LABRADOR MARINE TRANSPORTATION STUDY
PHASE II

May 15, 2004

Submitted to
Department of Transportation and Works
Government of Newfoundland and Labrador

Prepared by
Public Policy Research Centre
Memorial University of Newfoundland

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Executive Summary

The Public Policy Research Centre (PPRC) was commissioned by the Department of Transportation and Works (DTW) to undertake a review of the marine transportation system serving isolated communities on the coast of Labrador. This Study began on November 26, 2004. The work was to be completed in two phases with an interim report pertaining to Phase I, dealing with the short-term period 2004 to 2006, to be submitted on February 15, 2004 and a final report on May 15, 2004 (initially March 31, 2004) dealing with the longer-term and particularly the period after interconnection of the Trans-Labrador Highway (TLH) between Central Labrador and the coast (known as Phase III of the TLH). The constraining factor for Phase I was the multi-year contracts currently in place for the existing fleet and terminals.

The scope of the work was to examine the options available to service the anticipated transport demand of isolated communities on the coast of Labrador, for both freight and passengers. This was to be done through a financial and economic analysis of each option and a comparison of the benefits and costs associated with each. This includes total costs as well as the relative components borne by the Government and the end users. The Terms of Reference call for the PPRC to recommend the preferred marine transportation option and the associated terminal configuration.

The PPRC was required to carry out consultations with stakeholders to identify the most functionally acceptable options and to evaluate their acceptability. To this end, the Project Group travelled to Labrador and to Lewisporte and met with a number of groups, as identified in the *Interim Report*. These consultations focussed particularly upon the short-term options that were presented to Government in the *Interim Report*. The options presented in this report are for the longer-term service, after completion of Phase III of the Trans-Labrador Highway, and have not been discussed with stakeholders. It is recommended that such consultations take place before any action is taken.

On February 15, 2004 the PPRC completed its *Interim Report*, which identified a number of port and fleet deployment options for the period 2004 to 2007. The evaluation criteria given by Government to the PPRC for the evaluation of options were as follows: (a) to minimize cost to the Treasury; (b) to stabilize rates for residents of isolated communities; and (c) to minimize any adverse impact on the Provincial economy.

The fleet deployment option recommended was based on a cost benefit analysis which minimized cost as measured using these three criteria. This option provided for Lewisporte to continue as a staging port for a three year period with the Trans Gulf, or its replacement, sailing from Lewisporte directly to the isolated communities (except for Williams Harbour and Norman Bay), with the Sir Robert Bond operating between Cartwright and Happy Valley-Goose Bay, with the Northern Ranger sailing from Happy Valley-Goose to isolated communities carrying passengers and freight and with the Challenge One, or an equivalent vessel, serving Williams Harbour and Norman Bay. The PPRC also made a number of recommendations concerning adjustment measures and the freight rate structure.

On April 12, 2004, Government announced its decision whereby the Sir Robert Bond will provide freight and passenger service on a weekly basis with every second trip originating from Lewisporte and serving Cartwright and Happy Valley-Goose Bay and with alternating trips operating between Cartwright and Happy Valley-Goose Bay. The Trans Gulf will transfer freight unloaded by the Sir Robert Bond at Cartwright and transport it to isolated communities, while the Challenge One will service Norman Bay and Williams Harbour from Charlottetown and Port Hope Simpson, respectively.

This Report deals with the longer-term options for providing service to isolated communities. After completion of the Trans-Labrador Highway connecting central Labrador with the coast, there will be no need for the Sir Robert Bond, which can be retired from the service and sold. The service would then be based from a Labrador port. While Cartwright and Happy Valley-Goose Bay are the logical candidates to serve as the staging ports, the Project Group has concluded that Happy Valley-Goose Bay has the

advantage of port and transhipment infrastructure. While Cartwright has a longer ice-free operating season this does not outweigh the advantages of establishing Happy Valley-Goose as the main terminal.

The PPRC has identified three options for the long-term service into isolated communities. Under all three of these options, Williams Harbour and Norman Bay will continue to be served as at present with a small vessel such as the Challenge One. Option A involves the continued use of the Northern Ranger for passengers and freight, along with a freight-only vessel similar to the Trans Gulf. Option B calls for the Northern Ranger to be sold while a combined freight and passenger vessel is acquired which will reduce the fleet effectively to a single, multi-purpose vessel. A naval architect was engaged to advise on the cost of a new multi-purpose vessel. Option C provides for the sale of the Northern Ranger and the leasing of a replacement vessel for the Trans Gulf, which would carry freight only, with passenger travel addressed through subsidized air travel.

The analysis shows that the least cost option would likely be Option C, which would offer subsidized air service during the summer period in lieu of marine passenger service. The risk associated with this Option C, however, is high. It is difficult to forecast how demand might be affected as a result of the subsidy. It is also difficult to assess the acceptability of a subsidized passenger service available only during the summer, and not during the winter. Furthermore, it is difficult to forecast the cost of air service whose cost might be more volatile than marine passenger service. Finally, those people who would normally travel by air would likely claim eligibility for the subsidy, even though the intention of the program would be to serve only those who otherwise would travel using the marine service.

Acquisition of a new multi-purpose vessel has the potential to be more economic, depending on its capital cost and the cost of a management contract for its operation. Option B is therefore more attractive, based upon the information at hand, than Option A. The recommended course of action is to invite tenders for (a) construction of a multi-

purpose vessel; (b) purchase of such a vessel; as well as for (c) a long-term lease. The outcome of this tendering process can be used to decide whether to build, buy or lease. In the short-term, until completion of the Trans-Labrador Highway, Government can retain the Northern Ranger for passenger and freight service and lease a single purpose freight vessel. Government might also, in the short term, acquire a multi-purpose vessel as proposed in Option B and base that vessel in Lewisporte so as to serve the isolated communities within the context of the option 7 proposed in the interim report or else use the vessel to ship freight out of Cartwright, taking the place of the Trans Gulf in the fleet deployment option recently announced by Government. In both cases such a multi-purpose vessel would make the Northern Ranger redundant.

The PPRC has undertaken a review of freight and passenger rates. This analysis concludes that the rates charged are relatively low compared with other services in the Province as well as in comparison with marine services in other Provinces. The rate structure is not cost based but is highly arbitrary. It has remained unchanged for many years and is in need of a major revision. The Project Group has decided not to recommend piecemeal adjustments in the system even though it has identified a number of anomalies that should be corrected. One of these is the fact that the rates charged for long hauls are not significantly greater than for shorter distances. This reflects an unduly high weighting of fixed costs in the rate structure compared with the apparent weighting of fixed versus variable costs in the corresponding cost structure. Another anomaly relates to the fact that trailer backhauls from Happy Valley-Goose Bay are carried at no cost, while the carriage of any minimal load is subject to full load tariffs. It is recommended that a cost accounting system be established which allocates costs among categories of service, such as freight and passenger service, bulk and loose-stowage, and passenger vehicles. This cost accounting system should also break down all costs between fixed and variable costs. The new cost accounting system should be used to revamp the whole rate and tariff structure. The decision as to the level of cost recovery to be achieved is a policy decision that reflects the lack of other transportation options in isolated communities.

The Project Group has observed that the new service announced by Government treats Happy Valley-Goose Bay and Cartwright as isolated communities. It does this by charging freight going to these communities the same rates that applied before these communities were interconnected. This has the effect of increasing the traffic volume to and from Lewisporte into these communities. It also provides for highly subsidized competition with the fledgling trucking industry.

The *Interim Report* identified the fact that the relocation of the Labrador marine service from an Island base (i.e., Lewisporte) to a Labrador base will require adjustment on the part of consumers and suppliers. The *Interim Report* proposed a number of transitional measures to ease the burden of adjustment. The Project Group believes that these measures are still valid in the period leading up to the completion of Phase III of the TLH.

The *Interim Report* also recommended that management measures be taken to ensure that the quality of service reflects the needs and expectations of Labrador residents in isolated communities. The delegation of greater management authority to local managers dealing directly with residents and other users of the service is an important avenue to achieve service improvement.

The Labrador marine service is highly subsidized and it is important that users be aware of the large infusion of resources from the taxpayer. The actual cost of the service should be transparent to the users.

There is a potential role for the Northern Ranger to serve the needs of the tourism industry within the context of Option B, which reduces the marine fleet to a single, multi-purpose vessel. The Northern Ranger could be sold to private interests who might deploy the vessel for cruises originating out of Lewisporte and operating along the Northeast Coast of the Island and into Coastal Labrador.

Before finalizing this report, the Project Group met with government officials to determine whether the marine service decision announced by Government on April 12, 2004, will remain in place until the completion of the Trans-Labrador Highway. Should the decision be reviewed during the intervening period the advice of the Project Group remains as it was expressed in the *Interim Report*, namely, that Option Seven of the *Interim Report* be implemented, including adjustment measures which would allow for the service to be transferred to a Labrador base.

The recommendations contained in the report are listed as follows:

1. The Project Group recommends that, upon interconnection of the Trans-Labrador Highway, between Happy Valley-Goose Bay and the coast, the port of Happy Valley-Goose Bay be selected as the marine base for the Labrador service. The communities of Williams Harbour and Norman Bay should continue to be served from Charlottetown and Port Hope Simpson.
2. Upon interconnection, the services of the Sir Robert Bond will no longer be required and the vessel should be sold. Government should prepare for the interconnection by basing its planning on the use of a multi-purpose vessel. Its selection of a buy, build or lease approach to the acquisition of such a vessel should be determined through a bidding process which would enable Government to choose the most economical option. Adoption of this approach would make the Northern Ranger redundant. It might be marketed for its suitability to offer cruises from the Island to coastal Labrador.
3. Government should embark upon further consultations before committing itself to a strategy for providing marine service subsequent to the interconnection of the TLH.
4. Government should put in place a cost accounting system that will serve as the basis upon which a new freight and passenger tariff system can be designed. This accounting system should allow for the allocation of all costs among service categories, such as bulk freight, loose or palletized freight, passengers, passenger-related vehicles and tractor-trailers.

5. The actual cost of providing service, in relation to the subsidy, should be transparent to all users.
6. Transition measures should be put in place in allow adjustment to the shift from an Island marine base to one located in Labrador, regardless as to whether the shift takes place only upon interconnection of the Trans-Labrador Highway or before. The adjustment measures recommended in the *Interim Report* remain valid.
7. Management and quality service measures as recommended in the *Interim Report* should be implemented.
8. In the event that the service announced by Government on April 12, 2004, is revisited prior to the interconnection, the Project Group believes that the advice tendered in its *Interim Report* should be considered.

Foreword

The Project Group was comprised of Professor Merv Andrews, as Project Manager, retired professor of Engineering at Memorial University of Newfoundland, Dr. Ron Sparkes, Associate with the Labrador Institute of Memorial and David Vardy, Interim Director of the Public Policy Research Centre. The Project Group contracted specific components of the work to three faculty members at Memorial, namely, Dr. Wade Locke of the Economics Department, Dr. Azmy Aboulazm, a naval architect with the Marine Institute, and Professor Dag Friis, a naval architect with the Faculty of Engineering. The Project Group was also assisted by a number of students, including Rhonda Burke, Leanne Scoville, Tara Doyle, Elizabeth Ledwell and Robert Rex.

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Chapter One: Introduction

The Public Policy Research Centre of Memorial University was contracted to do a study of the Labrador Marine Transportation system to include two major phases of work. These two phases were an analysis of how best to reconfigure the Labrador transportation system and recommend the terminals and marine transportation routes which should be selected by the Provincial Government for 1) the period up to 2007 and 2) for the longer term, beyond 2007, in order to serve the transportation requirements for passengers and freight going into and out of communities on the coast of Labrador that are not connected by road.

As outlined in the Terms of Reference for the Study, the scope of the Labrador Marine Transportation Study was to include the long and short-term options for providing passenger and freight service to those communities that will remain isolated from the road network for the foreseeable future. These communities on the North Coast include: Nain, Bay, Natuashish, Hopedale, Postville, Makkovik and Rigolet and the communities of Black Tickle, Norman's Bay and Williams Harbour on the South Coast. Components of the Study were to include the historic and projected freight movements to and from Labrador, identify a list of options that would service these demands and, in turn, examine the financial and economic implications of each option. Details of the Terms of Reference can be found in Appendix A.

Phase I of the Labrador Marine Transportation Study was completed and submitted to government on February 15, 2004. That phase of the Study dealing with the short-term fleet configuration was constrained by the fleet size and capacity of those vessels that are currently under contract with the provincial government. Phase I of the Study contained a consultation component that sought the views of Labrador stakeholders on configuration of the fleet and comments on the proposed options. In addition, a naval architect and an economist were contracted to review the servicing options. In the review of the these Options, the PPRC was also guided by three major criteria: (1) that the cost to the Provincial Treasury be kept as low as possible; (2) that transportation rates be kept

to a minimum and freight costs to the isolated communities be no greater than the costs in effect in 2002; and (3) that the economic dislocation to the Province be minimized. A complete review of these findings can be found in the PPRC's *Interim Report*.

Subsequent to completion and submission of the *Interim Report* of the Public Policy Research Centre (PPRC) dealing with the Labrador marine services, Government made its decision regarding vessel and port configuration for the 2004 operating season. That decision provides for service in a format that is a variation of Option Two, as described in the PPRC *Interim Report*. Under the designated operating plan, the Sir Robert Bond will service Cartwright and Happy Valley-Goose Bay from Lewisporte while the northern isolated communities and Black Tickle will be serviced by the vessel Trans Gulf, from a transhipment terminal at Cartwright. The vessel Northern Ranger will be used to supply passenger service between Cartwright and the isolated northern communities, as well as Black Tickle. The small southern isolated communities of Norman Bay and Williams Harbour will continue to be serviced for both passenger and freight by the vessel Challenge One from Charlottetown.

Government has also announced that it is proceeding with completion of Phase III of the Trans-Labrador Highway (TLH), with the first construction contracts expected to be awarded during mid summer of 2004. This report deals with the second phase of the Study which is, in the main, the marine service configuration for the long-term, after the Trans-Labrador Highway is complete. The completion of the TLH will have a major impact on Government's role in providing a marine service between Labrador and the Island, which will be limited to the Strait of Belle Isle crossing, since Cartwright and Happy Valley-Goose Bay will be interconnected. This will improve the strategic role of Happy Valley-Goose Bay as a staging point for goods destined for isolated communities by allowing goods to be trucked not only from other parts of Canada, by way of the highway through Western Labrador, but also from the Island.

Vessel and management contracts for the present fleet are due to expire at various times within the next several years. All of these contracts allow for renewal periods

varying from three to five years. Of particular interest is the contract involving the Trans Gulf, which is due to expire at the end of the 2005 shipping season but for which Government has an option to renew for a further three years. Although this report deals mainly with options that would be applicable for the long-term, after the TLH is complete, some considerations regarding options for the short-term are given if it is decided that the Government does not wish to renew the contract for the Trans Gulf, or decides that the configuration as recently announced is to be terminated before the completion of Phase III of the TLH.

Subsequent sections of this report discuss some basic assumptions that might influence the type of long-term service provided and the optimum vessel and port configuration. Inasmuch as the levels of freight rates, passenger fares, and subsidy requirements are continuing concerns to the Government, the study has focused on existing tariffs and rates and has made a comparative analysis of these with other marine services. The findings of that analysis are also presented in this report.

Expected Traffic Demand

The demand for both passengers and freight by people in isolated communities will be largely independent of the location of any transhipment terminal or the type of vessels used. The same cannot be said of the level of traffic into and out of Happy Valley-Goose Bay. The shipping season 2003 saw significant changes to both passenger and freight as these relate to the port of Happy Valley-Goose Bay, namely, the freight demand from the Island decreased by more than 40 percent while the passenger demand increased by almost 60 percent over the 2002 demands. At the same time, the demands of the isolated communities remained virtually constant. The service role of the Sir Robert Bond has now been decided by Government and will not be discussed further. The following paragraphs present some detail regarding expected traffic flows to and from the isolated communities.

Freight Traffic

Since 2000, the total tonnage of freight moving into the isolated communities has increased at an annual rate of approximately two percent. The Project Group has also reviewed anticipated population growth for both the North and South Coast of Labrador. These population data are given in Appendix B. From those data it is noted that the annual population growth of the isolated communities is expected to be from .3 to 1.1 percent per annum. Since no major population growth is expected, it is reasonable to assume that the normal growth in freight traffic will continue.

Although the vast majority of that freight originates outside the Province, it is transhipped through one of three ports within the Province. These ports have evolved as: Happy Valley-Goose Bay, Lewisporte, and Cartwright. The utilization of the Trans-Labrador Highway has resulted in a growth in traffic moving from Happy Valley-Goose Bay accompanied by a decline in traffic from Lewisporte. The data in Table 1 below show the tonnage moved for the period 2000 to 2003.

With the recent announcement of Government regarding deployment of the fleet, some changes in tonnage from the transhipment ports to the isolated communities can be expected. For instance, the provision of a fully subsidized service from Lewisporte to both Happy Valley-Goose Bay and Cartwright is likely to curtail or even cause the elimination of the trucking of freight from Island communities to Cartwright.

In running the designated service, Government is departing from its long held practice of not providing subsidized marine service to communities that are connected by road to the highway network. Since both Happy Valley-Goose Bay and Cartwright are now connected to the highway, they would not have received subsidized marine service under the previous policy. This was the case during the 2003 shipping season. By virtue of the recently announced decision, these communities will now revert back to the same status as the isolated communities. The transportation role of Cartwright, other than for marine transhipment purposes is likely to be greatly diminished. There are no known developments, however, which would cause an increase in the total freight requirement to

these communities beyond the normal growth of approximately two percent per annum. Thus, when Phase III of the TLH is completed, the total freight demand to the isolated communities is expected to be approximately 9,000 tons annually. While the total freight demand is expected to experience only limited growth the choice of transhipment terminal and the amount of subsidy provided by Government will play a key role in vessel utilization of the service.

Table 1: Freight Transhipped to Isolated Communities (tons)

	From Happy Valley-Goose Bay	From Lewisporte	From Cartwright	Total
Year				
2000	2,811	5,153	106	8,070
2001	3,163	5,452	73	8,688
2002	3,085	5,471	50	8,606
2003	3,896	3,790	1,025	8,711

Source: Data provided to the PPRC by the Department of Transportation and Works, Government of Newfoundland and Labrador.

Passenger Traffic

As with freight traffic, passenger traffic on the marine mode to and from the isolated communities has held constant during recent years, with the total passengers moved being between 4,700 and 5,200 annually. Table 2 shows the intercommunity trip volumes for 2003. From conversations with government officials, it is noted that, in 2003, the composition of the exhibited traffic is virtually all local residents with very little tourist or non-local component. Prior to 2003, a tourist promotion called *Cruise Labrador* was in operation and there were a significant number of tourists carried on the Northern Ranger. The *Cruise Labrador* program has now been discontinued and while tourist traffic might play an important role in providing economic opportunity for the isolated communities, after discussion with Government officials it was learned that the primary role of the passenger service is to meet the travel requirements of local residents. As can be observed in Table 2, except for the Happy Valley-Goose Bay - Rigolet journey, which accounts for 25 percent of the total number of passenger trips, the number of other intercommunity trips is extremely small. For the purposes of this analysis, it is

assumed that demand for intercommunity trips via the marine mode for local residents will remain constant and low, even when the TLH is completed.

It should also be noted that while the development of the industrial facility at Voisey's Bay is proceeding, any passenger and freight traffic to and from that community is considered to be involved with servicing a developing industrial project and, as such, will not form part of the traffic demand for the Labrador Marine Service under study.

Table 2: Numbers of Inter Community Passenger Trips Taken Via Marine Mode, 2003

	Black Tickle	Cartwright	Goose Bay	Hopedale	Makkovik	Nain	Postville	Rigolet	Natuashish
Black Tickle		207	61			2			
Cartwright	189				6	28	11	29	
Goose Bay	73			43	67	85	32	935	62
Hopedale			20		61	288	59		34
Makkovik	1	12	75	60		6	240	17	
Nain		20	63	287	21		17		74
Postville		4	32	45	216	17		3	3
Rigolet		20	792	4	16	5	4		
Natuashish			29	47		838			

Source: Data provided to the PPRC by the Department of Transportation and Works, Government of Newfoundland and Labrador.

Study Assumptions

The recent announcement by the Minister, defining both the port and vessel configuration for the 2004 operating season, did not establish the duration or period of time for which these configurations would hold. This is an important issue, as it plays a vital role in the service and the cost characteristics of that service. If it is assumed that the configuration as announced would be in effect until completion of Phase III of the TLH, the vessel requirements, together with their attendant costs, could be entirely different from those encountered if the announced service expires prior to the completion of the TLH. If the announced service ends prior to the completion of the TLH, the recommendations of the Project Group regarding ports and vessel utilization remain as recommended in the Policy Centre's *Interim Report*, namely Option Seven.

Whether the announced service is in effect for the full period to the completion of the TLH, or some shorter time frame, there will be a continued need for a large vessel to accommodate both passengers and passenger related vehicles to and from Happy Valley-Goose Bay until the TLH is completed.

From the perspective of vessel utilization, it is assumed that the Sir Robert Bond, although being 29 years old, will be maintained in service until the TLH construction is completed. After that date, the Project Group assumes the vessel will be retired and the policy to be followed by Government will be that marine passenger and auto service between Lewisporte and Happy Valley-Goose Bay will be discontinued. It is assumed for the purpose of this study, that the contract for the Trans Gulf will be renewed or an equivalent vessel put in place.

It is assumed by the Project Group that regardless of what happens in the interim, after the completion of the TLH, the towns of both Cartwright and Happy Valley-Goose Bay will no longer be considered isolated communities and that marine service to these towns will be discontinued. It is further assumed that the northern isolated communities, along with Black Tickle, will be serviced from a single port in Labrador. That port is assumed to be Happy Valley-Goose Bay in light of the developed port and transhipment facilities available in that community and the strategic role it will play after interconnection.

In the first phase of the Study leading to its *Interim Report*, the Project Group was advised by senior Government officials that there was a strong desire by Government to put in place a service configuration that would minimize annual costs to the Provincial Treasury. While the configuration announced by the Minister is not the least costly option, it is assumed that for the long-term service after the completion of Phase III of the TLH, it is still a significant objective of Government that annual costs to the treasury be minimized.

Chapter Two: Options Considered

As a result of the recent decision by Government the service configuration as announced may be in effect until the completion of the TLH. The PPRC, in its *Interim Report,* has identified the most appropriate option to be implemented should the announced configuration change before completion of Phase III of the TLH. Accordingly, the range of options for the long-term is quite small. The brief list below identifies those issues and options studied. It is necessary to note that these are not necessarily mutually exclusive.

Option A: Single Purpose Vessels to Serve Passenger and Freight Demands

This provides for continued use of the Northern Ranger to provide passenger service along with a vessel similar to the Trans Gulf, a freight-only vessel to provide freight service after completion of Phase III of the TLH. Given the fact that the Government owns the Northern Ranger and the vessel has several more years of service life remaining, the economics of continued use of single purpose vessels are evaluated.

Option B: One Dual Purpose Vessel to Serve Passenger and Freight Demands

The Northern Ranger is sold, the contract with the Trans Gulf is terminated and a replacement vessel is obtained that has combined passenger and freight capabilities. Given that the passenger demand between the isolated communities is low and is not likely to grow dramatically in the foreseeable future, this type of vessel might hold some promise.

Option C: Single Freight-Only Vessel, Passenger Demand Transferred to Air Mode

A replacement vessel for the Trans Gulf is obtained to handle the freight requirements between Happy Valley-Goose Bay and the isolated communities. The Northern Ranger is sold and the passenger demand normally handled by the Northern Ranger is transferred to the air mode. As part of this option, and considering Government's desire to keep transport charges paid by users as low as possible, subsidy

is provided to cover the increased cost of air fares above the existing marine passenger fares.

Analysis of Options

Analysis of Option A

This Option proposes the continued use of single purpose vessels to service the isolated communities after the TLH is complete and fully functional. The Northern Ranger has limited capability to carry freight. This limited capacity and the inability to carry containers, from a practical point of view, both limit the utility of the vessel to that of a passenger service. The vessel, being built in 1986, has perhaps another 10 years of service life remaining without major overhaul and refit. Since the Government owns this vessel and was given it by the Federal government, there are no capital costs associated with it at this time. Thus, continued use would require the Government to incur only operating costs and any repair and major refits which might be needed as the vessel ages. The total operating cost, including fuel and routine maintenance for the Northern Ranger in the 2005 operating season, is forecast to be $2.6 million. Annual refit for this vessel has been costing Government an additional $350,000 to $880,000. Thus the total of all costs for this vessel is expected to be approximately $3,400,000 for the 2005 season.

The Trans Gulf (built in 1974) has been the subject of criticism by users from the isolated communities who feel the vessel should be replaced if the performance problems continue in the 2004 shipping season. It is difficult to determine the annual operating cost of a replacement vessel, as this is driven by market forces and the availability of vessels at the time when Government tenders for such a vessel. The specifications for a replacement vessel must include the ability to carry both containers and palletized freight, which is an advantage of the Trans Gulf. On the basis of a tender quote from a competing company at the time when the Trans Gulf was contracted, the Project Group estimates that a replacement vessel might be obtained for approximately $2.7 million for the 2005 operating season, with an escalation in that price being three percent per annum for each operating season thereafter. This price would represent a crewed charter similar

to that operated by the Trans Gulf with management, shore-based charges and fuel costs being extra. When fuel and other charges are taken into account, it is forecast that the total operating cost for this vessel will be $3.3 million. Thus, the combined cost to the Government for both vessels for the 2005 operating season is forecast to be $6.7 million. This is a gross cost and does not consider revenues generated from freight and passenger services.

The passenger demand to and from the isolated communities, including trips between these communities and Happy Valley-Goose Bay, has been relatively constant over the last four years with approximately 5,200 passenger trips expected in 2005. Under the current fare tariff, this traffic is expected to generate $117,000. Freight revenues are forecast to be $800,000. Therefore, the total revenues expected from this service configuration are approximately $917,000 for the 2005 operating season. Thus, the net cost of the service to the Government will be approximately $5,783,000 for 2005 with an estimated annual inflation of three percent for each year beyond 2005. This Option has not considered the cost of operating the Sir Robert Bond, as it has been assumed that the Sir Robert Bond will be taken out of service upon completion of the TLH.

Analysis of Option B

This option considers the impacts of selling the Northern Ranger and obtaining a multi-purpose purpose vessel to meet both the passenger and freight demands of the isolated communities. Given that the passenger requirements for such a vessel are low and not likely to increase dramatically in the foreseeable future, the size requirements for such a vessel would be only marginally larger than those of the Trans Gulf. The Government had entertained a similar suggestion of this type of service before, as it placed a tender call to lease such a vessel in June of 2002. At that time, responses to the tender call were not accepted, as the tendered price was unacceptably high. The Project Group has had a naval architect develop costs to have a similar vessel constructed and then placed into the Labrador service. The report of the naval architect showing details of

the total construction cost, as well as the total annual operating cost, for this option is appended to this report as Appendix C.

As can be seen, if this Option were used, the total annual cost to Government, including all capital and interest costs, crewing costs, shore-based costs including stevedoring, fuel costs and routine refit are forecast to be approximately between $5,000,000 and $8,400,000. When anticipated revenues are taken into account, the net annual cost to Government is likely to be in the range of $4,000,000 to $7,400,000. The wide variance in costs for this Option comes from the high degree of uncertainty associated with the relevant variables. For instance, the capital cost of the vessel has been amortized over a fifteen-year period but the vessel would be new and perhaps a twenty-year amortization period could be justified. This would have the effect of reducing the annual cost to Government. Also, for the purposes of analysis, a discount rate of 15 percent has been used. In the current economic climate, it may be possible to obtain rates in the range of 8 to 10 percent. Again, lower discount rates would mean lower annual cost to Government. The $4,000,000 figure quoted above takes the longer amortization period and the lower discount rate into account. This figure is lower than the tendered quote received by government in 2002 for a similar-type vessel. It is further noted that in completing the preliminary analysis and cost development, the size specifications may have led to a vessel slightly larger than that needed. A slightly smaller vessel would undoubtedly lead to a lower annual cost. While the costs presented are sufficiently accurate for planning purposes, the precise cost of such a vessel will not be known until detailed specifications are decided, detailed designs are completed and tendered prices are received for construction.

In addition to direct vessel costs, there are two other factors that might be considered when evaluating this option. If the ship were to be constructed at the Marystown shipyard, there would be considerable benefit to the Province during the construction phase. Secondly, the selling price of the Northern Ranger could be considered as a salvage value to be applied against the cost of the new vessel. This would have the effect of reducing the total annual cost to Government.

The use of a multi-purpose vessel, while of economic benefit to the Province, has a drawback from an operational point of view. This comes from the port time necessary to service the passenger traffic compared to that required to service the freight traffic. Inasmuch as the passenger service is being provided to meet the needs of local residents and not of tourists, there is a desire on the part of the local passengers to travel from trip origin to trip destination as quickly as possible. Port time to load and off-load freight can be considerably more than that required to load and off-load passengers. Therefore, passengers would find that sharing a vessel with freight would increase travel time and, in some instances, lead to the need for some travelers to book cabins, which would not be required on a shorter journey.

Analysis of Option C

The concept of discontinuing marine passenger services and subsidizing air passengers from and to the affected communities was offered as an option to Government in the *Coastal Labrador Transportation Study*[1] completed in 1997. At that time, the consultants estimated that an annual subsidy of $2,357,345 would be required, based on economy airline fares. In arriving at this figure, trips made between communities that have since been connected to the road were considered. If only the passenger trips between communities that are isolated today are considered, the subsidy requirement is significantly less. If the passenger traffic as shown in Table 2 above is considered and if full adult marine fares are applied as given in the current schedule of fares and tariffs, the expected revenue received by Government in respect of these passengers would be $155,000. Since it is very unlikely that all the passengers carried as shown in Table 2 would be adults, this revenue figure should be reduced to account for children and seniors that are part of the total annual demand. The exact makeup of the passenger demand is not known but for the purposes of this study the estimated total revenue was reduced to $120,000 to account for the fact that not all passengers would be paying full adult fares.

[1] Coastal Labrador Transportation Study, The SGE Group Inc. in association with Geoplan, FGA Consultants Ltd and Doanne Raymond, December 1997.

Using the same passenger demand and applying current economy air fares it is estimated that the cost to transport these passengers by air would be approximately $620,000.

Therefore, it can be concluded that if Government was willing to provide a subsidy of $500,000 annually, all the passengers now traveling on intercommunity trips by the marine mode could travel by air at no greater cost to the traveler. If it is considered that the passenger demand as shown in Table 2 contains a small number of tourists for whom subsidy would not apply, the total requirement would be slightly less than $500,000.

Earlier calculations indicate that presently the Government pays approximately $3,400,000 annually to operate the Northern Ranger. Selling this vessel would obviate this expenditure. In addition, any proceeds from such sale could be applied to meet future subsidy requirements of an expanded air service. It can reasonably be concluded that selling the Northern Ranger and providing subsidy to residents of the isolated communities to allow passenger travel by air makes economic sense and provides a potential annual savings to the Treasury of approximately $2,900,000. There are, however, some serious potential impacts that need to be considered in application of this option. These are:

(i) The total passenger demand is currently very low. The concept of traveling by air instead of traveling by the marine mode for the same cost to the passenger could serve to induce a significant demand, due to the novelty of air travel and the perceived low cost. Also, air travel might be viewed by passengers as more convenient than marine travel with shorter community stop-over time required. This characteristic could also lead to increased passenger demand. From a sensitivity analysis point of view, however, if the total passenger demand increased uniformly by a factor of three, that is the number of inter-community trips as shown in Table 2 were to all increase by a factor of three and if Government paid the full subsidy on these, there would still be an annual benefit to the Provincial Treasury of $1,900,000 compared to

continued operation of the Northern Ranger to accommodate the passenger demand.

(ii) The passenger demand being considered for subsidy under this option is that which is now carried by the marine mode. While the above discussion shows there is some merit in subsidizing that demand to allow it to be accommodated on the air mode the question of summer service versus winter service on the air mode is not addressed. If only summertime passengers on the air mode qualify for subsidy it may be viewed that this practice is discriminatory unless the same level of subsidy is offered to wintertime passengers. The total passenger demand for air travel between the isolated communities is not known to the Project Group thus the full economic impact of providing subsidy to all air passengers, both summer and winter cannot be calculated; however, it is suspected that it will be very substantial.

(iii) Currently, there is a substantial number of passengers carried between the isolated communities by the air mode during the summer. These are passengers, local residents, for whom the marine mode is simply not convenient. If the passengers who currently travel by marine mode become eligible for subsidy when that demand is transferred to the air mode, there is likely to be a demand to have the subsidy extended to the normal air travellers during the summer. This situation, of course, will only increase the overall passenger demand for air service during the summer.

(iv) While there appears to be considerable economic benefit to pursuing this option it must be recognized that the cost of providing marine services may not necessarily escalate at the same rate as does air services. The required subsidy as calculated using existing airfares cannot be assumed to hold constant for future years. Generally air travel is more sensitive to fuel cost increases. Increased fuel costs could play a major role in the magnitude of future subsidy.

(v) Even if, after considering all variables, this option still offers considerable economic benefit to the Province, there is still a major problem of how to apply the subsidy to ensure that only legitimate coastal residents receive it.

Government could institute a program of rebates where the user would receive the subsidy after the trip has been taken and paid for by the user at regular fares. This might place hardship on users who would have to be able to purchase airline tickets at full fare and complete their journey before being eligible for subsidy. There could be considerable time between purchase and receipt of subsidy rebate. This kind of administrative process tends to diminish demand somewhat as some users simply do not have the financial resources to make the initial purchase of the ticket. In addition, Government would have to put in place an office to process rebate claims and, although not likely to be excessively costly, this would detract from the overall economic effectiveness of this option.

(vi) While freight to isolated communities responds to the need for essential foodstuff and other necessary commodities the same may not be the case when it comes to passenger service. Much passenger travel is discretionary and for personal satisfaction while other travel is business related. Accordingly, the provision of air passenger service during summer periods at fares equivalent to those charged on the marine service may not be either practical or necessary. Some modest level of subsidy for air travel, during the summer period, may be sufficient to alleviate any burden or inconvenience arising from the elimination of marine passenger service.

Summary of Costs of Options

Assuming that one of the identified options is to be implemented on the completion of Phase III of the TLH, the following presents a summary of the annual cost in 2005 dollars of each during the first year of operation. Subsequent years will likely see an escalation at least equal to increases in the consumer price index.

Table 3: Comparison of annual costs of options.	
Option	**Annual Cost to Government**
A	$5,783,000
B	$4,000,000-$7,400,000
C	$3,000,000-$3,500,000

It is possible that the port and vessel configuration as recently announced by the Minister may be subject to review prior to the completion of Phase III of the TLH. It has earlier been suggested that Option Seven as recommended in the *Interim Report* be implemented. In any case, a decision on the replacement of the Trans Gulf must be made prior to the start of the 2006 shipping season. Any of the options identified above can be merged with Government's announced service or with Option Seven of the Interim Report. The multi-purpose vessel proposed in Option B above, for example, could be substituted for the Trans Gulf and the Northern Ranger at any time. That is, it is not necessary to wait until the completion of the TLH to implement one of the above options.

Finally, the retirement of the Sir Robert Bond when the TLH is complete represents an opportunity for Government to sell this vessel. It is unlikely that, given its age, it will elicit a large salvage value; however, any proceeds could be used to offset some of the costs of continued service to the isolated communities.

Transhipment Port

With its recent announcement Government has determined the transhipment ports to be utilized in the period until completion of Phase III of the TLH. When the highway is completed, there will be no need of all three ports, as in the 2004 season. As indicated in the above assumptions, Happy Valley-Goose Bay will be the only port from which a transhipment service will need to be provided to the isolated communities. As also earlier assumed, the Sir Robert Bond will be taken out of service as passengers will be

able to access Happy Valley-Goose Bay and Cartwright via the highway from anywhere in North America.

The choice of port as the long-term transhipment terminal is critical to the service being provided to the isolated communities. During the consultation phase of the *Interim Report*, the Project Group was informed by proponents of the advantages of each port, Happy Valley-Goose Bay, Cartwright, and Lewisporte in the long-term supply of the isolated communities. The physical characteristics of each port were described in the PPRC's *Interim Report*. From a pragmatic point of view, if the objective of minimizing cost to the provincial treasury is considered, Lewisporte is less attractive as the long-term port, as the distance between Lewisporte and the isolated communities is greater than that between a single Labrador port and the same communities. The longer distance will result in extra costs to the Provincial Treasury as well as less frequency of service to the isolated communities. From a purely infrastructure point of view, Happy Valley-Goose Bay has more facilities to offer than does Cartwright. The port of Cartwright, however, has an advantage in being on the coast rather than inland, as is Happy Valley-Goose Bay. This offers a slightly longer shipping season at both the beginning and end of the season. Compared with Happy Valley-Goose Bay, the terminal infrastructure at Cartwright is inadequate and considerable investment on the part of Government would be required to provide the necessary improvement. Furthermore, the wholesale distribution base of Happy Valley-Goose Bay is more comprehensive and better able to provide the kind of freight services required by the isolated communities.

An argument can be made for having both Happy Valley-Goose Bay *and* Cartwright as terminals. Cartwright could then be used to tranship freight moving to the isolated communities from centres located on the Island of Newfoundland and along the south coast of Labrador. Not retaining Cartwright as a terminal places Island business at a slight disadvantage when attempting to service the isolated communities. Freight from Island business would have to bypass Cartwright in order to get to Happy Valley-Goose Bay in order to be transhipped to the isolated communities. While this will undoubtedly add some cost due to a slightly higher freight rate, as the distance to be trucked would

increase, that incremental cost is expected to be quite small, less than one cent per pound. This is based on an analysis of trucking costs that indicate that this is the order of magnitude of costs incurred to move approximately the same amount of freight from St. John's to Lewisporte. That distance would be slightly longer than the road distance from Paradise River to Happy Valley-Goose Bay.

Chapter Three: Fares And Tariffs

The current fare and tariff being used on the Labrador Marine Service has been in use since 1997, although it is largely based on a structure that was in place many years ago when the service was operated by the Federal Government as a division of CN Marine. While over the years there have been numerous minor changes, the structure has remained basically unchanged. The published rates appear to bear very little resemblance to the cost of service and are filled with anomalies and inconsistencies. In the application of these rates and tariffs only a small portion of the cost of service is actually recovered through user charges.

Rates and fares for transport services are usually based on one of two possible structures. These are: (a) cost-based: which relates the rates charged to the cost of providing the service and has an objective that all associated cost be recovered and, in the case of private carriers, the amount recovered includes a profit, or (b) arbitrary-based: where the rates and fares charged are not necessarily related to costs but usually to some social objective such as aiding a particular group. In the case of arbitrary structures, the amount recovered usually is not sufficient to cover the cost of provision of such services and as a result some external group or agency must make up the difference through subsidization.

In the case of cost-based rates, when applied by governments, it is not necessary that all costs be recovered. Rather, governments can elect to recover only a portion of the cost and provide subsidy to make up any differences. However, starting from a basis of cost allows for the rates and tariffs to be applied in a very equitable manner regardless of what portion of the costs are recovered; whereas arbitrary-rates can lead to discriminatory charges.

As earlier observed, it is not clear if the rates being charged for the Labrador Service are cost-based. In order to apply a cost-based system, detailed cost accounting

records must be maintained. Usually that cost is made up from two variables. One being the part which reflects the fixed cost associated with the service and the other being those costs which vary according to the service being provided. In marine operations, variable costs can account for as much as 20 percent of the total costs. Table 4 gives a typical listing of component costs under each of these categories. In addition to having to deal with some costs which are fixed and independent of the traffic, and others that change according to traffic or some other characteristic, vehicles or vessels which carry mixed traffic must have some rational basis by which the cost of each type of traffic can be allocated. For instance, the Labrador Marine Service uses ships to carry a mixture of passengers, passengers in sleeping accommodations, passenger vehicles, tractor trailers, other trucks, heavy equipment, refrigerated and non-refrigerated containers, pallets and loose-stowed freight. A major problem arises when, for each dollar of cost, a fair and reasonable part of that dollar is to be allocated to each type of traffic.

Table 4: Components of the Total Cost of Marine Services

Fixed Costs	**Variable Costs**
Management Costs	Fuel
Associated Office Overheads	Stevedoring
Advertising	Operation of Port Equipment
Vessel Depreciation	Dunnage
Insurance	
Vessel Maintenance and Repair	
Crew Wages and Benefits	
Port Charges	
Ships Stores	

As part of this Study, a review of rates and fares was conducted which compared rates on the Labrador service to those charged in other services both within and outside the Province. Table 5 gives a summary of some of the charges obtained. Because many of the services contacted could not quote rates for pallets and loose-stow freight, a common quantity of a 50,000 pound container rate was arrived at for study purposes. For comparative purposes, and because a significant amount of freight to the isolated communities moves in pallet form the rates for transporting palletized freight were also reviewed. Table 6 shows the rates charged on the Labrador Service for a pallet containing 2,000 pounds.

Table 5: Comparison of freight charges for various services (50,000 pounds)

Service	Distance (km)	Rate ($)	Rate/km ($)	Rate per ton-km
Lewisporte-Cartwright	650	1,480	2.28	.091
Lewisporte-Nain	1,060	1,570	1.48	.059
Lewisporte-Goose Bay	886	1,510	1.70	.068
Cartwright – Goose Bay	350	1,420	4.06	.162
Cartwright –Nain	500	1,480	2.96	.118
Blanc Sablon-St. Barbe	34	137.50	4.04	.162
Port Aux Basque-North Sydney	154	414.50	2.69	.108
Argentia-North Sydney	426	1072.50	2.52	.101
Wood Islands-Caribou (N.S-P.E.I)	23	133	5.78	.231
Vancouver-Nanimo (B.C)	56	281.25	5.06	.203
Sept Isles-Natashquan (Que.)	295	4,017	13.92	.557
Sept Isles-Havre St. Pierre (Que,)	190	3,862	20.32	.813
Natashquan-Blanc Sablon (Que.)	330	4,307	13.05	.522

Table 6: Comparison of Freight Charges for Labrador Services for 2,000 Pound Pallet					
Service	**Distance (km)**	**Rate ($)**	**Rate/km**	**Rate per Ton-km**	**Rate per pound**
Lewisporte - Cartwright	650	97.60	.150	.150	.0488
Lewisporte - Nain	1,060	103.60	.098	.098	.0518
Happy Valley-Goose Bay - Cartwright	350	93.60	.267	.267	.0468
Cartwright – Nain	500	97.60	.195	.195	.0488

Table 7: Comparative Table, Adult Passenger – Marine Services			
Service	**Distance**	**Rate**	**Cost/km (in cents)**
Lewisporte – Cartwright	856	60.00	7.01
Goose Bay – Cartwright	365	40.00	10.96
Blanc Sablon – St. Barbe	34	9.00	26.47
Port Aux Basques – North Sydney	154	27.00	17.53
Argentia – North Sydney	426	75.50	17.72
Yarmouth – Maine	153	73.63	48.12
Saint John – Digby	69	35.00	50.72
Wood Islands – Caribou	23	12.00	52.17
Mantane – Baie Comeau	53.3	12.75	23.92
Mantane - Godbout	62.1	12.75	20.53
Vancouver Island – Victoria	44.4	10.25	20.09
Vancouver – Nanimo	55.5	10.25	18.49
Vancouver Island – Sunshine Coast	17.95	8.50	47.35
Port Hardy – Prince Rupert	506.9	102.50	20.22
Prince Rupert – Skidegate	172.05	19.75	11.48
Comox – Powell River	31.45	8.00	25.44

A similar analysis was conducted for the fares charges by Labrador Marine Services to transport passengers. Table 7 provides some detail regarding these. As noted in Table 5, the rates charged by the Labrador Marine Service do not bear any relationship to those charged for marine services in other jurisdictions. The reason for this is not clear although those charged for services in Quebec appear to be on a full cost recovery basis.

Within the Labrador Service there are unexplained anomalies. The rates do not appear to be cost-based and, as a result, do not reflect the effect of distance travelled. For instance, the rate on a cost per kilometre basis is almost three times more expensive between Goose Bay and Cartwright than between Lewisporte and Nain. Undoubtedly, the fixed cost of the operation would play a bigger role in the Cartwright to Goose Bay trip than the Lewisporte to Nain trip, but unless the fixed costs are an overwhelming component of the total costs the difference is difficult to explain. From data provided to the study by the Government, it would appear that the variable cost of providing the service is at least 20 percent of the total costs. The rates charged to transport freight cannot be correlated with the fixed and variable costs associated with the movements. There does not, however, appear to be any attempt to provide rates that reflect the fixed to variable cost ratios. It appears that the distance over which freight moves is not an important variable in setting the freight rates.

Sometimes rate adjustments create anomalies when they are made without reference to costs. An example of this is the policy of charging for tractor-trailer freight going to Happy Valley-Goose Bay on the basis of currently applicable rates but having a rate of zero for the return trip from Happy Valley-Goose Bay as long as the trailer is empty. If there is a single pound of freight in the trailer on the return, the charge becomes the full rate. It is difficult to determine a rational reason for these rates.

The Government has supplied the Project Group with some costs incurred by each vessel in the Labrador Marine Service for the period 1998 to 2003. While not in great detail, it would appear that the variable costs associated with the service during the 2003 season represent approximately 20 percent of the total cost of $13,749,937. There is no way of knowing from the data provided just how much represents expenditures on passenger and related services and on freight and related services.

As long as Government continues to use vessels to carry mixed cargos of passengers, vehicles and freight it is imperative that a system of cost allocation to each of these components be developed. This would apply to the operation of the Sir Robert

Bond and the Northern Ranger and, possibly, to the new vessel combining passengers and freight, if acquired. Cost elements that are used exclusively by one element of the service, for instance forklifts used to lift pallets of freight, can be costed and directly attributed to the freight component. Many of the other items of the operating cost of the vessels are shared by all components. One rational way of allocating costs between the various components is on the basis of volume or space consumed by that component. For instance, if passenger space occupies 40 percent of the available carrying space, then 40 percent of the operating cost could be allocated to the passenger service. Within each category of traffic, costs would have to be further broken down into those that are fixed and those that are variable. In the case of passenger traffic, such a division and allocation of costs allows for rates to be set which recognize the amount of resources used to carry a passenger from one point to another. Similarly, the cost of moving freight can be allocated to reflect weight, space and distance.

Once the true cost of each component of the traffic mix is determined, the rates charged can be set to recover all the cost or a proportion of the cost. The proportion of the cost to be recovered from traffic charges can be tied to Government social policy.

Chapter Four: The use of Subsidies

The Project Group understands the rationale for providing marine services to the isolated communities at greatly subsidized rates. When subsidized services are offered to communities that are not isolated they generally inhibit the establishment and/or the growth of non-subsidized services. This is simply because privately run services cannot, on an economic basis, compete with the heavily subsidized Government-run service. In the case of the marine service between Lewisporte and Cartwright, the presence of marine subsidy is likely to impede the development of the infant trucking service that was recently established. Happy Valley-Goose Bay, while not yet connected to the Island highway network, is connected to the North American highway network through Churchill Falls and Labrador City/Wabush and cannot be classed as an isolated community. In view of the fact that there is no road connection currently between Cartwright and Happy Valley-Goose Bay, a marine subsidy between Cartwright and Happy Valley-Goose Bay would be justified.

Although the announced service configuration has subsidized marine service to these two Labrador ports, the original terms of reference for this study stated that options must consider the economic impacts as well as the service requirements on affected communities. While Government will be providing marine service to Cartwright and Happy Valley-Goose Bay, it may not be necessary to provide the service at subsidized rates. An alternative to this would be to provide marine service between Lewisporte and Happy Valley-Goose Bay and between Lewisporte and Cartwright but apply the marine subsidy only to the Cartwright to Happy Valley-Goose Bay portion.

As described above, any freight moving from Lewisporte to Cartwright would move at rates that fully recover the cost of providing this service. Similarly, freight moving between Lewisporte and Happy Valley-Goose Bay would move under subsidized rates for the Cartwright to Happy Valley-Goose Bay portion of the journey only. The principal justification for this Option is that the highway to Cartwright has now been

completed and the trucking industry has developed to the point where freight service offered by this mode between Lewisporte and Cartwright is available to any user. If the specified marine service as recently announced by the Minister is operational, it offers the user a choice of mode. It is an accepted principle that, as far as mode choice is concerned, decisions are made on the basis of two main modal characteristics. These characteristics are those relating to the quality of service provided and/or the price of the service. The quality of service which influences choice of mode are items such as schedules, frequency, the amount of loss and damage, and reliability of the carrier. If service quality is approximately the same, users will make choice decisions on the basis of price, with the lowest price being that preferred. In a competitive market, that is a market where modes are free to compete against each other, the price should not be reflected in rates that are less than the cost of operation. If one mode exhibits a price advantage, that will ultimately play into the decision of shippers to use that mode. Price advantages should be predicated on the characteristics and management of the mode itself and not Government subsidy.

If it is accepted that the Labrador Marine Service recovers approximately 20 percent of its operating costs (there are no capital cost associated with the Sir Robert Bond nor the Northern Ranger as these vessels have been given to the Province by the Federal Government), it might be argued that the freight rates should be increased by a factor of five if the full operational costs for moving the freight are to be recovered. Thus, if a shipper was considering shipping a unit containing 50,000 pounds under a freight rate which is at present $1,480 for the Lewisporte to Cartwright service, the same shipper would see this rate increase to $7,400 if the full recovery of all operation costs was implemented.

This charge can be compared to that required to move the same weight by truck between Lewisporte and Cartwright, which is currently at approximately $3000. Similar differences exist for pallets of freight containing 1,000 or 2,000 pounds. It is recognized that the increase in marine rates by a factor of five is only approximate, as this reflects merely system average costs and not those directly associated with freight traffic. For

instance, the conclusion that only 20 percent of the marine cost of operation is recovered through user charges, while correct, does not indicate how much of the operating cost is recovered from freight services and how much is recovered from passenger and auto services. Conceivably, passenger and passenger services cost more than freight services and, thus, to provide for full cost recovery of freight services might require that current rates be increased by a factor of four rather than five. To ascertain the precise amount by which current freight rates need to be increased to reflect full cost recovery requires a cost accounting of the service being provided.

Notwithstanding the difficulties of determining the full and accurate cost of providing marine services, it is fully recognized that the services recover only a small portion of their full cost. If a factor of four was used in the above example instead of a factor of five, the cost to ship a container of 50,000 pounds by marine would still be $5,980 compared to $3,000 by the trucking mode. This has tremendous and wide reaching implications. If shippers are making decisions regarding choice of mode based on price only, clearly the marine mode has an overwhelming advantage if subsidy is provided at the current levels. If the same decisions are made when the marine rates are set to recover full operating cost the trucking mode has an advantage of the same order of magnitude. The price differential under each of the above possibilities is so large that it virtually assures the complete demise of the higher priced service.

From a vessel utilization point of view, if full cost recovery was used to set rates for freight services between Lewisporte and Cartwright, as well as between Lewisporte and Happy Valley-Goose Bay, the use of the Sir Robert Bond on a weekly basis may not be required. Some sailings could be underutilized. A modified schedule to reflect the actual demand for service could see some financial savings to the Provincial Treasury.

Undoubtedly, a higher freight rate for moving goods between the identified communities would impact business and employment in the general Lewisporte area. Conceivably, some jobs would be lost. From a provincial perspective, however, these

would simply change location as an equal number of jobs could be expected to be created in the Cartwright area.

Another criterion set for the consideration of options by Government officials is that the transportation costs to the residents of the isolated communities not increase dramatically over those of 2002. If the rates to Happy Valley-Goose Bay and to Cartwright were increased to the extent that full marine operations costs were recovered, it would have no impact on rates to the isolated communities as this freight could continue move under existing subsidy.

Chapter Five: Other Issues

Need For Transition Period

As indicated earlier, when the TLH is completed, the isolated communities in Labrador will receive marine service from a single port in Labrador, probably Happy Valley-Goose Bay. When that point in time arrives, the business association with Island suppliers, particularly Lewisporte, will be greatly diminished. Island businesses servicing Labrador will still be able to do so, but freight will have to be delivered by truck from Island communities to the transhipment port at Happy Valley-Goose Bay, thereby incurring additional costs. The Project Group recognized this in its *Interim Report* and recommended a transition period of three years, during which time reduced marine freight rates out of both Cartwright and Happy Valley-Goose Bay would be available, as well as policies and concerted efforts made to encourage businesses located in the isolated communities to develop relationships with suppliers in Happy Valley-Goose Bay. It was hoped that this would also encourage Island businesses to establish a presence in Happy Valley-Goose Bay. Under the announced Option, there are no such incentives and businesses in the isolated communities will continue with their long-held business relationships with Lewisporte until that service is discontinued. Without a suitable transition mechanism, it is suspected that a very significant disruption and even hardships will result due to any abrupt change in service as is evident in this Option.

In addition to the need for some transition adjustment for the isolated communities, there is a similar concern regarding Lewisporte. If all the traffic to Labrador, including Happy Valley-Goose Bay and Cartwright moves from Lewisporte until the completion of the TLH and these volumes suddenly decrease to zero when the highway is completed, there will be very drastic effect on Lewisporte. In its *Interim Report*, the PPRC recognized this and suggested measures to mitigate the negative impacts. This issue needs revisiting by Government.

Tourist Potential

During the public consultation phase of the Project Group, numerous comments were presented regarding the potential for tourism and transportation of tourists to and from the isolated communities. Most residents appreciate the economic value to communities from tourism. While they would like to see expanded tourism, there is, at the same time, some criticism of the marine passenger service using vessels that are shared by both tourists and local residents. In the main, local residents wish to complete their journeys on the vessel as quickly as possible. This means port layover times as short as possible. Tourists on the other hand prefer to have long port times to afford them the opportunity to visit places in each community. Further, local residents complain that the best accommodations on the vessel are often reserved for tourists.

It is noted above that should Options B or C be implemented, the vessel Northern Ranger would be taken out of service. It is also suggested that proceeds from a sale of that vessel could be applied to the cost of the implemented Option. In light of the fact that the vessel has very fine passenger accommodations and would be very well suited to an expanded tourist industry, it is suggested that Government consider providing the vessel to a viable tourist agency, perhaps out of Lewisporte, to operate along the Labrador coast. In addition to developing the tourist potential of the isolated communities, the few tourists who now travel on the regular service could be transferred to the tourist facility, thereby relieving the Government of any obligation for these.

Chapter Six: Conclusions and Recommendations

Re-Statement of Governing Criteria

During the investigation leading to its *Interim Report*, the Project Group was informed by Government officials that there were three major criteria governing the Labrador Marine Service. These are:

(1) The cost to the Provincial Treasury must be minimized;
(2) The cost of receiving freight by residents of the isolated communities must be no more than that incurred in 2002; and
(3) That by virtue of terminal location there not be major diversion of jobs from this Province to some other province.

Recommendations

Vessels

On its face Option C appears attractive. On closer examination it is subject to serious shortcomings and risks. Option A, the use of two single purpose vessels is the most costly to implement. Therefore, considering both cost and ease of implementation, it is recommended that the Government proceed with Option B.

Whether Option B uses a newly constructed vessel or a leased vessel can be evaluated in more detail given the fact that there is sufficient lead-time between the present and the completion of the TLH. Government can tender for such a vessel immediately and if prices are acceptable, a long-term contract can be entered into and the vessel can be used to replace the Trans Gulf and the Northern Ranger. The tender for a multi-purpose vessel can be placed to buy or lease, with the decision to be based upon the responses received. Should the tendered prices be unacceptably high, Government has sufficient time, perhaps five years, to have a replacement vessel designed and constructed at Marystown. In the medium term, until completion of the TLH, Government has the option of extending the contract for the Trans Gulf or leasing a single purpose replacement vessel. During that period of time, the Northern Ranger would need to be

retained in service to provide for passenger traffic. While recommending Option B, the Project Group is aware that the concept of taking the Northern Ranger out of service has not been directly discussed with the residents of the isolated communities. Many in these communities may have been aware of the concept of a new dual purpose vessel as the Government has tendered for such in 2002. If the concept has not been directly discussed with the affected residents, Government should proceed with full consultations prior to making a commitment to build, buy or lease such a vessel.

Freight Rates

This study has shown that there are significant discrepancies in the existing freight rate structure. It is the opinion of the Project Group that any freight rate system should be cost based. The previous sections of this report suggest the need for a full cost accounting and cost allocation method to be developed. When these are completed Government can, taking into account other social issues develop a system of rates that targets an acceptable percentage of the full cost of provision of the services.

It is therefore recommended that Government proceed as soon as practicable to put into place a full cost accounting of the service in sufficient detail that would enable all allocated costs of component traffic as well as fixed and variable costs to be identified.

Transition measures

The need for transition measures to allow a change from a Lewisporte-based service to a Happy Valley-Goose Bay-based service to be completed with a minimum of negative impact to the concerned communities has been discussed. In the *Interim Report*, recommendations were made to deal with this issue. The Project Group feels these recommendations are still valid and recommends that they be implemented.

On the basis of what the Project Group learned from consultations with stakeholders, the quality of service was not up to an acceptable standard and improvements are needed. It was recommended that more authority be delegated to local managers in direct contact with consumers and suppliers at the originating port, during transhipment, and at the final destination port. During the current year, it will be

important to ensure that the limited transhipment facilities at Cartwright are well managed, with expedited transfer of freight from the Sir Robert Bond to the Trans Gulf. Government has taken steps to improve the service and when the service is relocated to Happy Valley-Goose Bay upon completion of Phase III of the TLH many of the constraints upon port services will be removed.

Efficient use of the port and fleet will require that a good management information system be put in place, so that the cost of each service is well understood, along with the opportunity to achieve efficiencies. Introduction of a full cost accounting system will allow rates to reflect true cost. As with any other public service efficient use of subsidized facilities will be encouraged when users of the system understand the real cost incurred. To this end a proper cost accounting system is essential along with public information on the real cost and the magnitude of the subsidy.

The task of the PPRC and its Project Group was to design a reconfiguration of the marine service in Labrador. This task was to be performed in keeping with specified cost and service guidelines, including the three criteria noted earlier, with respect to minimizing cost to the taxpayer, stabilizing freight rates charged to residents of isolated communities and achieving maximum value added to the provincial economy. It is understood by the Project Group that the policy objectives of Government relate to the well being of the ultimate consumer of marine services, namely the people of Labrador. In assessing the options and measuring the costs and benefits the fundamental objectives, it must be emphasized that the primary consumers are those residents of isolated communities who depend critically upon the service for their basic human needs. By virtue of their isolation, these residents are heavily impacted by changes in the service. There is a real danger of losing sight of this fundamental objective in the midst of the complexity of the policy guidelines and the measurement of benefits and costs.

The challenge for Government is to ensure that the interests of these residents of isolated Labrador communities are at the forefront when policy decisions are made. They deserve to receive the highest standards of quality service at reasonable cost to the

consumer and to the taxpayer. In the preparation of this report, the PPRC has been cognizant of the importance of assisting Government to put in place a high quality and reasonably priced service, both for the short and the long term. The analysis and recommendations of the interim report and this final report are presented to Government with the intention that they will provide constructive input into the design of a service which is responsive to the needs of final consumers.

Appendices

Appendix A: Proposal And Terms Of Reference To Conduct An Analysis Of How Best To Reconfigure The Labrador Transportation System

Introduction

This proposal and terms of reference is provided in response to a request initiated by senior officials of the Departments of Works, Services and Transportation (DWST), Labrador and Aboriginal Affairs (DLAA) and Treasury Board Secretariat. It is understood that there will be a particular focus on the options, including the marine system originating from Lewisporte and another which involves a combination of roads through Labrador, combined with shipping north and south from depots in Cartwright and Happy Valley-Goose Bay. Subsequent sections provide details as to scope, methodology, administration and cost.

Scope

The results of this study are intended to provide information that will assist government in reaching rational service decisions with respect to the Labrador transportation system for goods, passengers and combined passenger/vehicular ferry service. With completion of Phase III of the Trans-Labrador highway (from Happy Valley-Goose to Cartwright) remaining several years into the future, and, the completion of the highway along the Quebec north shore connecting to the Labrador coastal highway still highly uncertain, the opportunity to move freight to and from Labrador communities has, and will continue, to increase and change.

It remains doubtful that any highway will be built in the foreseeable future to either the communities on the north Labrador coast (Nain, Voisey's Bay, Natuashish, Hopedale, Postville, Makkovik, and Rigolet) or certain remote communities on the southern Labrador coast (Black Tickle, Norman Bay, and Williams Harbour). Thus, there will be for some time a requirement to provide marine services to communities not connected by road.

Traditionally, these marine services have been provided through Lewisporte and Happy Valley-Goose Bay, and now Cartwright. The scope of the proposed study is to:

a) Review all available historic information regarding freight movements to and from Labrador;
b) Forecast what the freight movements are likely to be for the next ten to twenty years, including requirements for the major development by INCO at Voisey's Bay;
c) Examine the options available to service the anticipated transport demand;
d) estimate the financial and economic impacts of each option. Implicit in this analysis is the determination of costs and benefits associated with each option. This includes the total costs as well as the relative components borne by the government and the end user.

Methodology

The study will consist of the following tasks:

Task I

The first task of the Project Group will be to document the current situation. This will include a review of historic passenger and freight transport methods, how the coastal Labrador communities are serviced now, including the type of vessels, frequency of service, freight rates being charged, the type and extent of subsidy, and problems, both real and perceived, with the service. This task will also try to establish the objectives of the Government as it relates to the service and the impetus driving change.

Task II

The objective of this task is to establish a factual account of the extent of the transport problem. Central to this objective is the determination of an origin-destination estimate for freight and passengers moving to and from Labrador, both historically as well as future demand. In conducting this survey the review team will assemble data, including the demand for services to move household effects, including automobiles, from Labrador to the Island. It will include as well the movement of products such as fish and shellfish out of Labrador into markets both in Canada, the United States and the rest of the world. In the main, this task will rely primarily on data published in public reports and previously completed studies for the determination of historic freight patterns. Where necessary, data will be supplemented through telephone interviews with major shipping firms and consignees.

This task will not only identify the origins and destinations of freight and passengers but will also provide information regarding commodity types, routes used and modes of transport. The estimation of future freight demand represents a more challenging problem given the time constraints of the study. These constraints do not permit the development and testing of detailed forecasting models. Forecasts therefore will be made using growth factors established by interviewing select Labrador businesses.

The development of traffic statistics and a comprehensive origin-destination matrix will be limited to traffic data provided by the Division of Marine Transportation (DWST). It is understood that three years, and perhaps five years, of data are readily available from the Division. Forecasts, including future traffic demand, will be made from this database.

Task III

This will identify a number of marine and highway transport options. The object of this task is to determine various combinations of road and marine services which, to varying

degrees, have the capability of meeting the transport requirements of the residents of Labrador. These options will identify locations for marine terminals and the type of services provided from these. Consultations will be carried out with stakeholders to help identify the most functionally acceptable options. It is therefore proposed that the considered options will be analyzed and the most promising two or three identified and conveyed to Government prior to the end of 2003 and before commencement of the consultation process. These options will form the basis for consultations with stakeholders. The options to be addressed in the final report will be established by January 12, 2004, drawing upon the results of feedback from the transportation options presented in the consultation process. While a number of service options will be proposed, the vessels to be used will be those already in the existing fleet. This will be done keeping in mind the contractual arrangements now in place. Service options will be developed for the short term, up to three years, and the long term, covering the period up to the completion of Phase III of the Trans-Labrador Highway.

Task IV

The full cost of each transport option will be determined. This will include total capital cost as well as all operating costs. A cost-benefit analysis will be conducted to identify the most promising options.

An economic analysis of each option identified in Task III will be conducted. It is understood that cost data for this analysis will be provided by the DWST. In completing the analysis of these options, the Project Group is mindful of the Government's wishes that sufficient information be presented to it by February 15th, 2004, so that certain decisions regarding the service can be made.

Task V

A review of marine service freight charges will be carried out. The extent and the role of subsidy will be determined. Much of the required information for this aspect of the study will be obtained by talking with the principal carriers operating to and from Labrador. The basis for freight rate structures, on both the highway and marine mode, will be determined as will the reasons why there appears to be a wide variation in rates charged. Using data from this Phase of the study it will be possible to establish the
role that all transportation charges, including marine freight charges, play in retail costs at various centres in Labrador.

Task VI

An investigation of business relationships will be conducted to identify the relative proportions of Labrador freight requirements that come from Island suppliers and the potential for an expanded role for Labrador based suppliers. This will be carried out through telephone discussions with the major shippers in Labrador. This work will include a review of the potential opportunities for business activity which are linked to each transportation option, depending upon the base of operation for marine shipping.

The emphasis for this task will be to determine any economic impacts upon Lewisporte and the Island part of the Province as well as upon Happy Valley-Goose Bay, and Cartwright and the rest of Labrador, as a result of changes to the Labrador Marine Transportation Service. The consultations will focus upon the options, as referenced under Task IV above, and will involve meetings with representative groups, rather than public meetings.

Task VII

It has been suggested by Government officials that past experiences such as the completion of the Burgeo highway and the Island South Coast ferry services be reviewed, to determine similarities to the Labrador situation. The Project Group will obtain documents regarding the Island services and review these to see if suggestions for policy might be applicable to Labrador.

Consultations

The Project Group will meet with the North and South Coast transportation committees, representatives from Central and Western Labrador and the Straits area, and representatives from the Lewisporte area

Project Group

Memorial's Centre for Public Policy Research and its Labrador Institute have collaborated by identifying university capabilities that can be brought to bear on this transportation analysis. Professor Merv Andrews P.Eng. (retired) will coordinate the study. Professor Wade Locke (Economics) has agreed to complete most of the cost-benefit analysis.

Two co-op students will be hired to carry out data acquisition. Basic office support, including budget administration will be provided by the Public Policy Research Centre. The Interim Director will be involved in overseeing the project and will from time to time act as project coordinator. The Labrador Institute will participate in the study by:

a) performing vetting and validation roles for factual matters central to the analysis;
b) assisting with arrangements for consultations and interviews in the region;
c) assisting in the editing/writing activities for the final report; and
d) serving on the project management committee.

Timing of Study

The project will consist of two phases and will commence November 26th, 2003. Phase I will be completed with a final report to Government by February 15th, 2004 and Phase II will be completed by March 31st, 2004. Phase I will deal with the options to be considered for the period 2004 to 2007 (when the road from Happy Valley-Goose Bay to Cartwright is expected to be completed) and will recommend the preferred marine transportation and terminal configuration. Phase II will deal with the options relating to marine transportation requirements beyond 2007.

An interim report dealing with Phase I will be provided to DWST on or before February 15, 2004 in hard copy and in electronic format. The final report will be forwarded to DWST on or before March 31, 2004 in hard copy and in electronic format.

Appendix B: Population Projections

Population Projection by Economic Zone- Zone 1- Northern Labrador			
	Low Scenario	**Mid Scenario**	**High Scenario**
Year			
1991	3,100	3,100	3,100
1992	3,073	3,073	3,073
1993	3,071	3,071	3,071
1994	3,166	3,166	3,166
1995	3,173	3,173	3,173
1996	3,233	3,233	3,233
1997	3,288	3,288	3,288
1998	3,262	3,262	3,262
1999	3,306	3,306	3,306
2000	3,291	3,291	3,291
2001	3,275	3,275	3,275
2002	3,294	3,294	3,294
2003	3,309	3,309	3,309
2004	3,338	3,343	3,347
2005	3,342	3,356	3,371
2006	3,355	3,375	3,402
2007	3,376	3,399	3,441
2008	3,403	3,437	3,490
2009	3,414	3,460	3,524
2010	3,437	3,493	3,571
2011	3,481	3,547	3,641
2012	3,470	3,544	3,651
2013	3,492	3,595	3,716
2014	3,529	3,655	3,781
2015	3,521	3,669	3,802
2016	3,498	3,664	3,810
2017	3,480	3,668	3,820
2018	3,471	3,686	3,847

Source: Government of Newfoundland and Labrador, January 2004.

Population Projection by Economic Zone- Zone 4- Southern Labrador			
	Low Scenario	**Mid Scenario**	**High Scenario**
Year			
1991	3,030	3,030	3,030
1992	3,058	3,058	3,058
1993	3,099	3,099	3,099
1994	3,033	3,033	3,033
1995	3,018	3,018	3,018
1996	2,893	2,893	2,893
1997	2,859	2,859	2,859
1998	2,752	2,752	2,752
1999	2,778	2,778	2,778
2000	2,739	2,739	2,739
2001	2,761	2,761	2,761
2002	2,725	2,725	2,725
2003	2,707	2,707	2,707
2004	2,675	2,679	2,685
2005	2,663	2,669	2,677
2006	2,635	2,649	2,672
2007	2,587	2,607	2,636
2008	2,565	2,588	2,624
2009	2,596	2,627	2,670
2010	2,551	2,585	2,633
2011	2,540	2,583	2,642
2012	2,518	2,568	2,634
2013	2,480	2,539	2,609
2014	2,454	2,530	2,600
2015	2,423	2,508	2,578
2016	2,385	2,483	2,556
2017	2,333	2,438	2,515
2018	2,317	2,436	2,514

Source: Government of Newfoundland and Labrador, January 2004.

Appendix C: Capital and Operating Cost Estimate for Passenger Cargo Vessel for the Goose Bay to Nain Service, by Dag A. Friis

Capital and Operating Cost Estimate
For
Passenger Cargo Vessel
For
Goose Bay to Nain Service

By
Dag A. Friis P.Eng. MBA
Professor
Ocean and Naval Architectural Engineering

Executive Summary:

The total equivalent cost of operating a new vessel as specified below on this service is roughly $8.5 million per year assuming capital recovery over 15 years with a required rate of return of 15 %. The initial cost of the vessel is estimated to be of the order of $25 million.

Introduction:

This study is intended to give an indication of the cost to build and operate a passenger cargo vessel for the service between Goose Bay and Nain.

A rough concept design for a vessel with containerized, plus palletized and break bulk cargoes was developed to form a basis for the required cost estimates.

The basic capital cost estimate which had been based on a benchmarking exercise for the construction of a fishing vessel built in a Quebec yard came out slightly higher than the estimate resulting from the benchmarking against the cost of a RO-RO/LO-LO Ferry that is under construction for European owners. This indicates that the capital cost estimate is realistic for the current state of the shipbuilding market.

The Operating Cost estimates contain a higher degree of uncertainty since it was difficult, in the time available, to find information that the estimates could be checked against.

Vessel Specification:

- Vessel to be suitable to service and perform loading and unloading operations at Labrador ports from Goose Bay to Nain
- Maximum overall length 90 m.
- Fitted with stern door and ramp facilitating RO-RO and fork lift cargo handling.
- Fully enclosed cargo decks
- Vessel to be twin screw with at least one engine per shaft
- The vessel to have suitable ice class for seasonal operation on the coast of Labrador from June to the end of November.
- The required minimum cargo capacity is to be:
    - 60 twenty foot ISO containers (Technical Equivalent Units, or TEUs for short)
    - A minimum of 800 tonnes of additional cargo capacity in the form of palletized or break bulk cargo.
- Minimum passenger capacity of 100 with appropriate passenger lounge
- A minimum of 60 day/nighter seats
- Passenger cabins for accommodating a minimum of 24 passengers
- Cafeteria with steward services
- Vessel to be wheelchair accessible

Concept design:

A rough concept design was developed on the basis of the above requirements. Space has been allocated to fulfil all the requirements to a level of detail sufficient to develop a reasonable capital cost estimate. A fully developed preliminary design would likely result in some minor changes in vessel proportions and modifications to the vessel layout. However, such modifications are unlikely to change the expected cost of the vessel significantly.

The following are the estimated principal characteristics of the vessel:

Length overall in metres (LOA)	90.000
Length Between Perpendiculars in metres (LBP)	80.833
Breadth Moulded in metres (B)	15.600
Depth to lower cargo deck (m)	7.280
Depth to upper cargo deck (m)	10.640
Draft in metres (T)	5.600
Cb	0.670
Block coefficient (Cm)	0.980
Prismatic Coefficient (Cp)	0.664
Waterplane area coefficient (Cwp)	0.780
Displacement (tonnes)	4864
V (knots)	13.0
Installed Power (BHP)	6050

The following is a profile view of the vessel:

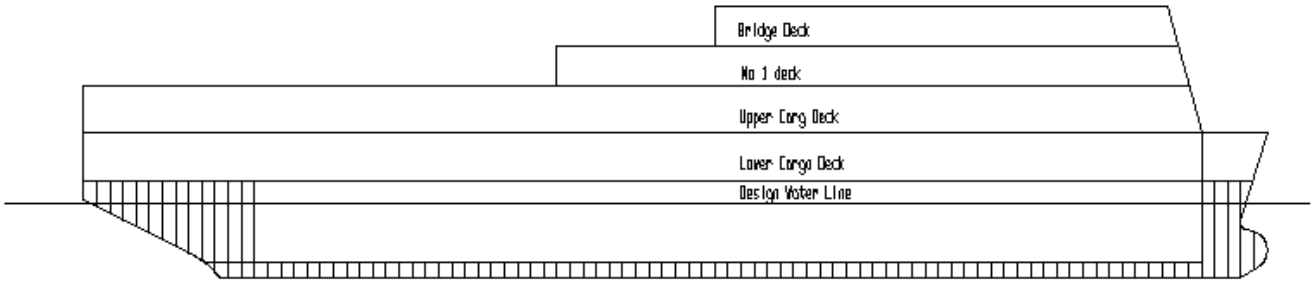

Figure 1: Vessel Profile View

This illustrates the extent of the superstructure and deckhouse structure. At the stern the vessel is to be fitted with a stern ramp for loading and unloading RO-RO Cargo, plus twin propellers, one left turning and one right turning. In addition the vessel is to be fitted with twin spade rudders located immediately aft of the propellers, or possibly with a larger rudder located at the vessel centre line depending on which gives the best arrangement for the mission of the vessel. The former will likely give better vessel control since it will allow the wash from the propellers to be redirected.

As mentioned in the specification the vessel should be fitted with a bow thruster. This is a detail that has not been included in the above diagrammatic profile.

It should be noted that there are various other propulsion and vessel steering and control arrangements that may be considered for a vessel being specifically designed and built for this service.

The following figures give diagrammatic layouts of the various spaces shown above except for the space below the lower cargo deck. The latter will house the machinery space and other spaces such as fuel tanks, ballast tanks etc:

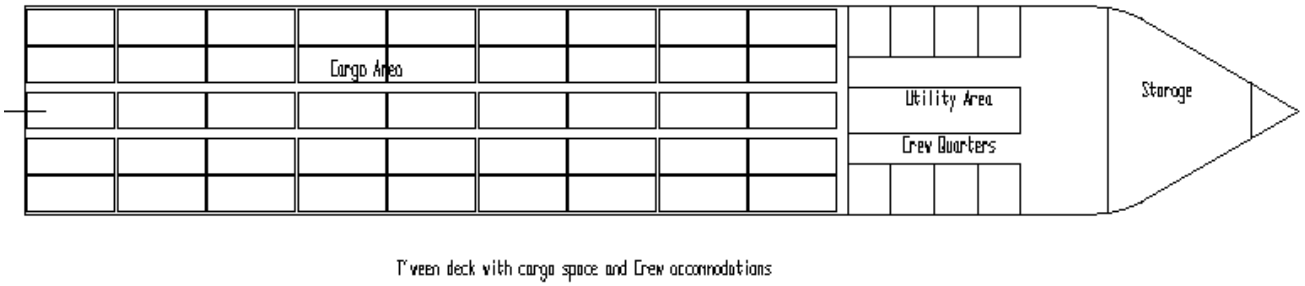

Figure 2: Lower cargo deck showing stowage space available for 45 TEUs as well as space for crew quarters.

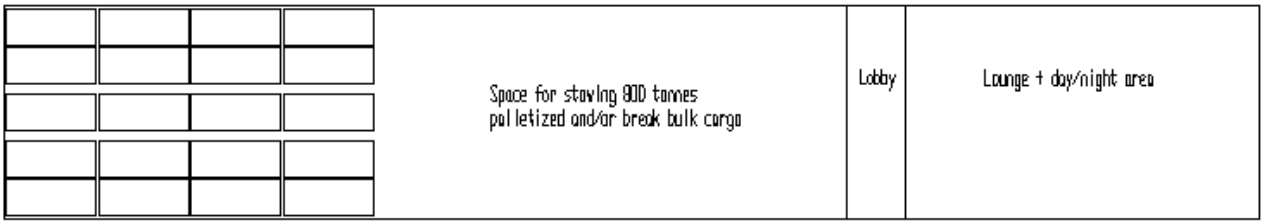

Figure 3: Upper cargo deck showing stowage space for 20 TEUs plus space for an additional 800 tonnes of palletized and/or break bulk cargo

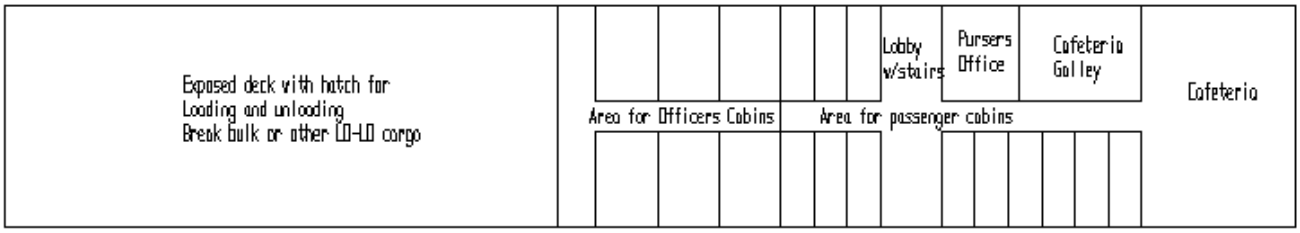

Figure 4: Number 1 deck showing area for passenger and officers' cabins plus cafeteria

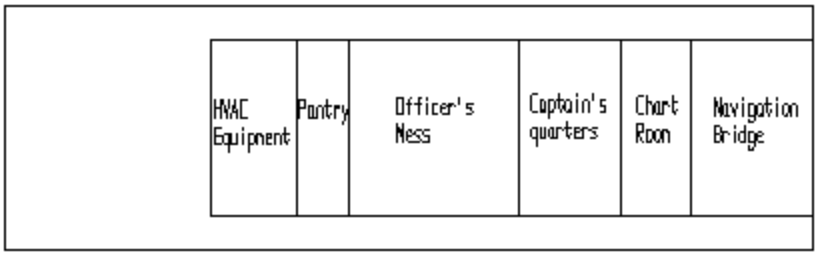

Figure 5: Bridge Deck showing a possible arrangement.

It should be noted that the above arrangement shows space for 5 more TEUs than the minimum specified. This indicates that there is enough flexibility in the arrangement to effect the necessary changes to ensure adequate space and flow of traffic for passengers and crew as well as adequate cargo stowage space.

Vessel Capital Cost Estimate:

The capital cost estimate was made using cost functions published by Carrayette in the Naval Architect (Royal Institution of Naval Architects) July 1978. These cost functions had already been benchmarked against the cost of construction of a 65 foot fishing vessel built in Quebec. Using this basis the price for the vessel was estimated to be about ***$26.6 million***.

Due to the significant difference in both size and function of the benchmarking vessel and the design another check on the accuracy of the estimate was needed. A RO-RO/LO-LO passenger/cargo ferry, currently under construction, for which a contract price is known, was located. The characteristics of this vessel are:

LOA (m)	216.000
LBP (m)	194.000
B (m)	30.500
D to Lower cargo deck (m)	9.100
D to upper cargo deck (m)	16.000
T (m)	7.000
Cb	0.550
Cm	0.930
Cp	0.590
Cwp	0.690
Displacement (tonnes)	23418
V (knots)	25.0
Power (BHP)	65306

The published price for this vessel is $167 million (converted to Canadian funds at current exchange rates obtained from Bank of Canada website).

The cost of this vessel estimated using the same cost functions as used above gave a cost of roughly $178.5 million. In other words, if the capital cost for our vessel is adjusted to the same cost level as this benchmark, the expected cost is reduced to about ***$25 million***.

Operating Cost Estimate:

Fuel:

Fuel cost will depend on the type of fuel required for the vessel. If the vessel is fitted with high speed diesel engines one will require running these using marine diesel fuel. This is obviously the most expensive option from a fuel cost point of view. Using medium speed engines one may be able to operate using Bunker C during full speed steaming only requiring to switch over to diesel fuel during low speed manoeuvring. The latter will mean that one will be burning diesel fuel when approaching and leaving each port. The generator sets will also be burning diesel fuel for generation of electrical power during the stay in port as well as during the voyage unless the electrical power is generated using power take off generators connected to the gearboxes during the voyage. These are design decision that can only be made when optimizing the vessel and engine plant design at the preliminary and detailed design stages.

During the full speed steaming one will on average expect to be operating at 90% of the installed (Maximum Continuous Rating, or MCR for short). I have assumed 168 hours of full speed steaming per round trip and 26 round trips per year for the new vessel. I have also assumed the specific fuel consumption rate to be 150 grams per BHP-hour. This is a bit on the conservative side. Some engines these days may only consume at a rate of 135 grams per BHP-hour when they are new. These are generally slow speed engines, however, which will not be suitable for this application due to their weight and large space requirement. It should be noted that the installed power estimate is likely to be relatively conservative, tending to result in higher estimated fuel cost than may be the case.

The annual fuel consumption, therefore, is estimated to be roughly 3570 tonnes.

I have assumed the following fuel prices as quoted for the port of Montreal on March 17, 2004 as shown in the appendix. I have also assumed an exchange rate for Canadian dollars of US$0.70.

This gives the following approximate fuel prices:

Bunker C:	$280/tonne
Intermediate marine fuel:	$306/tonne
Marine diesel fuel:	$529/tonne

This results in the following annual fuel costs:

Bunker C: $1,000,000

Intermediate marine fuel: $1,092,000

Marine diesel fuel: $1,888,000

There are several uncertainty elements in this cost. The most significant is likely the volatility of the international market in crude oil.

My assessment of the second important uncertainty, choice of engines, is that it should be possible to find suitable medium speed engines for this vessel. This should result in an annual fuel bill of the order of:

$1.1 to $1.2 million.

The Remaining Operating Costs:

The remaining costs are assumed to be covered by the operator of the vessel except for any major refit operations. Since this is a new vessel, one will not expect anything major in the first 10 to 15 years of operation unless there changes required for the vessel due to changing needs for the service.

I am assuming that the remaining costs will be due to the following expenses:

- Crew costs
- Maintenance costs
- Insurance costs
- Stevedoring and other terminal costs
- Administration and management costs etc.

The annual cost will to a great extent depend on the length of time that the management contract covers. A 10 to 15 year management contract is likely to result in costs that are lower for those costs that the ship management company has some level of control over like administration and management costs, stevedoring and terminal costs and normal maintenance costs. This leaves crew costs and insurance costs with a certain level of uncertainty.

Crew costs will be subject to what may happen with the negotiation of collective agreements over the period in question. These agreements, plus the competition for qualified mariners due to the increase in offshore oil and gas related activities, are going to put an upward pressure on crew costs. This will mean that unless the contract contains some cost escalation clause bidders will tend to add in a significant margin to cover this risk.

Based on Statistics Canada information the average annual pay for mariners are likely to be of the order of ***$60,000 to $65,000***. This figure already contains a fairly large number of individuals with only seasonal employment similar to what we will have for this service. Almost all shipping on the Great Lakes only operates from the end of March or beginning of April until the end of November. All or part of the crew is likely to be engaged in getting the vessel ready for the beginning of the season as well as preparing it for lay-up at the end the season. A watch-keeper service is also required during lay-up. Let us therefore assume an annual average pay for this crew is roughly ***$58,000***. The size of the crew will depend on the number of catering and housekeeping personnel deemed necessary. *If one assumes a total complement of 30*. This results in an annual crew cost of ***$2,001,000*** *assuming 15% benefits.* Obviously if one can manage to reduce the size of the crew down to ,say 20, the cost will be significantly decreased, i.e. roughly ***$1,350,000.*** For a modern highly automated vessel it is possible to reduce the number of ratings significantly and relying on shore based personnel in those cases where non-routine maintenance and other work is needed. It may be possible to reduce the required complement for this kind of vessel down to 12 to 15. This would mean an annual crew cost of ***$800,000 to $1,000,000.***

Marine Insurance costs like car insurance, have increased significantly in the last few years. It has not been possible with the limited time available for this study to get a good estimate of the anticipated insurance costs. The various categories of marine insurance that may be carried are:

- Comprehensive insurance
- Protection & Indemnity (P&I) insurance
- Freight insurance
- Hull and Machinery insurance
- Some more minor categories of insurance to cover: loss of or damage to victuals and minor equipment; claims due to loss of cargo etc that a creditor may lose a claim against a piece of equipment that he/she has a lien against.
- War risk insurance

General responsibility claims against the operator are covered by the combination of the comprehensive and P&I insurance. The premium for P & I insurance is generally stated as a certain amount per Gross Register Ton (GRT). The tonnage for this vessel is estimated to be of the order of 9,000 GRT. The comprehensive insurance premium is generally based on the assessed value of the vessel. In other words the premium may go down over time due to the depreciation of the asset.

Hull and machinery insurance is a function of the risk of accidental damage to hull and machinery and the expected cost of repair. This means that the premium will tend to be a function of the assessed value of the vessel also.

The freight insurance rates are a function of the value of the goods carried.

A very rough estimate of the possible level of total insurance costs based on current rates for fishing vessels is about 4.5% of the initial cost of the vessel, which amounts to ***$1,285,000*** roughly.

Repair and maintenance costs are likely to amount to on average, about $200,000 to $300,000 annually. Part of this is attributed to class dockings which are likely to be considered refit costs.

Stevedoring costs and terminal costs I assume are a function of the time the vessel spends in port. If we assume that we have on average 5 stevedores being paid $10 per hour and we have roughly 50 hours of stevedoring per week for 26 weeks the total cost is roughly *$65,000* per year. If we add in about *$35,000* per year for other terminal costs we get a total stevedoring and terminal cost of ***$100,000 per year***.

I would guess that the administration costs attributable to this service would be of the order of ***$150,000 per year***.

Summary:

The expected costs are all stated in terms of 2004 dollars.

It is customary for shipowners to expect a discounted capital recovery over the time of the initial economic life of the vessel, i.e. till the time of the major refit of the vessel. This will normally occur after 10 to 15 years of service depending on the length of the long term time charter for the vessel. They generally expect a relatively high rate of return on their investment, e.g. 10% to 15% above prime lending rate. The residual value of the vessel may be estimated using the declining balance method assuming a declining balance rate of 10%. This gives a residual value of $8,716,961 at the end of a ten year period and $5,147,278 at the end of 15 years.

Required Annual Capital Recovery		
Discount rate	Equiv. annual cost 10 year life	Equiv. annual cost 15 year life
0%	$1,628,304	$1,323,515
5%	$2,544,501	$2,169,077
10%	$3,520,765	$3,125,458
15%	$4,553,042	$4,166,825
20%	$5,626,742	$5,276,045
25%	$6,740,270	$6,430,555

This is plotted in figure 6 below.

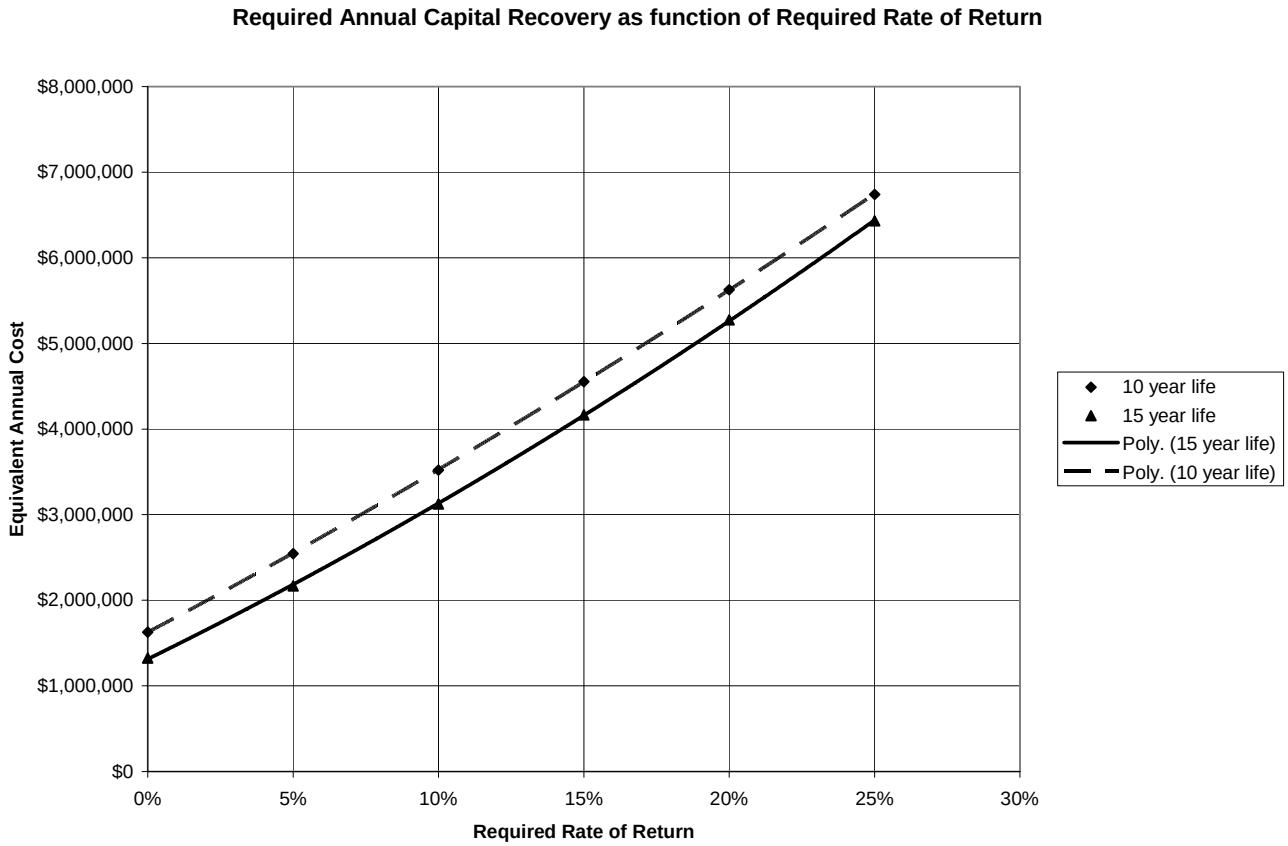

Figure 6: Annual Capital Recovery as function of Required Rate of Return

If we assume a required rate of return of 15% is reasonable in the current financial climate this gives us an annual capital recovery cost of roughly $4.2 million if we assume a 15 year capital recovery period.

The equivalent annual cost for this service then may be expected to be as follows:

Item:	Equivalent annual cost
Capital Recovery	$4,200,000
Fuel cost	$1,100,000
Maintenance and repair	$300,000
Crew cost	$1,350,000
Insurance	$1,285,000
Stevedoring and terminal costs	$100,000
Administration	$150,000
Total Equivalent Annual cost for service	$8,485,000

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