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Crunching Numbers: Canadian Surface Combatant Infrastructure Budget Constraints

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CRUNCHING NUMBERS: CANADIAN SURFACE COMBATANT INFRASTRUCTURE BUDGET CONSTRAINTS

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AIM

1. The aim of the service paper is to examine and make recommendations on the Canadian Surface Combatant (CSC) project infrastructure budget funding envelope. The cost of the CSC ships has increased from $26.2 billion in 2008 to $77.3 billion in 2021 due to project delays, requirement changes, and inflation associated with ship construction costs.[1] The portion of the project budget allocated to infrastructure budget has stayed constant while the price of the ships has risen due to inflation. Many Parliamentary Budget Officer (PBO) Reports have been written detailing the cost increase of the ships, but there has been very little examination of the impact of inflation to the infrastructure required to support this new capability. Inflation causes not only an increase in the price of the ships but also an increase the cost of infrastructure. In many cases, building the ships and building the infrastructure require similar trades and materials in construction and in Halifax and Victoria can actually compete against each other for labour. The cost increase of the ships will not be addressed in this paper. The focus of this paper is on the cost increase to the infrastructure required to realize the Full Operational Capability (FOC) of the CSC project. This paper will demonstrate that as the total cost of the project increases, so should the infrastructure spending envelope. This paper proposes that the infrastructure portion of the major capital project should be 5% of total project cost and be adjusted for inflation accordingly.

INTRODUCTION

2. The CSC program is Canada's largest and most complex procurement to date and consists of up to 15 ships and various infrastructure upgrades. The operational objective for the new ships is to replace the capabilities of the Canadian Patrol Frigate (CPF) fleet and the RCN's previously retired IROQUOIS class destroyer (DDH) fleet of 4 ships.[2] This procurement represents Canada's most complex and financially most significant defence project. This major capital program is comprised of purchasing and integrating a capability which extends well beyond ships. The procurement program cost estimates include costs of development, production, spare parts, ammunition, training, program management and infrastructure.[3] Annex A details the scope of the supporting infrastructure projects linked directly to the CSC. Due to the complexity and physical size of the new warship, combined with the current aging RCN infrastructure, allowances for new infrastructure budget are included in the overall program budget. The infrastructure funding is to support the additional secret level training requirements of the CSC as well as construction of new jetties and upgrades to current jetties due to the physical size and displacement of the CSC and also the electrical load requirements when in harbour. Without the infrastructure upgrades, Canada will not be able to train sailors for the CSC or berth the ships in HMC Dockyards.

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[1] Government of Canada. *The Cost of Canada's Surface Combatants*: 2021 Update and Options Analysis. Office of the Parliamentary Budget Officer, 2021

[2] Government of Canada. *The Cost of Canada's Surface Combatants.* Office of the Parliamentary Budget Officer, 2017.

[3] Government of Canada. The Cost of…. Office of the Parliamentary Budget Officer, 2017.

3. When the CSC program was introduced in 2008, the original program budget was set at $26.2 billion (then-year, or nominal dollars).[4] Originally it was estimated that it would cost "$1.7 billion per ship for 15 ships in then-year dollars."[5] Originally, the cost of the ships was estimated by the RCN but then, due to concerns of accuracy, the federal government tasked the PBO with costing the CSC. In 2017, the PBO released their inaugural costing report increasing the program budget to "$61.82 billion, or $4.1 billion per ship for 15 ships."[6] The 2017 PBO report does not analyze the requirement for infrastructure because its focus is on the ships, spares, and munitions required for the ships. In 2018, the Assistant Deputy Minister for Material (ADM Mat) reaffirmed the $55-60 billion budget for the CSC project further breaking costs by percentage. ADM Mat stated in their rough program breakdown that 5% would be allocated for infrastructure.[7] However, because the RCN is the lead to develop requirements for infrastructure and inform the project of these requirements, the RCN developed a target of $2.4 billion static number (approximately 4% of overall project cost) for all of infrastructure based on the 2017 value of the project. This is the root cause of the lack of infrastructure funding.

4. As of today, five years later, the RCN has not revised the $2.4 billion despite significant inflation. ADM Mat is the program lead and holds the financial approvals for the project but has tasked the RCN to develop its own infrastructure requirements as these will be facilities ultimately run by the RCN. Demonstrating the continually increasing cost of this projected is the 2019 PBO costing update increasing overall costs of the ships to $69.8 billion.[8] The project cost has risen constantly at a staggering rate and the 2021 PBO report pegs costs at $77.3 billion.[9] The PBO reports are focused solely on the cost of the construction of the ships, spares, and munitions. The RCN is making a gross error in estimating the total cost of infrastructure in today's dollars as $2.4 billion instead of increasing this amount to 5% of the overall project cost.

5. This paper will demonstrate that by using a number of $2.4 billion, the RCN is no longer accounting for inflation of infrastructure correctly and will not adequately fund the future infrastructure required for FOC. As the price for the ships continues to increase, the infrastructure envelope is held constant at $2.4 billion effectively making the purchasing power of infrastructure less every year construction of infrastructure is delayed. Lastly, this paper will discuss the importance of infrastructure and training facilities in relation to operational capability. It will highlight the need for the infrastructure budget to be a percentage of the project cost, which is continually increasing to account for inflation as the budget for the ships increases. This paper will prove the importance of spending on infrastructure and ultimately people to develop doctrine and deliver training versus spending on the latest battlefield technology and which provides a greater return when resources are constrained.

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[4] Government of Canada. The Cost of…. Office of the Parliamentary Budget Officer, 2017.
[5] Government of Canada. The Cost of…. Office of the Parliamentary Budget Officer, 2017.
[6] Government of Canada. The Cost of…. Office of the Parliamentary Budget Officer, 2017.
[7] The Free Library. S.v. Who's who and what's what in the defence sector.." Retrieved Jan 22 2023 from https://www.thefreelibrary.com/Who%27s+who+and+what%27s+what+in+the+defence+sector.-a0543464981
[8] Government of Canada. *The Cost of Canada's Surface Combatants: 2019 Update.* Office of the Parliamentary Budget Officer, 2019.
[9] Government of Canada. *The Cost of Canada's Surface Combatants*: 2021 Update and Options Analysis. Office of the Parliamentary Budget Officer, 2021.

DISCUSSION

6. When the CSC project was initially announced, in 2008, the estimated cost was $26.2 billion. It should be noted that the original cost estimates were done by the RCN and current cost estimates are conducted by the PBO. The PBO is seen as an unbiased third party. Today that cost has risen to an estimated $77.3 billion. The cost of the project has risen by $51.1 billion in 14 years and is projected to continue to rise significantly with the estimated delivery of the first CSC in 2035. The main reason for the cost increase is inflation of both raw materials and also labour directly impacting construction costs which account for 50-60% of the overall budget.[10] Firstly, it is important to note that inflation from the past is well known and calculated. Furthermore, inflation is predicted in costing models used by project managers and Treasury Board analysist in Canada.

7. Inflation varies for different geographical regions of the country due to many factures such as transportation costs, labour market availability, etc. From the statistics Canada website, inflation is within one percent difference for building construction between Vancouver and Halifax (note: the RCN dockyard is in Victoria, however StatsCan does not list Victoria construction inflation values). From quarter one 2017, to quarter four 2022, inflation in Halifax and Vancouver rose by 150%.[11] This is extremely significant because the RCN has held the infrastructure budget steady at $2.4 billion since 2017. As per Table 1, to properly account for inflation, the infrastructure budget from 2017 of $2.4 billion should now be $3.6 billion in today's dollars. The numbers in red represent a deficit in infrastructure budget vs requirements. As per Annex A, the RCN is still planning for an infrastructure cap of $2.4 billion in 2022 and this will result in a lack of suitable infrastructure requirements needed to achieve FOC. Annex A shows that the RCN requires 4 new training buildings, numerous jetty upgrades as well as warehousing expansions and range upgrades. If the RCN does not begin accounting for inflation in the infrastructure budget, it will not be prepared to support the full capability of the CSC.

TABLE 1. *CSC project costing of ships and infrastructure over time.*

Year	2008	2017	2019	2021
Cost of Ships (billion $)	26.2	61.82	69.8	77.3
Infra Budget (billion $)	1.1	2.4	2.4	2.4
Infra Cost (billion $)	1.1	2.4	3.2	3.6

8. The timeline in Annex A demonstrates that achieving the RCN infrastructure requirements will take many years. Unfortunately, the starting point for the RCN infrastructure is not in a good state. Debbie Baxter, in her report on military infrastructure by Deloitte, states, extended periods of insufficient investment have become an increasing challenge to the operational effectiveness of Canada's military installations, putting at risk operational

[10] The Free Library. S.v. Who's who and what's what in the defence sector.." Retrieved Jan 22 2023 from https://www.thefreelibrary.com/Who%27s+who+and+what%27s+what+in+the+defence+sector.-a0543464981

[11] https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1810013501&pickMembers%5B0%5D=2.1&cubeTimeFrame.startMonth=01&cubeTimeFrame.startYear=2017&cubeTimeFrame.endMonth=10&cubeTimeFrame.endYear=2022&referencePeriods=20170101%2C20221001

readiness"[12]As per Annex A, the infrastructure projects are to begin in 2025 and continue until 2046. The longer term the project, the more affect inflation will have on the overall cost, making accurate cost predictions very challenging. Therefore, because this project takes place over so many years, a costing mistake at the onset will reap havoc 25 years down the road when critical infrastructure, such as secure training facilities are a hard and fast requirement for FOC of the CSC fleet. To ensure operational readiness, it is critical that the infrastructure component of the CSC budget is not held firm at $2.4 billion but increases appropriately to account for inflation.

9. In the CAF, there is a tendency to underemphasize the importance of infrastructure and focus the equipment itself. The ADM Mat and RCAF has found themselves in this situation with the F-35 procurement. The delivery of the new F-35 jets is delayed until 2029 because as the Comd RCAF stated, "What we need to do is have enough time to have all the infrastructure in place, the security in place, the (information technology) backbone, so that when the F-35 comes to Canada, we actually have capability."[13] The RCN is in the same situation with the CSC. It seems that most of the project rigor was in the ship selection and design and infrastructure was an afterthought. The importance of building infrastructure to develop training and doctrine is critical to harnessing technological developments such as the CSC to ensure future operational success. Watts states, "getting doctrine wrong can lead to military disaster; doctrine encompasses more than what is written in official manuals; superior technology in and of itself does not, and cannot, guarantee military success…"[14] Therefore, ensuring a sufficient infrastructure budget to facilitate training and doctrine development when procuring new capabilities such as the CSC is critical to the successful implementation of the technology. The secure training and doctrine development spaces include simulators that the current secure training footprint cannot accommodate. The CSC requires simulators to train sailors and also develop and war-game future doctrine. The CSC budget for infrastructure should account for inflation and continue to grow to maintain an approximate value of 5% of the overall program cost.

10. Furthermore, the war in Ukraine has demonstrated the importance of training and infrastructure in warfighting. Annex A demonstrates that approximately 40% of the infrastructure budget is required to build four new training centers for the RCN. The equipment that the Ukrainian Forces are using are easily supplied by allies, however the training of personnel takes time to ensure the equipment is effectively used. In fact, Garamone of the U.S. Department of Defence states, "Training is responsible for Ukraine's greatest advantage over the Russian invaders."[15] The Ukraine war has been an excellent case study demonstrating the importance of the human aspect of conflict. Marx argued that, "technology is in the ultimate service of humanity, not the other way round."[16] The will to fight, when combined with training, and doctrine is the foundation of a fighting force. The Russian invasion of Ukraine has demonstrated the importance of people, training, and doctrine in modern warfare.

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[12] Debbie Baxter Debbie Baxter Partner, "Creating Smarter Military Bases," Deloitte Canada, September 29, 2021.
[13] The Canadian Press, "Personnel Shortage Challenging Air Force's Plan to Introduce F-35, Other Equipment," MSN (The Canadian Press, February 13, 2022.
[14] Watts, Barry D. *Doctrine, Technology, and War*. AIR WAR COLL MAXWELL AFB AL, 1996
[15] Jim Garamone, "Training Key to Ukrainian Advantages in Defending Nation," U.S. Department of Defense (DOD News, September 6, 2022).
[16] Bimber, B. (1990). "Karl Marx and the Three Faces of Technological Determinism". *Social Studies of Science*, *20*(2), p. 358.

11. The infrastructure that is required for the next generation of Canadian warship will be designed for training and doctrine development of the future. In the event of a maritime conflict, the requirement for infrastructure to train and develop doctrine is of utmost importance. The current RCN infrastructure is "largely a byproduct of decisions made during the Second World War and the Cold War, with only modest investments made in the following decades wearing down the country's ability to rapidly execute military campaigns."[17] In Canada's case, the RCN need to ensure infrastructure, which is mostly allocated to training facilities for the CSC, needs to be a priority. It will not serve the long-term effectiveness of the RCN well, to spend all of the CSC budget on ships while the training and infrastructure deteriorate.

CONCLUSION

12. Without a doubt, the budget for the CSC project will continue to rise due to inflation. With the ship's construction spanning from the early 2030s to the mid-2040s predicting inflation for materials and labour is challenging. The costing for the CSC project is much more than just building vessels for the RCN, it buying a capability with the most advanced technology ever employed by the RCN. The project includes spare parts for the ships, training, and infrastructure elements as well that will all face rising costs due to different inflation indexes. As eluded to by Marx earlier, people are the most important asset and area of investment for militaries. The infrastructure budget captures the training and doctrine development aspect of investing in sailors beyond buying a new technology. Investing in the infrastructure to train people and develop doctrine is critical to the future successes of the RCN. ADM Mat and the RCN must develop a concise costing plan and budget to adhere to as the project progresses in order to ensure the full capability is realized of the most technologically advanced and largest combat ship the RCN has ever operated.

RECOMMENDATION

13. The CAF is purchasing a capability not just a new warship. In turn, that capability requires an extensive infrastructure component to ensure operation effectiveness. As an unbiased party, the PBO should re-evaluate the cost of the CSC project on a semi-annual basis and include infrastructure in the updated cost estimate. The RCN should immediately stop budgeting for an infrastructure budget of $2.4 billion. The infrastructure budget should maintain approximately 5% of the overall project cost in order to meet the complex future training and infrastructure requirements. ADM Mat should provide the appropriate funds to the RCN to undertake the infrastructure projects as their proposed timeline states.

Annex A. CSC project placemat DGNFD

[17] Debbie Baxter Debbie Baxter Partner, "Creating Smarter Military Bases," Deloitte Canada, September 29, 2021.

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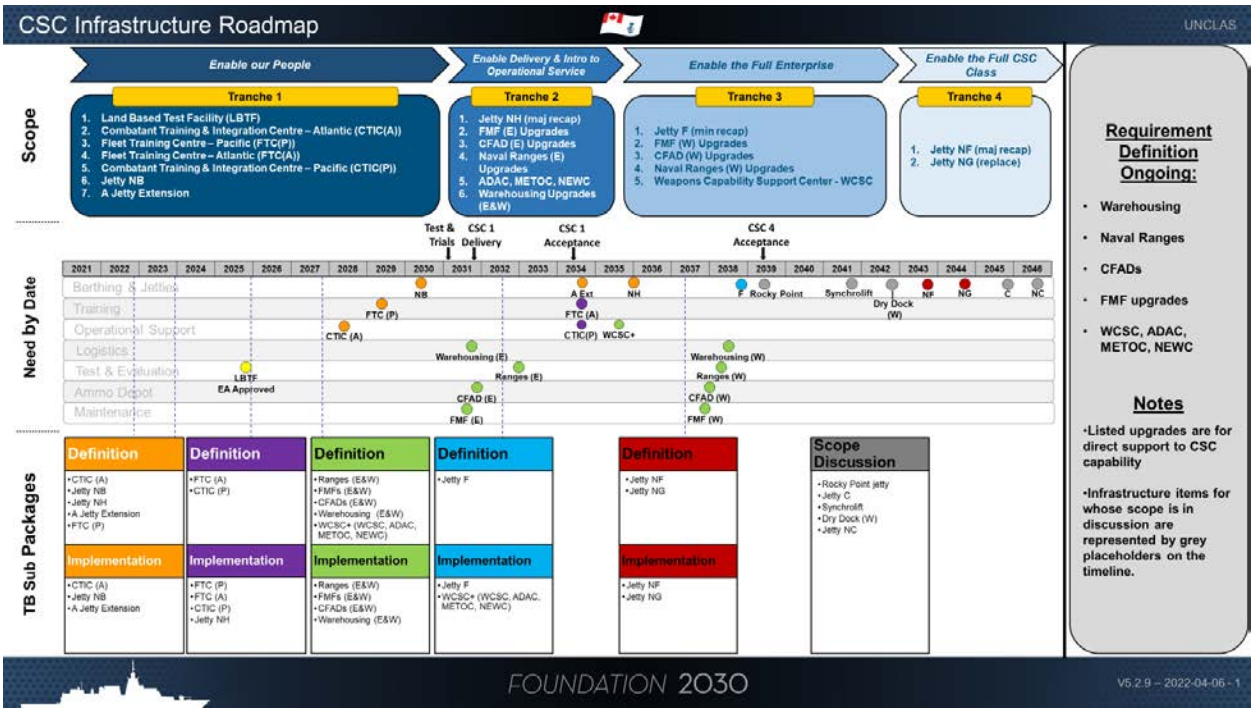

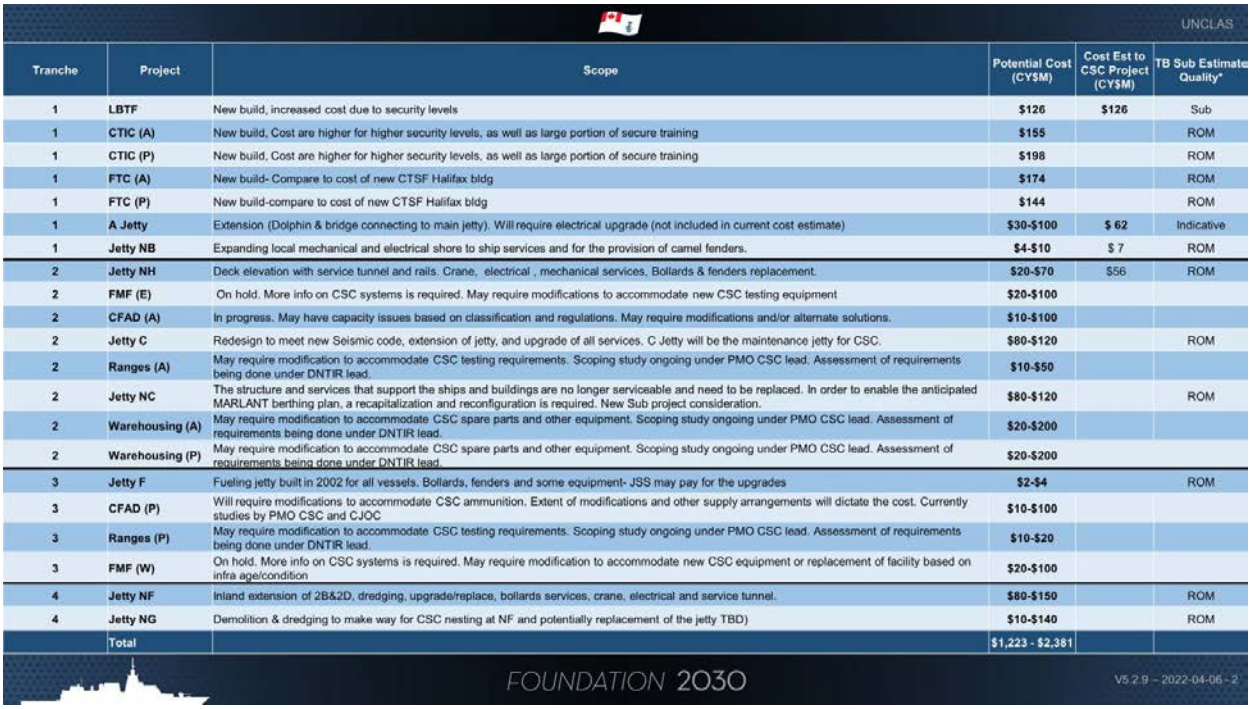

Tranche	Project	Scope	Potential Cost (CY$M)	Cost Est to CSC Project (CY$M)	TB Sub Estimate Quality*
1	LBTF	New build, increased cost due to security levels	$126	$126	Sub
1	CTIC (A)	New build, Cost are higher for higher security levels, as well as large portion of secure training	$155		ROM
1	CTIC (P)	New build, Cost are higher for higher security levels, as well as large portion of secure training	$198		ROM
1	FTC (A)	New build- Compare to cost of new CTSF Halifax bldg	$174		ROM
1	FTC (P)	New build-compare to cost of new CTSF Halifax bldg	$144		ROM
1	A Jetty	Extension (Dolphin & bridge connecting to main jetty). Will require electrical upgrade (not included in current cost estimate)	$30-$100	$ 62	Indicative
1	Jetty NB	Expanding local mechanical and electrical shore to ship services and for the provision of camel fenders.	$4-$10	$ 7	ROM
2	Jetty NH	Deck elevation with service tunnel and rails. Crane, electrical , mechanical services, Bollards & fenders replacement.	$20-$70	$56	ROM
2	FMF (E)	On hold. More info on CSC systems is required. May require modifications to accommodate new CSC testing equipment	$20-$100		
2	CFAD (A)	In progress. May have capacity issues based on classification and regulations. May require modifications and/or alternate solutions.	$10-$100		
2	Jetty C	Redesign to meet new Seismic code, extension of jetty, and upgrade of all services. C Jetty will be the maintenance jetty for CSC.	$80-$120		ROM
2	Ranges (A)	May require modification to accommodate CSC testing requirements. Scoping study ongoing under PMO CSC lead. Assessment of requirements being done under DNTIR lead.	$10-$50		
2	Jetty NC	The structure and services that support the ships and buildings are no longer serviceable and need to be replaced. In order to enable the anticipated MARLANT berthing plan, a recapitalization and reconfiguration is required. New Sub project consideration.	$80-$120		ROM
2	Warehousing (A)	May require modification to accommodate CSC spare parts and other equipment. Scoping study ongoing under PMO CSC lead. Assessment of requirements being done under DNTIR lead.	$20-$200		
2	Warehousing (P)	May require modification to accommodate CSC spare parts and other equipment. Scoping study ongoing under PMO CSC lead. Assessment of requirements being done under DNTIR lead.	$20-$200		
3	Jetty F	Fueling jetty built in 2002 for all vessels. Bollards, fenders and some equipment- JSS may pay for the upgrades	$2-$4		ROM
3	CFAD (P)	Will require modifications to accommodate CSC ammunition. Extent of modifications and other supply arrangements will dictate the cost. Currently studies by PMO CSC and CJOC	$10-$100		
3	Ranges (P)	May require modification to accommodate CSC testing requirements. Scoping study ongoing under PMO CSC lead. Assessment of requirements being done under DNTIR lead.	$10-$20		
3	FMF (W)	On hold. More info on CSC systems is required. May require modification to accommodate new CSC equipment or replacement of facility based on infra age/condition	$20-$100		
4	Jetty NF	Inland extension of 2B&2D, dredging, upgrade/replace, bollards services, crane, electrical and service tunnel.	$80-$150		ROM
4	Jetty NG	Demolition & dredging to make way for CSC nesting at NF and potentially replacement of the jetty TBD)	$10-$140		ROM
	Total		$1,223 - $2,381		