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Sappers in Close Engagement

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Solo Flight

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CANADIAN FORCES COLLEGE – COLLÈGE DES FORCES CANADIENNES

JCSP 46 DL – PCEMI 46 AD
2019 – 2021

SOLO FLIGHT

SAPPERS IN CLOSE ENGAGEMENT

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SAPPERS IN CLOSE ENGAGEMENT

INTRODUCTION

The world is changing, and in 2017 the Canadian Armed Forces (CAF) undertook transformation efforts to adapt to those changes.¹ In the future, the Canadian Army (CA) will have to conduct operations overseas against state and non-state actors seeking to operate below the threshold of conflict using weapons of greater lethality and precision in faster decision cycles. At the same time, global climate change is creating a competing and increasing demand on the CA to respond to natural disasters within Canada. At the joint operational level, the Pan-Domain Force Employment Concept (PFEC) provides the roadmap to navigate these changes.² The Canadian Army Modernization Strategy (CAMS) directs how the Army will follow this using its Close Engagement concept.³

A critical part of how the CA responds to this future operating environment (FOE) will depend upon the contribution of the Royal Canadian Engineers (RCE) to the combined arms team during these operations. The current organization and employment of the RCE is inadequate to meet the demands of these two situations. Therefore, just as the CA will adapt to these internal and external changes, the sappers of the RCE must also change. **This essay will argue for a fundamental reorganization of the RCE to be successful in the FOE and provide the right types of engineer support to ensure mission success.** They will still need to provide their traditional contributions to land power of mobility, counter-mobility, survivability and general engineer support.⁴ Each of these functions requires specialist equipment and training

¹ Canada. Department of National Defence. *Strong, Secure, Engaged: Canada's Defence Policy*. Publication Catalogue: D2-386/2017E. 2017.

² Canada. Department of National Defence. *Pan-Domain Force Employment Concept*. 2020.

³ Canada. Department of National Defence. A-PP-106-000/AF-001. *Advancing with Purpose: Canadian Army Modernization Strategy*. Ottawa: Canadian Army. December 2020.

⁴ Canada. Department of National Defence. B-GL-361-001/FP-001. *Engineers in Operations 1st Edition*, Kingston: Army Publishing Office, Canadian Army Doctrine Publication, 10 October 2018.

that is becoming increasingly difficult for every Combat Engineer Regiment (CER) to provide. The status quo risks having units inadequately prepared to do too many tasks or conversely misapplying scarce and over-qualified personnel to tasks requiring less training. The highly lethal environments of warfighting will require deployed sappers to be focused on high levels of proficiency and readiness focused on mobility and survivability that can only be achieved by the Regular Force (RegF). To preserve this readiness and specialization, it is possible to enable the Army Reserve (ARes) sappers to provide the general engineer support required during disaster response missions within Canada.

METHODOLOGY

It is necessary to adequately detail how that reorganization could occur to understand its impacts on structure, equipment and training. To identify the specific demands and tasks faced by sappers, this essay will analyze the characteristics of the contemporary conflicts in Iraq, Afghanistan, Ukraine and Nagorno-Karabakh. It will be possible then to generalize these sapper effects using the U.S. conceptual model for Advanced Engagements to best fit into the CA's Close Engagement model.⁵ Finally, the proposed re-organization plan for the RCE will be used to address these impacts.

CANADIAN MILITARY ENGINEERS

The Branch of Military Engineers within the CAF has a complex institutional structure and supports Departmental objectives and joint requirements. This essay seeks to address the tactical impacts of the FOE on Army operations and the military engineers that support and enable them. Therefore, this essay will focus on those military engineers working within the Army as they form the bulk of deployable capabilities to address the demands of the CAF's

⁵ Canada. Department of National Defence. B-GL-310-AG-001, *Close Engagement: Land Power in an Age of Uncertainty*. Kingston: Army Publishing Office, 20 Mar 2019.

domestic and expeditionary operations. RCAF engineers typically have limited deployable capacity and normally augment deployed CA structures with construction engineers in named operations. The term “sapper” will be used in this essay to refer to Army engineers to emphasize this distinction and their focus on mobility, counter-mobility and survivability tasks.

FUTURE OPERATING ENVIRONMENT (FOE)

The FOE has been well-defined in both PFEC and CAMS. They both point to a future of great power conflict among states as well as the rise of non-state actors armed with weapons of greater utility and lethality. PFEC focuses on the importance of multi-domain operations below the threshold of conflict and the requirement to understand and integrate non-lethal effects and information operations. These policies state that because of persistent global competition with a variety of fully-empowered and enabled agents, the CAF needs the full spectrum of capabilities to handle every contingency. Moreover, to meet the Canadian government’s need for decisive effects, the CAF must be continuously on high readiness.⁶ CAMS reinforces this theme by expecting the Army be prepared to do everything in every type of operation from small-scale domestic operations to full-scale warfare involving heavy forces. It makes little mention of an intention to discard capabilities but in fact looks to add them in a resource neutral way to operate in the cyber, space and information domains.⁷

GLOBAL WARFIGHTING EXAMPLES

This strategic-level understanding can be used as a lens to view events seen in 21st Century conflicts such as the Iraq and Afghanistan campaigns, Russian-Ukrainian fighting in Donbas and the recent clash between Armenian and Azerbaijan forces in Nagorno-Karabakh.

⁶ *Pan-Domain Force Employment Concept*, p.15-31

⁷ Canadian Army Modernization Strategy, p.4-14

These observations will provide the evidence that will underpin recommended organizations and training of the RCE.

The Iraq and Afghanistan conflicts that began after September 2001 saw significant civilian and military casualties caused with increasingly complex improvised explosive device (IED) tactics by insurgents and terrorists. These non-state actors used these weapons as one of their only means to overcome the advantages of NATO nations in vehicle and base protection. Such threats will persist and become increasingly lethal requiring sappers with advanced training and specialized equipment.⁸ Furthermore, both PFEC and CAMS forecast a future of more urban operations for the CAF. The US experiences in al-Sadr City, Iraq in 2008 can refine our understanding of future urban operations. While the Counter-IED fight will persist, we will need to innovate the traditional function of sappers to shape the battlespace to achieve our effects.⁹ In Sadr City, for example, the extensive use of concrete barriers placed by U.S. sappers channelled enemy movements, reduced enemy observation and improved the protection of friendly forces from IEDs and indirect fire. Future warfighting will continue to be dominated by larger numbers of sappers applying advanced skills and employing sophisticated equipment to provide mobility and survivability support to manoeuvre units.¹⁰

In Donbas in 2014, the Russians conducted full-spectrum operations by employing mechanized warfare with massed artillery and armour and also irregular warfare units all in synchronization with a sophisticated information and cyber campaign.¹¹ As well, Russian

⁸ Kiras, James. "Modern Irregular Warfare: Afghanistan and Iraq." *In The Practice of Strategy: From Alexander the Great to the Present*, Chapter 13, Ed. John A. Olsen and Colin S. Gray, 274-275. Oxford Scholarship Online, 2012.

⁹ Bowers, Christopher O. "Future Megacity Operations — Lessons from Sadr City." *Military Review* 95, no. 3 (May/June 2015): pages 8-16.

¹⁰ Spencer, John. "The Most Effective Weapon on the Modern Battlefield is Concrete". *Modern War Institute*. 14 Nov 2016.

¹¹ Thomas, Timothy L. "Russia's Asymmetric Concept: Based on Military Art, Geopolitics, and Risk." *In Russian Military Thought: Concepts and Elements*. Chapter 4 & 5, McLean, Virginia: MITRE Corporation, August 2019, p.44, 47 and 61

mining and route disruptions in that conflict confirmed its methods and commitment to the practice of anti-access/area-denial (A2AD) tactics in the land domain.¹² All of these point to future conflicts where the entire battlespace is constrained and friendly forces are perpetually in contact with the enemy. Main Operating Bases (MOBs) filled with rear-echelon staff and support personnel may not be possible due to irregular threats and long-range artillery fire. Contact with the adversary may not occur under an umbrella of friendly air superiority, on open road networks, and with a disproportionate amount of firepower; our future near-peer adversaries may have just as many advanced fighting capabilities as we do, and sapper capabilities will be needed to support those fights.¹³

Nagorno-Karabakh in September 2020 further demonstrates the demands for sappers in the FOE. In some localized reports, there were examples of engineer-heavy equipment efforts to clear route obstacles like trenches and barricades in ways that would have been characteristic of World War II.¹⁴ However stepping back and looking at the whole conflict provides more enduring lessons. While Armenia had a numerical advantage in conventional airpower, Azerbaijan was able to inflict casualties on massed-vehicle formations with a variety of next generation unmanned aerial systems (UAS).¹⁵ It is necessary to look beyond the novelty of UAS and see the greater trend of integrated recon-strike complexes like Russia's SNOWDOME devastatingly demonstrating greater speed, precision and lethality. To counter this, rapid mobility becomes the key method to survive on the battlefield and that mobility will require advanced sapper capabilities like route clearance to affect.

¹² Vershinin, Alex. "The Challenge of Dis-Integrating A2/AD Zone: How Emerging Technologies Are Shifting Balance Back to the Defense." *Joint Force Quarterly* 98 (3rd Quarter 2020): 13-19.

¹³ Monaghan, Sean. "Countering Hybrid Warfare: So What for the Future Joint Force?" *Prism* 8, no. 2 (4 October 2019): p.87-92.

¹⁴ Gressel, Gustav. "Military lessons from Nagorno-Karabakh: Reason for Europe to worry", *European Council on Foreign Affairs*, 24 November 2020,

¹⁵ Ismailzade, Fariz. "The future of Karabakh: An Azerbaijani perspective", *Daily Sabah*, 11 Jan 2021.

DEFINING ADVANCED ENGAGEMENT

The challenge presented by these conflicts can be clarified using the US Army concept called Advanced Engagements.¹⁶ They describe these “advances in sensing, precision attack and decision-making” as those that are compressed in time, extended in space, more lethal and routinely interconnected across multiple domains.¹⁷ Overall, Advanced Engagements have six tactical implications but sappers are most involved in the issues of “strikers vs shielders” and “finders vs. hidlers”.¹⁸ For the first, the great lethality of modern recon-strike complexes require that in future operations, Canadian manoeuvre units will need to be highly mobile or be destroyed as was clear in Nagorno-Karabakh. The mobility support by Canadian sappers will operate in this same lethal environment but will also have to be rapid, versatile and adaptable so that their supported infantry and armoured units can make it to their objectives. For the second implication, engineer units will continue to support the manoeuvre forces to camouflage, conceal and deceive but will now have to do it with innovative techniques and in coordination with other friendly forces focused on effects in the cyber and electromagnetic domains.

CHALLENGES OF CLOSE ENGAGEMENT

All of these events validate the CA’s commitment to Advanced Dispersed Operations: the need to disperse over wide areas for protection and mission accomplishment and then concentrate for decisive action.¹⁹ To meet these challenges, the CA has identified a number of land operational requirements: to generate multi-purpose, combat capable forces that are scalable, adaptable and modular. Recognizing that ADO is the critical operational skill, Close

¹⁶ Fastabend, David and Ian Sullivan. “An Advanced Engagement Battlespace: Tactical, Operational and Strategic Implications for the Future Operational Environment”. *Small Wars Journal*, 24 Oct 2017, p.1

¹⁷Ibid, p.2

¹⁸ Fastabend, David and Ian Sullivan. “An Advanced Engagement Battlespace: Tactical, Operational and Strategic Implications for the Future Operational Environment”. *Small Wars Journal*, 24 Oct 2017,, p.2

¹⁹ Canadian Army Modernization Strategy, p.24.

Engagement is the distinguishing feature of future conflict. Close Engagement is defined as “the ability to equally apply, at the tactical-level, both lethal and non-lethal effects at close range to influence the physical, moral and cognitive planes within the operating environment....[C]lose Engagement is predicated on an ability to effectively engage in close combat when required, but focusing on close engagement underscores the necessity of being able to create a broader range of effects within the operating environment to ensure operational and strategic objectives.”²⁰

Close Engagement demands an intimate understanding of the adversary and environment with significant adaptability and initiative by junior leaders supported by advanced equipment.²¹

Sappers retain a key role and must be at a high level of training and readiness to support the all-arms team in both traditional and innovative ways. Sappers coordinating with emerging and non-lethal domains will need to stand upon an advanced level of training and modern equipment.

The prioritization within PFEC and CAMS to develop non-lethal capabilities might seem to reduce the role sappers primarily employed to deliver effects into the physical plane.

However, it has been repeatedly demonstrated for military operations to be successful and credible, actions and words must align. The efforts of engineers cannot be an after-thought or a capability framed in Cold-War thinking. As a capability that shapes the terrain and modifies the environment in which people live, it can be the agent of the most obvious physical impact a commander can make in a battlespace to concretely validate a message.

In parallel with this changing nature of conflict globally, domestic operations within Canada have increased in their occurrences. These operations are given priority and pre-eminence in the new Defence Policy when it says, “Strong at Home”.²² They unfortunately have

²⁰ Canada. Department of National Defence. B-GL-310-AG-001, Close Engagement: Land Power in an Age of Uncertainty. Kingston: Army Publishing Office, 20 Mar 2019, p.13

²¹ Ibid, p.14.

²² *Strong, Secure, Engaged*, p.59

a fully different set of requirements than the high-intensity conflicts in expeditionary operations. These domestic operations demand fewer complex engineer capabilities, and are mostly focused on general engineer support such as construction engineering and heavy equipment work. This does not require the advanced mobility skills and high levels of readiness needed in warfighting. The engineer tasks in these missions however currently use sappers trained to those levels, thus reducing the availability of the regular force to force generate for more intense expeditionary conflicts.

SAPPER MODERNIZATION

The structure of the Army organized around brigades and regiments was born in the Cold War and CAMS seeks to develop new institutional approaches to handle the challenges of the FOE. Currently each RegF and ARes brigade has an organic Combat Engineer Regiment (CER). Additionally, the CA has 4 Engineer Support Regiment (4 ESR) to provide general engineer support for theatre opening and closing activities at the joint operational level. The three RegF CERs each have two field squadrons, a CIED squadron, support squadron and administration squadron. Contrastingly the ARes CERs each have two field squadrons and an administration squadron. While smaller and fewer opportunities to train, ARes CERs are equipped and mandated to do water supply and logistic bridging.²³ In both cases however, field squadrons are typically tasked with intimate support to an affiliated infantry or armoured manoeuvre unit to provide mobility and survivability capabilities. In the RegF CERs, their support squadrons contain the general engineer support capabilities like water supply, construction engineering and logistic bridging.

²³ Canada. Department of National Defence. B-GL-361-001/FP-001. Engineers in Operations 1st Edition, Kingston: Army Publishing Office, Canadian Army Doctrine Publication, 10 October 2018., Chapter 11.

The RCE will need to pivot away from its traditional emphasis on large-scale mobility capabilities, mine warfare and "green-field" camp construction characteristic of Cold War and Afghanistan campaign operations. The demands of the FOE are well addressed by the ADO model with substantial consequences for the military engineers. However to be successfully employed in that model, a proposed restructuring of the RCE would separate these capabilities between the RegF and ARes to ensure the necessary support and responsiveness to combat arms units and for domestic operations.

The major deduction of both PFEC and CAMS is the need for sappers to be ready to provide tactical mobility and survivability at a high level of skill on short notice: always expert, always ready. The CA has focused on medium-weight forces with LAVs as the backbone of the manoeuvre arms.²⁴ This demands that sapper squadrons supporting them must be similarly equipped with the engineer-variant LAVs as well as mechanized explosive ordinance disposal (EOD) and expedient route opening capabilities (EROC), not just for CIED operations but for overall mobility support as well. This advanced and intense mobility support cannot be done by ARes infantry pioneers; they have neither the responsiveness, vehicle protection, nor the capacity to support either mechanized infantry or armoured forces in battle. Contemporary warfighting shows that tactical digging remains a viable capability. Therefore armoured engineer vehicles (AEV) on the Leopard 2 chassis, armoured bridge layers, and up-armoured dozers will remain core capabilities for the foreseeable future. Together this would form the medium-weight engineer capabilities of a future sapper squadron to support medium- and heavy-weight manoeuvre. This would allow the RegF CERs to divest themselves of support activities like general engineer support, construction engineering, and logistics bridging. Since the counter-

²⁴ *Canadian Army Modernization Strategy*, p.14.

mobility task of building minefields has been absent for some time from sapper training, the ability to construct minefields can finally be divested. This is an acceptable reduction in capability without significant risks given the size and typical missions of the CA as well as our Canadian political preferences.

While the CA's focus is on medium forces, it is also rebuilding its light forces as well.²⁵ Medium engineer capabilities have sufficient protection and mobility support for heavy forces, but simply dismounting engineers from those platforms is not an appropriate way to generate light sapper teams. Separate sapper organizations at the squadron level are required to support light infantry battalions. These sappers would require dedicated equipment for airborne, airmobile and amphibious operations focused and the unique demands of EOD on these operations. This focus would allow these light force sappers to obtain and maintain the all-arms training demands such as parachuting, complex terrain qualifications (modern-day rappelling), and helicopter operations. This sub-unit would also house the combat divers to best support dismounted recce.

This increased specialization and focus on tactical mobility and survivability therefore would allow the RegF CERs to shed major camp construction tasks, logistics bridging and water supply, as well as horizontal and vertical construction. These resources could therefore be re-allocated to where they are routinely employed, namely 4 ESR and the RCAF. A portion of the RegF personnel could also be re-allocated to the ten ARes CERs to provide greater depth in skills and capacity. This is consistent with the aim of CAMS to form a stronger One-Army team of full- and part-time soldiers.²⁶ The ARes would need to take on these general engineer support responsibilities. There is another benefit to this though since construction and heavy equipment

²⁵ *Canadian Army Modernization Strategy*, p.17-18.

²⁶ *Canadian Army Modernization Strategy*, p.42-45.

operations are also most closely aligned with skills required on a daily basis in the civilian economy. Developing those capabilities at the local ARes level could have a synergistic reinforcement with local industry and educational institutions.

It is not practical to have a mix of these capabilities in each ARes CER however. Each of these skills requires a reservist to be not only a sapper but a specialist within a command and control arrangement that understands that specialty's employment. ARes CERs will need to continue to have combat engineer troops as well as those specialized in general engineer tasks. To make this more achievable, it is recommended that these units be focused on one specialty and, among the ten ARes CERs, have some regional distribution. Such an arrangement exists now albeit informally. For example, 39 CER in southern BC has a long-standing focus on bridging²⁷ whereas 33 CER in Ottawa has an extensive expertise in geospatial engineering and cartography. With institutional focus and committed resources, these informal arrangements could be reinforced. The RCAF's 14 Construction Engineer Squadron has successfully demonstrated that an entirely reserve force unit can maintain these advanced and specialized skills.²⁸ These general engineer support capabilities are all required in domestic operations and therefore maintaining them within their supported Canadian communities and can be generated by the ARes in timeframes required in DOMOPS.

The consequences of this are not dramatic from an equipment acquisition point of view. The current in-progress equipment projects are all aligned with these proposals. The Bridge Gap Crossing Modernization project (BGCM) is an omnibus effort to deliver a variety of logistics and tactical bridging capabilities that can be re-scaled to deliver armoured bridge layers to the RegF

²⁷ Canadian Military Engineer Association. "39 CER Hosts Ex PALADIN RESPONSE 2019". 5 Jan 2020.

²⁸ Canadian Military Engineer Association. "14 Construction Engineering Squadron Deploys". 1 Jan 2010.

and support bridges to the ARes.²⁹ The Common Heavy Equipment Replacement project (CHER) seeks to deliver a complete replacement of heavy and light dozers and earthmoving equipment as well as their armoured-protection packages.³⁰ It is the overall numbers that may need reduction and allocations will have to change as this becomes focused on 4 ESR and the ARes. The CA is also delivering a system for smaller-scale water purification that is more supportive of the ARes (ASWUPS).³¹ One challenge in conversation within the CA is that these systems are complex, and therefore potentially difficult to maintain and practically employ. That level of expert support would be best provided within a unit holding the specific mandate enabled by a RegF cadre and ARes personnel assigned to deliver it. In summary, these equipment projects are not inconsistent with the proposed re-organizational changes.

CONCLUSION

The CA faces a future of expeditionary operations characterized by greater lethality and complexity in parallel with an increased number of domestic disaster response missions in Canada. The sappers of the RCE are an essential component to the CA's success in both of these situations but support them in markedly different ways. Contemporary global conflicts in Afghanistan, Iraq, Ukraine and Nagorno-Karabakh show over and over again that sapper support is critical for manoeuvre forces to move and survive. Re-organizing the RegF sappers to specialize on mobility and survivability tasks is necessary for them to reach the advanced levels of training and high readiness demanded by the global environment. At the same time, this specialization would allow the ARes to focus on building the general engineer support

²⁹ Canada. Department of National Defence. *Bridge and Gap Crossing Modernization*. 01 Sep 2020.

³⁰ Canada. Department of National Defence. *Common Heavy Equipment Replacement*. 01 Sep 2020. <http://dgpaapp.forces.gc.ca/en/defence-capabilities-blueprint/project-details.asp?id=1016>.

³¹ Canada. Department of National Defence. *Advanced Sub-Unit Water Purification System*. 01 Sep 2020. <http://dgpaapp.forces.gc.ca/en/defence-capabilities-blueprint/project-details.asp?id=1020>

capabilities most needed in domestic operations while reinforcing skills relevant to the civilian economy. This re-organization uses the unique situations of each component of the RCE to maximize total readiness required for success in the FOE and preserve the CA's vital role at home and abroad.

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