade Tactics B-GL-321-003/FP-001'. Army Doctrine Centre, 2017.

Ian M. Brown. 'Not Glamorous, But Effective: The Canadian Corps and the Set-Piece Attack, 1917-1918'. *The Journal of Military History* 58, no. 3 (July 1994).

'Industry Works with Defence to Help Army Engineers Survey Water Crossings'. Accessed 5 May 2024. <https://www.army.mod.uk/news-and-events/news/2022/04/industry-and-defence-help-army-engineers-survey-water-crossings/>.

Iyer, Major Aditya. 'Bridging through Time From River Crossing in World War II to Wet-Gap Crossing Today and in the Future'. The Association of the United States Army, February 2024.

Johnson, David. 'Would We Do Better? Hubris and Validation in Ukraine'. War on the Rocks, 31 May 2022. <https://warontherocks.com/2022/05/would-we-do-better-hubris-and-validation-in-ukraine/>.

Jones, Seth G, Riley McCabe, and Alexander Palmer. 'Seizing the Initiative in Ukraine'. Center for Strategic and International Studies, October 2023.

Jones, Seth G, Alexander Palmer, and Joseph S Bermudez Jr. 'Ukraine's Offensive Operations'. Center for Strategic and International Studies, June 2023.

Leonhardt, David. 'The Counteroffensive Is Coming'. *The New York Times*, 26 May 2023, sec. Briefing. <https://www.nytimes.com/2023/05/26/briefing/ukraine-counteroffensive.html>.

Marapoti, James. 'The Breaching of Simple and Complex Obstacles'. *The Marine Corps Gazette*, January 1991.

McEnany, Charles, and COL Daniel S Roper. 'The Russia-Ukraine War One Year In'. Association of the United States Army, March 2023.

Metcalf, Chase. 'Is There Anything to Learn From Ukraine?' *War Room - U.S. Army War College* (blog), 30 November 2023.

<https://warroom.armywarcollege.edu/articles/learning-lessons-1/>.

- ‘NATO Multimedia - NATO Allies Demonstrate River-Crossing Prowess during Exercise Saber Guardian 23’. Accessed 10 April 2024.
<https://www.natomultimedia.tv/app/asset/691115>.
- Owen, William F. ‘The False Lessons of Modern War: Why Ignorance Is Not Insight’. *The British Army Review*, no. 185 (2023).
- Pikner, Stephan. ‘Leveraging Multi-Domain Military Deception to Expose the Enemy in 2035’. *Military Review*, April 2021.
- Ryan, Mick. ‘Mobilizing Intellectual Capacity for Ukraine’s Big Five Operational Challenges of 2024’. Modern War Institute, 8 February 2024.
<https://mwi.westpoint.edu/mobilizing-intellectual-capacity-for-ukraines-big-five-operational-challenges-of-2024/>.
- Stepanenko, Kateryna, and Frederick Kagan. ‘Russian Offensive Campaign Assessment, May 14’. Institute for the Study of War, 14 May 2022. <http://dev-isw.bivings.com/>.
- The Economist*. ‘Franz-Stefan Gady and Michael Kofman on What Ukraine Must Do to Break through Russian Defences’. Accessed 5 May 2024.
<https://www.economist.com/by-invitation/2023/07/28/franz-stefan-gady-and-michael-kofman-on-what-ukraine-must-do-to-break-through-russian-defences>.
- Tim Fish. ‘Gap Crossing: The Challenges of Water Obstacles in Europe’. European Security & Defence, 5 March 2024. <https://euro-sd.com/2024/03/articles/36873/gap-crossing-the-challenges-of-water-obstacles-in-europe/>.
- Watling, Jack, and Nick Reynolds. ‘Stormbreak: Fighting Through Russian Defences in Ukraine’s 2023 Offensive’. Royal United Services Institute, September 2023.
- Zarlenga, Jass. ‘Engineer Reconnaissance within a Mechanised Squadron in 2030 | The Cove’, 17 September 2019. <https://cove.army.gov.au/article/engineer-reconnaissance-within-mechanised-squadron-2030>.