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VEHICLE RECOVERY OPTIONS FOR 2016 TO 2025

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Service paper for Director RCEME and DGLEPM (for furtherance to Recovery Centre of Excellence: DLEPS 4)

AIM

1. The aim of this service paper is to make recommendations on how to manage the current gaps in the land forces recovery capability until the Enhanced Recovery Capability (ERC) project delivers in 2023 (estimated delivery timeframe).

INTRODUCTION

2. As part of the sustain function, recovery includes the following key tasks: battlefield recovery (suspend or direct tow); back loading and cross-loading (towing or transport via low-bed trailers); extraction and righting (through winching and heavy lift); route clearance; and obstacle crossing support.[1] It is essential that each of these key tasks are able to be conducted in both domestic and expeditionary operations.[2]

3. Recovery is a key enabler to battlefield mobility – the services of extricating a vehicle casualty from a difficult position to carry on with its mission, or towing it back to a place of repair is essential to a force with limited vehicle resources such as the Canadian Army. At the time of its initial delivery in 1991, the Heavy Logistics Vehicle Wheeled (HLVW) wrecker was designed to perform the full range of extraction and towing capabilities. It was able to extract and tow the full spectrum of B fleet vehicles held by the land component, as well as most of the Army's armoured vehicles (less the Leopard tank, for which there were a limited number of

[1] Department of National Defence, B-GL-300-004/FP-001, *Sustainment* (Kingston: Chief of the Land Staff, Dec 2010), 4-5.

[2] Department of National Defence, *Draft Unclassified Statement of Operational Requirement* (Ottawa: Chief of Staff Land Strategy, February 2016), 14.

Leopard-specific Armoured Recovery Vehicles (ARVs)). Since that time however, both wheeled and armoured fleets in the Army's inventory have been getting heavier and they have now outstripped the capacity of the HLVW wrecker. Additionally, new vehicle fleet procurements did not include a recovery variant. Although it was hoped that the inventory of ARVs would "take up the slack," their limited numbers and geographic distribution prevent this.

DISCUSSION

4. In 2015, the Commander Canadian Army ordered a trial to quantify the actual capability gap, particularly as it related to the wheeled armoured fleet. This was completed in Petawawa 20-23 April 2015 and the draft report[3] was used to inform this service paper. The purpose of this trial was to determine practical recovery options for the Light Armoured Vehicle Upgrade (LAVUP) fleet, and it was *not* an engineering trial. It was subject to time constraints, thus limiting the comprehensiveness of data collected and types of recovery scenarios. Recovery assets tested included Fifth Wheel Towing and Recovery Device (FWTRD) mounted on a Super HLVW tractor, Mobile Tactical Vehicle Recovery (MTVR), Armoured Heavy Support Vehicle System (AHSVS) Recovery, and LAVUP. The HLVW wrecker was not tested as its limitations are known.[4]

5. Other key supporting documents include the Capability Development Record (CDR)[5] and draft Statement of Requirements (SOR)[6] from the ERC project. Within the RCEME community, the importance of this capability gap was highlighted by the fact that an entire edition of the

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[3] Major Martin V. Algate, *Draft Recovery Trial Report: LAVUP – Petawawa 20-23 April 2015* (Ottawa: Director Land Equipment Program Staff, 2015).

[4] *Ibid*.

[5] Department of National Defence, *Capability Development Record: Army of Tomorrow (AoT) Sustainment System* (Ottawa: Chief of Land Strategy, 2007).

[6] Department of National Defence, *Draft Unclassified Statement of Operational Requirement* ….

RCEME Journal was devoted to this topic.[7] In the issue, D RCEME noted that with the capability gap clearly identified, Commander Canadian Army was now able to put specific guidance in writing on what could and could not be accomplished with current recovery assets, particularly as it relates to the recovery of wheeled armoured vehicles.[8]

6. The capabilities of the current recovery assets available within the existing Canadian Armed Forces inventory are described below. Limitations noted are ones taken from the draft recovery trial report[9], the Army Commander's guidance[10] and several safety advisory messages:

a. Wheeled Recovery

i. HLVW Wrecker. Delivered in 1991, this vehicle was life extended to be able to remain in service until the delivery of the ERC. It can do extrication, suspend tow (up to 25T), and has a mobile handling equipment crane. It is unable to suspend tow any of the LAV variants and is limited in its extrication capabilities for the LAV and light tracked fleets. Its ability to recover the Army's B fleet varies; light vehicles are fully supported, but newer acquisitions outstrip its capacity.

ii. AHSVS Recovery. This is a recovery variant of the AHSVS which was procured for use in Afghanistan. Only five were originally procured.

[7] *RCEME Journal*, no. 2 (2015): 1-32.
[8] Colonel K.J. Hamilton, "Director's RCEME Message: Improve Our Recovery Capabilities," *RCEME Journal*, no. 2 (2015): 4; Lieutenant-General J.M.M. Hainse, *LAV 6.0 Recovery Direction* (Commander Canadian Army: file 12350-1 (CA G34), 19 June 2015).
[9] Major Martin V. Algate, *Draft Recovery Trial Report …*.
[10] Lieutenant-General J.M.M. Hainse, *LAV 6.0 Recovery Direction …*.

iii. Modular Catastrophic Recovery System (MCRS). This system is a combination of a FWTRD (referred by the manufacturer's name of "Tru-Hitch™") and a tilt-deck recovery trailer (TDRT). The FWTRD towing attachment turns the 16T HLVW tractor or AHSVS tractor into a wrecker. The TDRT provides back loading capability for all wheeled vehicles in the present inventory (including LAVUP).[11] The capacity of this device (63T) bridges a portion of the gap between the HLVW wrecker and the ERC.

iv. Flat-bed Trailers. These trailers are used for transportation of disabled vehicles from the point of extraction to the point of repair. Most often these are used on paved roadways; however some can be used on hard-packed earth.

b. Armoured Recovery

i. MTVR. These light armoured recovery vehicles are based on the extended M113 chassis and may be retired with the divestment of the M113 fleet. Notwithstanding, their capability was assessed during the Petawawa recovery trial and the MTVR was found to be a good recovery support option to the wheeled armoured fleet.

ii. Generation 1 Leopard ARV (Taurus). Built to recover the original Leopard tank fleet, it can extract any of the Canadian Army vehicles (less new generation tanks). With a fleet of only 8 vehicles, these are dedicated to heavy armoured recovery and are located solely in areas with Leopard

[11] Major R.S.J. Levac, "Fifth Wheel Towing and Recovery Device," *RCEME Journal*, no. 2 (2015): 10.

tanks. With such limited distribution, these are not available for general recovery purposes. These vehicles are generally transported via low bed to reduce mileage on the vehicles as well as to prevent road damage which can occur when the vehicles pivot or when roads are not rated for such a large vehicle. Divestment of the Taurus is expected upon final delivery of the Mammoth.

iii. Generation 2 Leopard ARV (Mammoth). Built to recover the latest generation of Leopard tanks, the nickname of Mammoth has been given to this vehicle (see figure 1 for justification). It has the same distribution limitations as the Taurus as there will only be a total of 12 vehicles once all are delivered (to date, 8 have been received).[12]

Figure 1 – Leopard 2 ARV (Mammoth) winches a pair of Leopard 1 ARVs (Taurus)[13]

7. In order to understand the capability gap that must be managed, a selection of current and upcoming fleets of vehicles requiring recovery services within the land forces is listed below, along with the existing recovery options and limitations:

[12] Department of National Defence, "Departmental Performance Report 2014-2015," last accessed 1 February 2016, http://www.forces.gc.ca/en/about-reports-pubs-departmental-performance/2014-2015/section-iii-status-report-on-transformational-and-major-crown-projects.page#FMEP.

[13] Major R. Allan, M. Moggridge and R. Mercure, "Armoured Recovery Vehicles," *RCEME Journal*, no. 2 (2015): 11.

a. Medium Logistics Vehicle Wheeled (MLVW). While this fleet has mostly been replaced by the Medium Support Vehicle System (MSVS), a few remain. It is fully supported by the HLVW wrecker.

b. HLVW. At present, all variants are fully supported by a combination of the HLVW wrecker and FWTRD.

c. HESV. Restrictions preventing the suspend tow of this vehicle by the HLVW wrecker were identified in a message issued in September 2014.[14]

d. MSVS MILCOTS and Standard Military Pattern (SMP) variants. The HLVW wrecker is unable to suspend tow these vehicles. The FWTRD may be able to perform suspend tow on both MILCOTS and SMP variants. The AHSVS recovery may also be able to perform suspend tow. Due to their height, low-clearance low beds will be required for back-loading transportation on public roadways.

e. Logistics Vehicle Modernization (LVM) Project. These vehicles will eventually replace the HLVW and the LSVW fleets. The LVM Heavy fleet of vehicles is expected to be a standard chassis that will carry a variety of containerized pods and/or palletized systems.[15] Their size and weight is expected to be in excess of the current HLVW or MSVS. There is no recovery variant presently planned within this project. The current HLVW wrecker cannot recover these vehicles

[14] LCol J.G.C. Beaulieu and LCol D.D. Ross, *HLVW Recovery Restriction Suspended Tow of a HESV Vehicle* (Director General Land Equipment Project Management: file 14-028(DGLEPM Ops), 121420Z Sep 14).

[15] Department of National Defence, "LVM Project Business Case," last accessed 2 February 2016, http://cid-bic.forces.mil.ca/Cid/Data/Documents/2083/LVM_Business_Case_Version%205%20-%20Copy.docx

(neither extraction nor towing). It is undetermined whether the FWTRD or AHSVS recovery will be able to perform suspend tow on these vehicles.

f. AHSVS. A recovery variant was purchased with this fleet and is able to support it. While this fleet was initially procured for expeditionary operations only and was prohibited from operating in Canada, a recent decision has been made to allow domestic operation of the fleet, including recovery.

g. M113 Tracked Light Armoured Vehicle (TLAV). This fleet of light tracked vehicles is anticipated to be divested. Prior to divestment, their recovery needs (extraction and towing) are met by the MTVR.

h. Bison. This eight-wheeled armoured support vehicle uses an early-generation LAV chassis and is thus subject to the suspend tow restrictions placed on the other LAV variants. Extraction can be achieved by Bison Mobile Recovery Vehicle (MRV), MTVR or Taurus/Mammoth as well as possibly both FWTRD and AHSVS recovery. Low bed transportation is required for back loading.

i. LAV (LAV III and LAVUP variants). The recent direction from the Commander Canadian Army identifies that suspend towing is not authorized due to rear-wheel stresses on the LAV. Extrication can be achieved by MTVR, Bison MRV, HLVW wreckers and FWTRD. Direct tow can be undertaken by another LAV using A-frames, but the connection must be done by RCEME technicians, and not

operators.[16] The current A-frame is limited to a safe working load below the LAV's operating weight. Thus, a new tow bar procurement is underway.

j. Tactical Armoured Patrol Vehicle (TAPV). No recovery variant was procured with this vehicle purchase. Direct tow by other TAPV is possible for short distances and self-recovery is possible for limited extraction. The HLVW wrecker cannot suspend tow the vehicle, nor extract it. It is undetermined whether or not the FWTRD or the AHSVS recovery can perform suspend tow. Taurus and Mammoths can perform complex extraction, if available. Low bed transportation will be required for back loading.

k. Leopard Tanks. Second generation tanks require recovery (extrication or direct tow) by the Mammoth, whereas first generation tanks can be recovered by either Taurus or Mammoth ARVs. Suspend tow is not available for tanks. Back loading via low bed is recommended for longer distances.

8. Thus, with the recovery assets currently available, the analysis shows that:

a. Extraction. There are some vehicles that require a heavier more powerful winch than is presently available on the HLVW wrecker. While both Leopard ARVs have a larger winch capacity, they are limited in their employment due to their small numbers and geographical disposition. FWTRD and AHSVS recovery provide some extraction capability, but fleet quantities and distribution are low. Depending on divestment decisions, MTVR and Bison MRV can also provide extraction.

[16] Lieutenant-General J.M.M. Hainse, *LAV 6.0 Recovery Direction* ….

b. Direct Tow. To enable direct tow, an investment in tow bars, tow straps and training is needed, particularly for operators to be able to work with RCEME technicians. Direct tow is suitable for short-distance towing and is not a panacea for longer-distance recoveries.

c. Suspend Tow. With the restriction on suspend tow for some vehicles and the potential lack of capacity to lift upcoming fleets, a vehicle with a suspend tow capacity greater than the HLVW wrecker's 25T is needed. Adding the higher-capacity FWTRD[17] and AHSVS[18] recovery assets will assist, but these are still limited in number and capability.

d. Back Loading. A full range of low-bed vehicles (high weight capacity, low height clearance) is required to back-load equipment once it has been extracted to a suitable road surface. This is doctrinally a transport vice recovery function and should remain so. However, the equipment to support this must be available (through organic or contracted inventory).

9. Below are some of the assets or services available within industry or other militaries to offset Canadian Armed Forces recovery assets. This list is not exhaustive, as industry and coalition options are continually evolving:

a. Industry Options.

[17] Jane's IHS, "Tru-Hitch for Towing," last accessed 2 February 2016. https://janes.ihs.com/Janes/Display/1619943.

[18] Jane's IHS, "Mercedes-Benz Actros Range of Trucks," last accessed 2 February 2016. https://janes.ihs.com/Janes/DisplayFile/JMVL9034.

i. A draft briefing note (BN) to Director Land Requirements (DLR) in Jan 2016[19] identifies specific heavy duty commercial vehicles that could be targeted for North American use. A limitation to these vehicles is that they are not always suitable for off-road use.

ii. The logging and mining industries sometimes use non-conventional options, such as diggers/excavators, for extraction of their heavy-duty vehicles. Using existing engineer support vehicles, or contracting these as necessary, could provide an alternative to a commercial heavy-capacity tow-truck in off-road situations for extraction.

b. Coalition Partner Options. According to informal research conducted by DLR 6-4, the United Kingdom presently has an 8-wheeled 28T Man wrecker that they have declared surplus, and in the US, there is a recovery variant of the 8-wheeled Oshkosh HEMTT (M984 model). Both are capable of off-road use.[20]

10. Realizing that gaps still remain, these can be filled or mitigated by the following options. Many of these options can be exercised in both domestic and expeditionary situations:

a. Rent high-capacity commercial vehicles on a case-by-case call-up for each recovery call. To facilitate this, national standing offers should be established with local call-up authorities. A clearly-defined response timeline would be one

[19] Major Rob Haddow, *Briefing Note for DLR: Interim Commercial Recovery Capability for the LAVUP FoV* (Ottawa: Director Land Requirements, 15 Jan 16), Annex A.

[20] Off-road in this instance refers to the capability to use non-paved or unimproved roads/tracks. It should not be confused with the capability for cross-country mobility over ground with no discernible road/track.

of the key requirements for both the service provider and local commanders so that expectations could be managed.

b. Lease high-capacity commercial wreckers/tow-trucks (although from the ERC presentation to PMB in Oct 2015, it was highlighted that when the LVM and Common Heavy Equipment Replacement projects presented this option, industry had indicated a reluctance to lease heavy vehicles to the military). This course of action could thus prove problematic.

c. Using the Army Commanders' miscellaneous requirements (MR) funds, purchase very limited quantities from either industry or through Foreign Military Sales to augment the AHSVS recovery fleets across the country to add the high-capacity suspend tow option in regions where it is most needed.

d. Consider retaining the MTVR, until delivery of the ERC, to enable extraction support to the TAPV and LAVUP fleets. With the divestment of the remainder of the M113 fleet, a consolidation of spares could provide sufficient support to the MTVR.

11. The draft BN to DLR highlights some of the key limitations commanders will need to accept to bridge the gap in this interim period. These include:

a. Commanders being comfortable with commercially coloured vehicles deploying on exercise and/or operations to provide recovery support. Commanders would also need to accept that the commercial variants may not enable the full military

functions such as storage for personal weapons, cam/concealment, have limitations in off-road mobility, blackout lighting and military communications.

b. Potential delays in receiving recovery support, particularly while waiting for a service provider if a call-up for services on a case-by-case basis is selected.

c. Accepting that a small, potentially mixed fleet of wreckers will be challenging to maintain. If the option of purchasing individual assets with MR funds is used, it must be understood that this is an *interim* measure and that the assets will be divested on delivery of the ERC. In this case, regional maintenance organizations should be able to set up short-term maintenance provisions for this equipment.

CONCLUSION

12. Although the addition of the FWTRD and AHSVS recovery assets to the recovery inventory has partially mitigated the lack of capability of the HLVW wrecker, gaps remain in meeting the full recovery capability required for domestic and expeditionary support. These gaps will remain until the delivery of the ERC in the 2023 timeframe. Options to address this gap include rental of high-capacity tow-truck services on an as-required basis, leasing commercial tow-trucks or even purchasing some from industry or through foreign military sales, and the retention of a targeted divestment fleet. As identified above, each of these has benefits and challenges.

RECOMMENDATION

13. In this service paper, four interim options were presented to meet the current recovery capability deficiency: renting equipment/services, leasing equipment, purchasing equipment,

and, finally, retaining the MTVR fleet. Depending on the domestic or expeditionary situation, a combination of these options is recommended. Taking into consideration whatever resources are already regionally available as well as the tactical and geographical situation, more than one of the options may be suitable. With the size of Canada and regional dispersion of military assets, there is no "one-size-fits-all" solution, so maintaining flexibility and pursuing multiple options will be the key to success.

BIBLIOGRAPHY

Algate, Major Martin V. *Briefing Note to Commander Canadian Army (CCA): Essential Qualification – Enabling Capability for Fifth Wheel Towing and Recovery Device (FWTRD).* Ottawa: Director Land Equipment Program Staff, 18 Nov 2015.

—. "The Recovery Centre of Excellence." *RCEME Journal*, no. 2 (2015): 8.

—. *DRAFT Recovery Trial Report: LAVUP – Petawawa 20-23April 2015*. Ottawa: Director Land Equipment Program Staff, 2015.

Allan, Major R., M. Moggridge and R. Mercure. "Armoured Recovery Vehicles." *RCEME Journal*, no. 2 (2015): 11.

Beaulieu, LCol J.G.C and LCol D.D. Ross. *HLVW Recovery Restriction Suspended Tow of a HESV Vehicle*. Director General Land Equipment Project Management: file 14-028(DGLEPM Ops), 121420Z Sep 14.

Canada. Department of National Defence. "Armoured Recovery Vehicle Conversion Begins." Last accessed 1 February 2016. http://materiel.mil.ca/en/index.page.

—. B-GL-300-004/FP-001. *Sustainment*. Ottawa: Kingston: Chief of the Land Staff, Dec 2010.

—. *Capability Development Record: Army of Tomorrow (AoT) Sustainment System*. Ottawa: Chief of Staff Land Strategy, Jun 2007.

—. "Departmental Performance Report 2014-2015." Last accessed 1 February 2016. http://www.forces.gc.ca/en/about-reports-pubs-departmental-performance/2014-2015/section-iii-status-report-on-transformational-and-major-crown-projects.page#FMEP.

—. "Leopard Family of Vehicles." Last accessed 1 February 2016. http://materiel.mil.ca/en/land-equipment/tracked-light-armoured-vehicles.page.

—. "LVM Project Business Case." Last accessed 2 February 2016. http://cid-bic.forces.mil.ca/Cid/Data/Documents/2083/LVM_Business_Case_Version%205%20-%20Copy.docx

—. "National Recovery: Policy and Procedures for Recovery of Land Vehicles." Ottawa: Director Land Equipment Program Staff. Last accessed 1 February 2016. http://admmat.mil.ca/dglepm/dleps/documents/Vec_Recovery.pdf.

—. *DRAFT UNCLASSIFIED Statement of Operational Requirement*. Ottawa: Chief of Staff Land Strategy, February 2016.

—. "Tracked Light Armoured Vehicles." Last accessed 1 February 2016. http://materiel.mil.ca/en/land-equipment/leopard-armoured-vehicles.page.

Haddow, Major R.J. *Briefing Note for DLR: Interim Commercial Recovery Capability for the LAVUP FoV*. Ottawa: Director Land Requirements, 15 Jan 16.

Haddow, Major Rob and MWO Glen Scott. "Enhanced Recovery Capability Project." *RCEME Journal*, no. 2 (2015): 9.

Hainse, Lieutenant-General J.M.M. *LAV 6.0 Recovery Direction*. Commander Canadian Army: file 12350-1(CA G34), 19 June 2015.

Hall, Mr A.G. and LCol D.D. Ross, *Interim Synthetic Recovery Rope NSN 4020-20-008-8882*. Director General Land Equipment Project Management: file 15-007(DGLEPM Ops), 231507Z Feb 15.

Hamilton, Colonel K.J. "Director's RCEME Message: Improve Our Recovery Capabilities." *RCEME Journal*, no. 2 (2015): 4,7.

Jane's IHS. "Mercedes-Benz Actros 8 × 8 Heavy Tractor Truck." Last accessed 2 February 2016. https://janes.ihs.com/Janes/Display/1501875.

—. "Tru-Hitch for Towing." Last accessed 2 February 2016. https://janes.ihs.com/Janes/Display/1619943.

Levac, Major R.S.J. "Fifth Wheel Towing Device." *RCEME Journal*, no. 2 (2015): 10.

Levac, Major R. and LCol M. Corriveau, *EROC Husky – Lift/Suspend Tow Restriction (Safety Advisory)*. Director General Land Equipment Project Management: file 15-043(DGLEPM Ops), 151352Z Dec 15.

Saunders, CWO Jeff. "Weapons Technician: Recovery Training for the Weapons Technician?" *RCEME Journal*, no. 2 (2015): 24.

Van Dyk, Major Jason and CWO Pierre Tremblay. "Vehicle Technician: Message from OA and AOA." *RCEME Journal*, no. 2 (2015): 21.