

# PLANNING AND FEASIBILITY STUDY

## Digby Island / Tsimshian Peninsula Access Project

September 2003



**PLANNING AND FEASIBILITY STUDY  
DIGBY ISLAND/TSIMSHIAN PENINSULA ACCESS PROJECT**

undertaken on behalf of:

Lax Kw'alaams First Nation  
Metlakatla First Nation  
City of Prince Rupert  
BC Ministry of Transportation  
Western Economic Diversification Canada

by:



TRILLIUM *Business Strategies Inc.*

with major components of the study completed as follows:

Technical Feasibility and Cost  
Conceptual Bridge Designs  
Potential Program Savings  
Potential Proceeds from Land  
Potential Economic Benefits

*Stevens Engineering Ltd.*  
*Delcan Corporation*  
*Ministry of Transportation*  
*Royal LePage Advisors*  
*CCG Consulting Group Ltd.*

September 2003



## **TABLE OF CONTENTS**

	<b>PAGE</b>
EXECUTIVE SUMMARY	1
INTRODUCTION	3
PRELIMINARY DESIGN AND CAPITAL COST ESTIMATE	10
EVALUATION OF PROJECT BENEFITS	17
NEXT STEPS	26

## **LIST OF FIGURES AND TABLES**

	<b>PAGE</b>
Figure 1    Aerial Photograph of Prince Rupert Region	4
Figure 2    Overall Project Scope	11
Table 1     Capital Cost Estimate	15
Table 2     Cost of Widening Crossings and Paving Roads	16
Table 3     Summary of Potential Program Savings	18
Table 4     Summary of Potential Savings for Shuttle Users	20
Table 5     Summary of Potential Proceeds from Land	20
Table 6     Summary of Potential Social Benefits	21
Table 7     Summary of Potential Economic Benefits	23
Table 8     Summary of Potential Income Taxes	24
Table 9     Summary of Potential Benefits	25

## EXECUTIVE SUMMARY

The Prince Rupert Region is situated on the North Coast of British Columbia. It is the traditional territory of the Lax Kw'alaams and Metlakatla peoples.

About 1,200 people, mostly First Nations, reside on the Tsimshian Peninsula. The Lax Kw'alaams First Nation is located at Port Simpson, 20 km north of Prince Rupert. The Metlakatla First Nation is also located on the Peninsula, near Venn Passage.

About 15,000 people live in the city of Prince Rupert on Kaien Island, a rugged coastal island adjoining the mainland. The Prince Rupert Airport on Digby Island services the region.

There are no road connections between Lax Kw'alaams, Metlakatla, the airport and Prince Rupert.

Improved transportation service has been an important local priority. Ideally, a network of roads and connecting bridges would connect the Lax Kw'alaams and Metlakatla communities, the Airport on Digby Island, and Prince Rupert. These improvements, which have become known as the Digby Island / Tsimshian Peninsula Access Project (Access Project), would facilitate the movement of people and goods within the region as well as into and out of the region.

In June 2001, the Lax Kw'alaams First Nation, Metlakatla First Nation, City of Prince Rupert, Ministry of Transportation and Western Economic Diversification Canada agreed to complete the planning and feasibility phase of the proposed Access Project.

The proposed transportation improvements include the following components:

1. a road connecting the existing Prince Rupert road network near the Fairview Terminal to a bridge at the harbour entrance
2. a suspension bridge spanning the harbour from Kaien Island to Philips Point on Digby Island
3. a road connecting the suspension bridge to the existing Digby Airport Road
4. a road connecting the Digby Airport Road to a bridge across Venn Passage
5. a tied-arch bridge spanning Venn Passage from Dundas Point on Digby Island to Verney Island on the Tsimshian Peninsula
6. a road connecting the Venn Passage bridge to the south end of the Tuck Inlet Road leading to the community of Lax Kw'alaams, and a spur road to the community of Metlakatla.

The study concluded that the development of a network of roads and connecting bridges to connect the Lax Kw'alaams and Metlakatla communities, the Airport on Digby Island, and Prince Rupert is technically feasible, and the infrastructure could be constructed for about \$138 million (2003\$).

The second objective of the planning and feasibility phase of the Digby Island/Tsimshian Peninsula Access Project was to confirm the project economics. The work involved an assessment of project benefits using analytical techniques utilized by the provincial and federal governments in the evaluation of infrastructure initiatives.

The potential project benefits are summarized as follows:

	PV
Program Savings	\$30.7 M
Savings for Airport Shuttle Users	\$7.6 M
Proceeds from Land	\$51.9 M
Social Benefits	\$17.7 M
Sub-Total	\$107.9 M
Economic Benefits ( <i>all sectors except offshore oil and gas</i> )	\$499.0 M
Sub-Total	\$606.9 M
Economic Benefits ( <i>offshore oil and gas</i> )	\$2,000.0 M
Total	\$2,606.9 M

(40 year term, 6% discount rate)

Potential income taxes generated from economic activity attributable to the Access Project are summarized as follows:

	PV Federal Tax	PV Provincial Tax	PV Total
All sectors except offshore oil and gas	\$21.39 M	\$27.76 M	\$49.15 M
Offshore oil and gas	\$50.00 M	\$62.00 M	\$112.00 M
Total	\$71.39 M	\$89.76 M	\$161.15 M

(Federal goods and services tax, provincial social services tax, and resource royalties not quantified. Provincial & municipal property taxes included in Potential Proceeds from Land.)

While the potential program savings, savings to airport users, proceeds from land, and social benefits may materialize, there is considerable uncertainty about whether the potential economic benefits identified in this study could be realized. Offshore oil and gas benefits in particular are considered extremely uncertain.

Given the high level of uncertainty surrounding the potential economic benefits, the Project Steering Committee decided that no further work on the overall scheme should be undertaken at this time. Instead, the funding partners agreed to pursue improvements to the transportation network involving consolidation of ferry services and construction of some components of the Access Project on Digby Island and the Tsimshian Peninsula.



## INTRODUCTION

The Prince Rupert Region is situated on the North Coast of British Columbia. It is the traditional territory of the Lax Kw'alaams and Metlakatla peoples.

The region encompasses a number of individual coastal communities. The locations of these communities reflect the dependence people have placed on fishing over the centuries, and the role transportation has placed in shaping our society over the past 100 years.

About 1,200 people, mostly First Nations, reside on the Tsimshian Peninsula. The Lax Kw'alaams First Nation is located at Port Simpson, 20 km north of Prince Rupert. The Metlakatla First Nation is also located on the Peninsula, near Venn Passage. Many members of both First Nations have decided to live outside their communities, largely because of remoteness and lack of opportunity.

Prince Rupert is located on Kaien Island, a rugged coastal island adjoining the mainland. It is home to about 15,000 people. Approximately 25% are of First Nations descent.

Dodge Cove is a small community located on Digby Island. The Prince Rupert Airport is also situated on Digby Island. An air photo of the area is shown in Figure 1.

The region is economically dependent on the resource and service sectors.

The movement of people and goods within the region as well as into and out of the region is restricted. Access to Lax Kw'alaams is by float plane or by vehicle ferry and resource road. Access to Metlakatla is by water taxi or private boat. Access to the airport is by vehicle ferry.


Improved transportation service has been an important local priority for several decades. Ideally, a network of roads and connecting bridges would connect the Lax Kw'alaams and Metlakatla communities, the Airport on Digby Island, and Prince Rupert. These improvements would facilitate travel within the region and make air travel more convenient.

In 1995, the provincial Ministry of Transportation and Highways commissioned studies to identify potential alignments and order-of-magnitude costs for such improvements.

These studies, concluded in 1996, determined that a high level bridge could be constructed at Emerson Point to link Kaien Island and Digby Island, and a low level bridge could be constructed at Verney Island to link Digby Island and the Tsimshian Peninsula. These links together with associated road works, would permit all weather travel between Prince Rupert, the Airport on Digby Island, Metlakatla, and Lax Kw'alaams. The estimated cost of the proposed improvements was \$108 M (1996\$).

The proposed project became known as the Digby Island/Tsimshian Peninsula Access Project (Access Project).



An aerial photograph showing a coastal region. The Tsimshian Peninsula is on the left, with a narrow strip of land labeled 'Prince Rupert' extending into the water. To the right of this strip is 'Kaien Island', and further down is 'Digby Island'. The water is a deep blue, and the land is a mix of green and brown. Labels are placed in white boxes with black text.

Tsimshian Peninsula

Kaien Island

Prince Rupert

Digby Island

Prince Rupert  
← Airport



Later that year, Honourable David Anderson, then federal Minister of Transport, established the Northwest Transportation Corridor Task Force to examine the transportation needs of the broader region.

The Task Force completed its work and issued its report in 1997. It concluded that if economic prospects for the region are to be realized, significant change is required. The Task Force recommended that the federal and provincial governments resolve access issues for the Lax Kw'alaams and Metlakatla First Nations. It also recommended the federal, provincial and municipal governments support improved access between Prince Rupert and Digby Island.

In June 2001, the Lax Kw'alaams First Nation, Metlakatla First Nation, City of Prince Rupert, Ministry of Transportation and Western Economic Diversification Canada agreed to complete the planning and feasibility phase of the proposed Digby Island / Tsimshian Peninsula Access Project.

The planning and feasibility phase was to involve the following activities.

- 1) *Confirm technical feasibility and update estimate of capital costs*
  - a) *Complete preliminary survey work, including limited aerial photography, mapping, hydrographic survey*
  - b) *Undertake high level archaeological and environmental examinations*
  - c) *Undertake geotechnical overview and terrain analyses, including limited muskeg probing, drilling at piers and abutments*
  - d) *Develop a preliminary road design*
  - e) *Develop conceptual bridge designs*
  - f) *Prepare a Class "D" cost estimate*
- 2) *Confirm project economics and develop preliminary business plan*
  - a) *Update evaluation of project benefits*
  - b) *Identify opportunities to offset capital costs through:*
    - i) *Implementation of user fees*
      - *Airport users*
      - *Alaska State ferry users*
    - ii) *Dedication of future program expenditure savings*
      - *Canada*
      - *British Columbia*
      - *City of Prince Rupert*
      - *Lax Kw'alaams*
      - *Metlakatla*
      - *Air Carriers*
    - iii) *Land value capture*
      - *Digby Island*
      - *Tsimshian Peninsula*
    - iv) *Direct contributions by the Parties*



- c) *Evaluate opportunities to conclude components of the project through public-private partnerships by means of*
  - i) *Assignment of user fees*
  - ii) *Dedication of program expenditure savings*
  - iii) *Land value capture*
- 3) *Undertake cost-sharing discussions and develop pro-forma financial plan detailing proposed capital expenditures and funding by source*
- 4) *Confirm the commitment of the parties to funding and/or financing of the Access Project as required*

The parties established a Project Steering Committee, comprised of one representative of each entity, to oversee the work. The City of Prince Rupert agreed to serve as the lead agency and assume day-to-day responsibility for the project. A multi-disciplinary project team was assembled to undertake the work.

In September 2003, the Project Steering Committee reviewed the findings of the Project Team. The Committee agreed that work on the technical feasibility, capital cost estimate, and evaluation of project benefits was complete. The Committee decided that no further work on the overall scheme should be undertaken at this time. Instead, the funding partners agreed to pursue improvements to the transportation network involving consolidation of ferry services and construction of some components of the Access Project on Digby Island and the Tsimshian Peninsula.

This report summarizes the work that was done to:

1. confirm the technical feasibility and update the estimated capital cost of the Access Project, and
2. assess the project economics.

Other reports completed as part of this study are:

1. Preliminary Design Summary Report  
Digby Island / Tsimshian Peninsula Access Project  
*Stevens Engineering Ltd.*  
*September 2003*
2. Route Location Study  
Prince Rupert to Tuck Inlet  
*Northern Region*  
*Ministry of Transportation*  
*March 2002*



3. Conceptual Geotechnical Report  
Prince Rupert to Tuck Inlet  
*Northern Region*  
*Ministry of Transportation*  
*March 2002*
4. An Archaeological Overview Assessment  
Digby Island / Tsimshian Peninsula Access Project  
*David Archer and David Friesen*  
*May 2002*
5. Environmental Assessment Overview  
Digby Island / Tsimshian Peninsula Access Project  
*Northern Region*  
*Ministry of Transportation*  
*March 2002*
6. Preliminary Design  
Digby Island / Tsimshian Peninsula Access Project  
*Associated Engineering Ltd.*  
*August 2002*
7. Engineering Feasibility Study  
Proposed Crossing  
Venn Passage  
*Delcan Corporation*  
*October 2002*
8. Engineering Feasibility Study  
Proposed Crossing  
Kaien Island to Digby Island  
*Delcan Corporation*  
*February 2003*
9. Cost Estimate Summary  
Digby Island / Tsimshian Peninsula Access Project  
*E. Wolski Consulting*  
*June 2003*
10. Revenue Potential from Lands  
Digby Island / Tsimshian Peninsula Access Project  
*Royal LePage Advisors*  
*October 2002*



11. Benefit Analysis Spreadsheet  
Digby Island / Tsimshian Peninsula Access Project  
*Partnerships Department  
Ministry of Transportation  
July 2003*
12. Potential Economic Impacts  
Digby Island / Tsimshian Peninsula Access Project  
*CCG Consulting Group Ltd.  
September 2003*

A report completed in conjunction with this study is:

13. Cost Benefit Analysis  
Relocation of AMHS Terminal  
Prince Rupert to Port Simpson  
*Transportation Engineering NorthWest LLC  
February 2001*

Relevant reports completed previously include:

14. Infrastructure Investment to Promote BC North Coast Economic Growth  
*Lax Kw'alaams First Nation, Metlakatla First Nation, City of Prince Rupert  
April 2000*
15. Lax Kw'alaams Physical Development Plan  
*Kerr Wood Leidal Associates Ltd.  
November 1999*
16. Lax Kw'alaams – The New Century (Volumes 1, 2, 3)  
*Stephen C. Conway  
August 1999*
17. Southeast Alaska Transportation Plan  
*Alaska Department of Transportation and Public Facilities  
State of Alaska  
March 1999*
18. Metlakatla First Nation Physical Development Plan  
*Bullock Baur Associates Ltd.  
1997*



19. Final Report of the Northwest Transportation Corridor Task Force  
*Northwest Transportation Corridor Task Force*  
*February 1997*
20. Benefit Analysis  
Prince Rupert, Digby Island and Tsimshian Peninsula  
Proposed Road & Bridge Link  
*InterFacts Consulting Ltd.*  
*1996*
21. Route Feasibility Study  
Kaien Island to Digby Island  
*Buckland and Taylor in association with McElhanney Associates*  
*December 1995*
22. An Initial Evaluation  
Digby Island to Lax Kw'alaams  
*Northern Region*  
*Ministry of Transportation*  
*December 1995*
23. Western LNG Project  
Volume 5, Socio-Economic Impact  
*Dome Petroleum Ltd.*  
*1983*
24. Route Location Study  
Prince Rupert – Port Simpson  
*Ministry of Highways*  
*January 1976*

## PRELIMINARY DESIGN AND CAPITAL COST ESTIMATE

The first objective of the planning and feasibility phase of the Digby Island / Tsimshian Peninsula Access Project was to confirm the technical feasibility and estimated capital cost of the proposed transportation network.

The work included:

- completion of a route location study
- completion of high level archaeological and environmental examinations
- completion of a geotechnical overview and terrain analysis, including limited muskeg probing
- development of a preliminary road design
- development of preliminary bridge designs for the link connecting Kaien Island and Digby Island and the link connecting Digby Island and the Tsimshian Peninsula
- preparation of a preliminary cost estimate suitable for business plan development

This work was coordinated by Stevens Engineering Ltd. The findings are detailed in its Preliminary Design Summary Report dated September 2003.

The proposed transportation improvements include the following components:

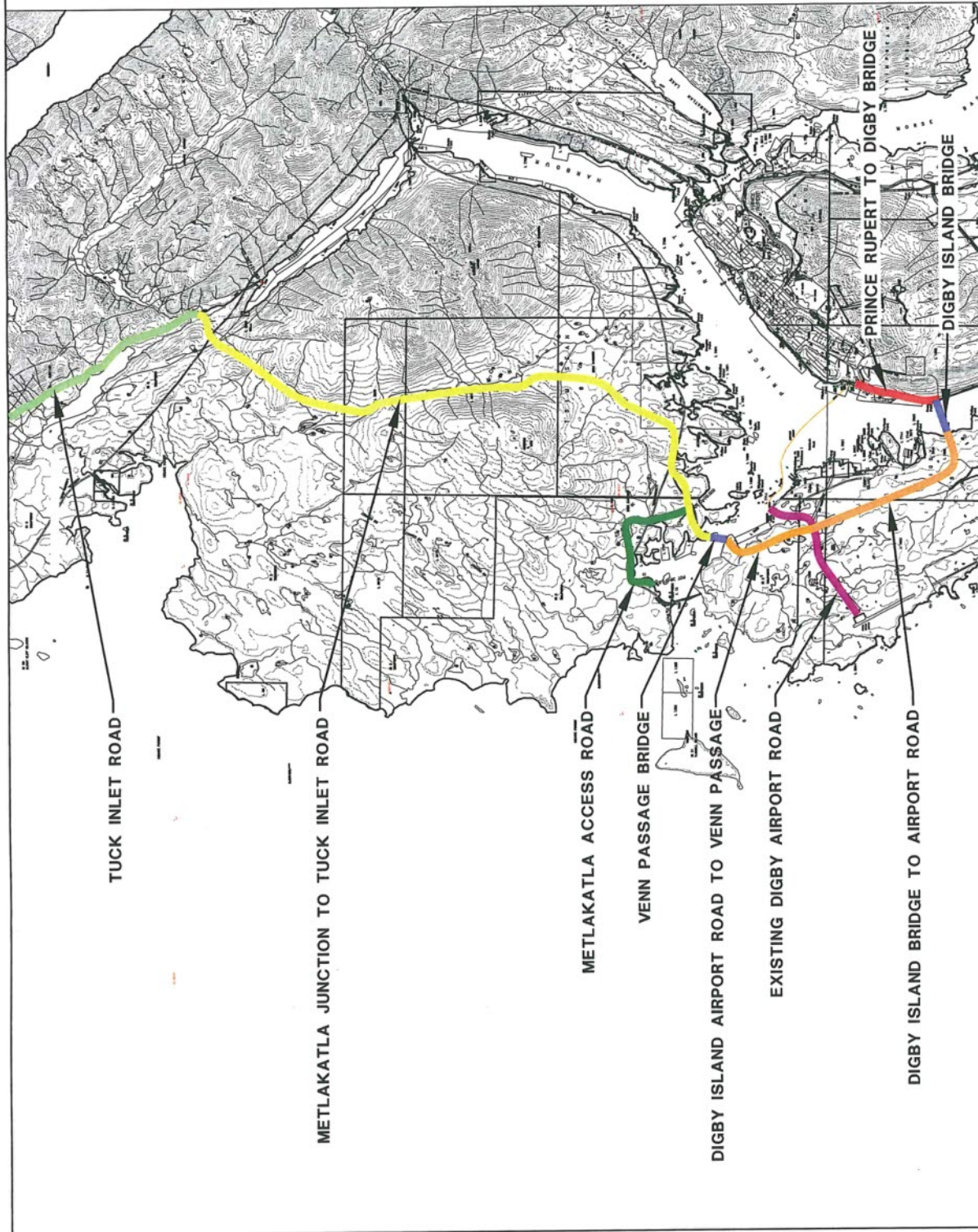
1. a road connecting the existing Prince Rupert road network near the Fairview Terminal to a bridge at the harbour entrance
2. a suspension bridge spanning the harbour from Kaien Island to Philips Point on Digby Island
3. a road connecting the suspension bridge to the existing Digby Airport Road
4. a road connecting the Digby Airport Road to a bridge across Venn Passage
5. a tied-arch bridge spanning Venn Passage from Dundas Point on Digby Island to Verney Island on the Tsimshian Peninsula
6. a road connecting the Venn Passage bridge to the south end of the Tuck Inlet Road leading to the community of Lax Kw'alaams, and a spur road to the community of Metlakatla.

The preferred route is shown in Figure 2. This route was selected because:

- it is the shortest route through terrain with favourable conditions for construction and ongoing maintenance
- a reasonable design standard can be achieved
- it minimizes construction in peat bog
- archaeological and environmental impacts are avoided, and
- construction costs are minimized.

Each component is summarized in the following sub-sections.





DIGBY ISLAND/TSIMSHIAN PENINSULA  
ACCESS PROJECT

# OVERALL PROJECT SCOPE

FIGURE No.

2

**1. KAIEN ISLAND ROAD**

Location	Fairview Terminal to Digby Island Bridge
Design speed	80 km/h
Cross section	two 3.6 metre lanes / 1.0 metre shoulders
Surface	Paved
Total length	2.8 km

Subgrade construction would be accomplished with conventional cut and fill methods or full bench cuts on steeper side hill slopes. Special construction methods may be required in isolated areas where slopes are unstable and where the road crosses existing debris flow tracks.

**2. DIGBY ISLAND BRIDGE**

Location	Kaien Island to Philips Point on Digby Island
Configuration	Suspension bridge
Design speed	80 km/h
Cross section	two 3.6 metre lanes / 1.0 metre shoulders
Main span length	725 metres
Navigation channel width	200 metres
Vertical clearance	61 metres above High Water Level

A suspension bridge at Philips Point is preferred because it:

1. eliminates direct impact on archaeological sites
2. avoids most environmental impacts
3. provides improved geometry
4. minimizes construction risk
5. is less expensive than either a suspension bridge or a cable-stayed bridge at Emmerson Point

A suspension bridge of this size is well within the limits of technical feasibility. Towers would be constructed on dry land with no seabed impact. Deck segments would be prefabricated aerodynamically streamlined steel box sections. Approach spans would be conventional ground-mounted structures, comprised of precast girders and simple piers.

**3. DIGBY ISLAND ROAD****DIGBY ISLAND BRIDGE TO AIRPORT ROAD**

Location	Digby Island Bridge to Airport Road
Design speed	80 km/h
Cross section	two 3.6 metre lanes / 1.0 metre shoulders
Surface	Paved
Total length	9.8 km



The proposed route traverses through a rock knob near the west end of the proposed Digby Island Bridge. Rock fill can be used for the Digby Island approach to the suspension bridge and for road construction across extensive peat bogs.

The route follows better-drained ground wherever possible. Generally, subgrade construction would be accomplished with conventional cut and fill methods. Where deeper layers of peat occur, corduroy construction or excavation of peat and placement of rock fill would be required.

#### 4. DIGBY ISLAND ROAD

##### AIRPORT ROAD TO VENN PASSAGE BRIDGE

Location	Airport Road to Venn Passage Bridge
Design speed	80 km/h
Cross section	two 4.0 metre lanes
Surface	Gravel
Stream crossings	Single lane
Total length	2.65 km

The proposed route would traverse similar ground to that south of Airport Road. However, there will be a higher probability of encountering deeper muskeg/peat layers, and construction through these areas will require special techniques including corduroy road construction.

An 8.0 metre cross section for gravel roads would facilitate future paving.

#### 5. VENN PASSAGE BRIDGE

Location	Dundas Point to Verney Island
Configuration	Tied-arch bridge
Design speed	80 km/h
Cross section	two 3.6 metre lanes / 1.0 metre shoulders
Main span length	230 metres
Navigation channel width	150 metres
Vertical clearance	20 metres above High Water Level

A tied-arch bridge between Dundas Point and Verney Island is preferred because it:

1. eliminates direct impact on the large winter village archaeological site
2. minimizes environmental impact through construction avoidance within the intertidal zone of sandy substrate
3. minimizes the risk of ship impact because piers and foundations would be located away from the navigation channel
4. represents the shortest crossing of Venn Passage
5. minimizes construction risk
6. is less expensive than other bridge types.

Tied-arch bridge designs have been used for many road bridges throughout British Columbia and are well within the capabilities of many engineering and construction firms.

The main arches and tension ties would be steel boxes. The under-deck system consisting of floor beams and stringers would also be steel.

Piers would be relatively massive concrete structures. The deck would consist of a field placed concrete wearing surface on pre-cast panels. Approach spans would be conventional structures comprised of steel or precast girders and simple abutments.

#### 6. TSIMSHIAN PENINSULA ROAD VENN PASSAGE BRIDGE TO TUCK INLET ROAD SPUR TO METLAKTLA

Location	Venn Passage Bridge to Metlakatla Junction Metlakatla Junction to Metlakatla Metlakatla Junction to Tuck Inlet Road
Design speed	80 km/h
Cross section	two 4.0 metre lanes
Surface	Gravel
Stream crossings	single lane
Total length	Bridge to Junction: 1.50 km Junction to Metlakatla: 4.37 km Junction to Tuck Inlet Rd.: 16.80 km

Routes on the west side of Mission Mountain and in the McNichol Creek valley were considered. The Mission Mountain route was not practical due to extensive interconnected side hill peat bogs and wetlands.

The McNichol Creek valley route is recommended. This route was initially surveyed in 1975.

Environmental impacts are largely avoided through a combination of alignment adjustments and bridges.

While conventional road design and construction techniques would be used, the route will present some challenges. Specifically, there are areas that will require sub-excavation and rock fill and corduroy construction, and areas of side hill peat bog that will require special construction techniques. Side hill excavations will require the installation of rock berms so that peat will not slide into the road excavation.



**CAPITAL COST ESTIMATE**

A preliminary cost estimate was prepared by E. Wolski Consulting using the Elemental Parametric Method. Mr. Wolski has extensive experience in the preparation of detailed cost estimates for major transportation infrastructure projects in British Columbia.

The Elemental Parametric Method of estimating ensures that a comprehensive and thorough accounting of all project costs is provided. Project scope elements are compiled and quantified, and reasonable estimations of all associated costs such as project management, construction supervision, and contingency are developed. This ensures that the full project cost is considered for budgeting purposes.

The estimate reflects the unique challenges of building roads and bridges in the Northwest region of British Columbia and takes into consideration actual costs on recent projects such as the Kincolith Extension Project.

The estimate drew from topographic information and earthwork quantities provided through preliminary designs developed by Associated Engineering Ltd. Estimates for major structures were derived from conceptual bridge designs at Phillips Point and Venn Passage developed by Delcan Corporation.

A 15% Most Probable Factor was applied to neat line excavated quantities and a 15% Contingency was included in the estimate.

The estimate is in 2003\$ and includes all anticipated cost items, but does not include interest during construction and Goods and Services Tax. The estimate is presented in Table 1.

**Table 1**  
**Capital Cost Estimate**  
**Digby Island / Tsimshian Peninsula Access Project**

COMPONENT		COST
1.	Fairview Terminal to Digby Island Bridge	\$4.2 M
2.	Digby Island Bridge	\$72.8 M
3.	Digby Island Bridge to Digby Airport Road	\$10.7 M
4.	Digby Airport Road to Venn Passage Bridge	\$2.3 M
5.	Venn Passage bridge	\$13.0 M
6.	Venn Passage Bridge to Metlakatla and Tuck Inlet Road	\$34.6 M
TOTAL		\$137.6 M

An estimate was prepared to widen stream crossings from single lane to two lanes and pave the roadways for component 4 – Digby Airport Road to Venn Passage Bridge and component 6 – Venn Passage Bridge to Metlakatla and Tuck Inlet Road. An estimate was also prepared to widen stream crossings and pave the Tuck Inlet Road, currently under reconstruction. These estimates are presented in Table 2.

**Table 2**  
**Incremental Capital Cost Of Widening Stream Crossings**  
**And Paving Of Gravel Roads**

COMPONENT		COST
4.	Digby Airport Road to Venn Passage Bridge	\$ .4 M
6.	Venn Passage Bridge to Metlakatla and Tuck Inlet Road	\$5.3 M
	Tuck Inlet Road	\$4.5 M
TOTAL		\$10.2 M

### PROJECT RISKS

The project has been planned in such a way that project risks are largely mitigated through avoidance and good engineering practice, or are accounted for in capital cost estimates.

Known archaeological sites and sensitive environmental areas have generally been avoided. Construction in peat bog and muskeg has also been minimized through careful route selection.

The location and configuration of the Harbour bridge avoids in-water construction and relies on proven technology and techniques.

The Venn Passage bridge design minimizes in-water construction and utilizes a conventional design.

Cost estimates include allowances for sub-excavation, rock fill and corduroy construction. Estimates were based on most probable quantities as determined by assessment of ground conditions and realistic suitability of local materials for construction.

Where appropriate, cost estimates were based on more pessimistic assumptions. For example, since geotechnical conditions for the Digby Island Bridge were not tested, the cost estimate assumes that more expensive piles will be required for the east tower of the bridge. However, it is quite probable that the pier can be supported on a less expensive spread footing.

Risks that could materialize and are not reflected in the capital cost estimates are as follows:

- extreme fluctuations in the price of steel and other imported construction materials
- shortages in skilled labour
- unusual weather conditions causing fill material to become unusable
- additional suspension cable anchoring to compensate for weak rock
- additional culverts through areas of muskeg to address wider area drainage requirements



## EVALUATION OF PROJECT BENEFITS

The second objective of the planning and feasibility phase of the Digby Island/Tsimshian Peninsula Access Project was to confirm the project economics.

The work involved an assessment of project benefits using analytical techniques utilized by the provincial and federal governments in the evaluation of infrastructure initiatives.

Various components of the work were completed by the following entities:

- potential program savings *Ministry of Transportation  
Partnerships Department*
- potential savings for shuttle users *Ministry of Transportation  
Partnerships Department*
- potential proceeds from land *Royal LePage Advisors*
- potential social benefits *Ministry of Transportation  
Partnerships Department*
- potential economic benefits *CCG Consulting Group Ltd.*

For the purposes of calculating incremental project benefits, it was assumed that reconstruction of the Tuck Inlet Road and relocation of the Tuck Inlet Ferry Terminal to Arrow Point have been completed.

A term of 40 years was utilized to calculate the Present Value (PV) of potential benefits. This term reflects the average useful life of the proposed improvements.

A discount rate of 6 per cent was applied. This is the rate utilized by the Province of BC for the quantification of future benefits.

A completion date of 2007 was assumed for the Access Project.

### POTENTIAL PROGRAM SAVINGS

Program savings can be generated because the ongoing costs of delivering programs and services will be reduced or eliminated if the Access Project is completed. Program savings are summarized in Table 3.

**Table 3**  
**Summary of Potential Program Savings**

	<b>PV</b>
<b>Lax Kw'alaams</b>	
Band / Community Operating Costs <i>primarily comprised of business travel costs and freight costs, including fish plant shipments</i>	\$760,884
Capital Project Mobilization / Transportation Savings <i>negative benefit resulting from reduction in house construction subsidies</i>	-\$547,871
Ferry Service <i>negative benefit resulting from loss of net proceeds from Tuck Inlet ferry operation</i>	-\$809,984
Sub-Total	<u>-\$596,971</u>
<b>Metlakatla</b>	
Band / Community Operating Costs <i>primarily comprised of business travel costs and freight costs</i>	\$305,305
Capital Project Mobilization/Transportation Savings <i>new house construction transportation/mobilization cost reductions</i>	\$168,991
Ferry Service <i>discontinuation of Metlakatla ferry service</i>	\$3,520,682
Digby Airport Road Lease <i>discontinuation of right-of-way lease</i>	-\$254,786
Sub-Total	<u>\$3,740,192</u>
<b>City of Prince Rupert</b>	
City Operating Costs <i>staff airport travel</i>	\$8,327
Airport Ferry and Dock <i>discontinuation of ferry subsidy</i>	\$7,101,933
Landfill Revenue <i>Metlakatla tipping fees</i>	\$191,090
Sub-Total	<u>\$7,301,350</u>
<b>Provincial Government</b>	
Ambulance Service <i>primarily comprised of medivacs to Airport</i>	\$3,594,083
Solicitor General <i>additional travel to Lax Kw'alaams and Metlakatla</i>	-\$4,355
Children and Family Development <i>reduction in staff and child travel costs</i>	\$13,457
Ministry of Health <i>reductions in hospital stays new services</i>	\$8,174,397



Ministry of Education	\$932,286
<i>discontinuation of water taxi services – Dodge Cove and Metlakatla</i>	
RCMP	\$28,362
<i>additional policing costs – Metlakatla</i>	
<i>reduction in policing costs – Lax Kw'alaams and Airport</i>	
BC Ferries	\$5,191,260
<i>residual value of Tuck Inlet ferry</i>	
<i>avoidance of Tuck Inlet ferry rehabilitation costs</i>	
<i>elimination of Metlakatla operating subsidy</i>	
Sub-Total	<u>\$17,929,490</u>
<b>Federal Government</b>	
Health Canada	\$963,670
<i>staff travel costs</i>	
<i>non-emergency patient travel costs</i>	
INAC	724,933
<i>reduction in capital funding for housing</i>	
Sub-Total	<u>\$1,688,603</u>
<b>Agencies, Boards, and Commissions</b>	
Prince Rupert Airport Authority	\$1,294,117
<i>reductions in staff travel costs, reductions in Airport Road operating costs, increases in fuel sales</i>	
Prince Rupert Port Authority	\$2,015
<i>reductions in staff travel costs</i>	
BC Hydro	\$463,248
<i>reductions in maintenance costs – Digby Island, Metlakatla, Lax Kw'alaams</i>	
Social Program Agencies	\$17,499
<i>changes in staff travel</i>	
Sub-Total	<u>\$1,776,879</u>
<b>Business</b>	
Air Carriers	\$676,967
<i>reductions in ferry costs for staff</i>	
Telus	\$397,133
<i>savings in fiber optic cable installation costs</i>	
<i>reductions in maintenance costs – Digby Island, Metlakatla, Lax Kw'alaams</i>	
Farwest Bus Services	-\$2,258,333
<i>elimination of Airport shuttle service</i>	
Sub-Total	<u>-\$1,184,233</u>
<b>Total Potential Program Savings</b>	<u>\$30,655,310</u>

**POTENTIAL SAVINGS FOR AIRPORT SHUTTLE USERS**

Airport shuttle users will receive a financial benefit since shuttle service can be discontinued if the Access Project is completed. These savings are summarized in Table 4.

**Table 4**  
**Summary of Potential Savings for Shuttle Users**

	PV
<b>Individuals</b>	
Airport Shuttle Users	\$7,574,030
<i>elimination of Airport shuttle service fares</i>	
<b>Total Potential Savings for Shuttle Users</b>	<u>\$7,574,030</u>

**POTENTIAL PROCEEDS FROM LAND**

Revenues can be generated through resource rents, Crown land dispositions, and increases to the property tax assessment base if the Access Project is completed. Potential proceeds from land are summarized in Table 5.

**Table 5**  
**Summary of Potential Proceeds from Land**

	PV
<b>First Nations Benefits from Land</b>	
Net timber proceeds	\$3,058,937
Sub-Total	<u>\$3,058,937</u>
<b>City of Prince Rupert</b>	
Residential taxation	\$11,682,163
<i>Prince Rupert and Digby Island Crown lots</i>	
Retail/Commercial taxation	\$1,629,966
<i>Prince Rupert and Digby Airport development</i>	
Industrial taxation	\$1,910,775
<i>Prince Rupert and Digby Airport development</i>	
Sub-Total	<u>\$15,222,904</u>
<b>Provincial Government</b>	
Stumpage value	\$6,179,671
<i>Timber harvesting on Tsimshian Peninsula</i>	
Crown lot sales	\$5,476,817
<i>Digby Island residential lots</i>	
School residential taxation	\$7,145,103
<i>Prince Rupert and Digby Island Crown lots</i>	
School retail/commercial taxation	\$489,011
<i>Prince Rupert and Digby Airport development</i>	
School industrial taxation	\$597,137
<i>Prince Rupert and Digby Airport development</i>	
Sub-Total	<u>\$19,887,739</u>



**Agencies, Boards and Commissions**

Prince Rupert Airport Authority <i>leases and concessions</i>	\$2,297,873
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Sub-Total	\$2,297,873
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**Private Business**

Energy Sector, Mining Sector	\$1,237,328
Forest Sector	\$10,196,457

*proceeds from harvesting*

Sub-Total	\$11,433,785
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<b>Total Potential Proceeds from Land</b>	\$51,901,238
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**POTENTIAL SOCIAL BENEFITS**

A broad range of social benefits can be generated if the Access Project is completed. Social benefits that can be quantified are summarized in Table 6.

**Table 6**  
**Summary of Potential Social Benefits**

	PV
<b>Time Savings</b>	
<i>Travel time savings for people currently traveling between Prince Rupert, Airport, Metlakatla, and Lax Kw'alaams</i>	\$8,378,975
Sub-Total	\$8,378,975
<b>Vehicle Operating Costs</b>	
<i>Additional vehicle operating costs for people currently traveling between Prince Rupert, Airport, Metlakatla, and Lax Kw'alaams</i>	-\$14,797,593
Sub-Total	-\$14,797,593
<b>Travel Accident Costs</b>	
<i>Additional accident costs for people currently traveling between Prince Rupert, Airport, Metlakatla, and Lax Kw'alaams</i>	-\$232,957
<i>Accident costs for latent travellers</i>	-\$2,217,759
Sub-Total	-\$2,450,717
<b>Value of Life Saved</b>	
<i>Reductions in avoidable deaths</i>	\$26,561,462
Sub- Total	\$26,561,462
<b>Total Potential Social Benefits</b>	\$17,692,127

### POTENTIAL ECONOMIC BENEFITS

A broad range of social benefits can be generated if the Access Project is completed. However, for the purposes of this study, only the potential economic benefits of the GDP and employment gains for industries in the Prince Rupert area export base were assessed.

The potential gains were calculated by CCG Consulting Group Ltd. using industry multipliers for direct, indirect and induced impacts developed by BC Stats. Since the data base is provincial, the multiplier impacts are for the whole of BC. As a result, estimates of indirect and induced effects in particular are likely to be widely dispersed in the province (mainly in the northern and Lower Mainland regions). Imports into BC are excluded, although many will originate in the rest of Canada.

For this study, seven sectors form the export base. They are:

- pulp and paper
- log exports
- aquaculture
- transportation
- tourism
- construction
- offshore oil and gas

Offshore oil and gas is not part of the export base at this time. The federal and provincial moratoriums on offshore oil and gas exploration and extraction would need to be lifted before any economic benefits may be generated in this sector.

There are other industries in the existing export base, notably the fisheries sector and the terminals at Ridley Island. Improved stocks and new commercial species suggest fishing and processing can remain stable over the study period. In addition, a greater amount of industrial land at Ridley may be utilized productively.

There are a number of other industries, such as specialized wood products, research and development, and major industrial activities that may emerge over time. However, these have not been included in this analysis.

Economic benefits were computed by:

1. Estimating the increases or additions to sales values based on informed opinion and recent studies
2. Multiplying the increases or additions by multiplier coefficients for direct, indirect and induced GDP and employment (person years), and
3. Multiplying the product by the relative impact of the Access Project might have on the particular sector.

Potential economic benefits are summarized in Table 7.



**Table 7**  
**Summary of Potential Economic Benefits**

SECTOR	PV of Total GDP (\$ Millions)	Portion attributable to Access Project	PV of GDP Impact (\$ Millions)	Employment Impact (person years)
<b>Pulp and Paper</b> <i>Pulp mill reopens and higher-value paper mill added</i>	\$1,250.0	5.0%	\$62.5	2,389
<b>Log Exports</b> <i>Sawmill does not reopen but log exports increase</i>	\$214.0	5.0%	\$10.7	455
<b>Aquaculture</b> <i>Growth in sales split evenly between finfish and shellfish (attribution to Access Project: finfish – 10% shellfish – 30%)</i>	\$1,337.5	20.0%	\$267.5	11,750
<b>Transportation (Note 1)</b> <i>Development of container port Incremental growth in air travel New airport related activities</i>	\$85.2	27.5%	\$23.4	1,321
<b>Tourism</b> <i>Pocket cruise ships Large cruise ships Eco-tourism Heritage and culture</i>	\$239.6	25.0%	\$59.9	4,361
<b>Construction</b> <i>PV of Access Project construction</i>	\$75.0	100%	75.0	1,945
<b>Sub-Total</b>	\$3,201.3		\$499.0	22,221
<b>Offshore Oil and Gas</b> <i>Annual economic benefits as follows: Years 1 – 7 zero Years 8 – 11 \$500 M per year Years 12 -15 \$1,000 M per year Years 16 – 40 \$1,500 M per year</i>	\$10,000.0	20%	\$2,000.0	38,193
<b>Total Potential Economic Benefits</b>	\$13,201.3		\$2,499.0	60,414

(Note 1: Potential benefits shown reflect 20% of the benefits identified in the CCG Consulting Group Ltd. Report. Potential benefits were reduced in part to take into consideration benefits included as Proceeds from Land)

Potential income taxes generated from economic activity attributable to the Access Project are summarized in Table 8.

**Table 8**  
**Summary of Potential Income Taxes**

SECTOR	PV GDP	PV Federal Tax	PV Provincial Tax	PV Total
Pulp and Paper	\$62.5 M	\$2.44 M	\$3.50 M	\$5.94 M
Log Exports	\$10.7 M	\$.51 M	\$.61 M	\$1.12 M
Aquaculture	\$267.5 M	\$ 11.24 M	\$12.57 M	\$23.81 M
Transportation	\$23.4 M	\$.96 M	\$1.41 M	\$2.37 M
Tourism	\$59.9 M	\$2.82 M	\$3.65 M	\$6.47 M
Construction	\$75.0 M	\$3.42 M	\$6.02 M	\$9.44 M
<b>Sub-Total</b>	<b>\$499.0 M</b>	<b>\$21.39 M</b>	<b>\$27.76 M</b>	<b>\$49.15 M</b>
Oil and Gas	\$2,000.0 M	\$50.00 M	\$62.00 M	\$112.00 M
<b>Total</b>	<b>\$2,499.0 M</b>	<b>\$71.39 M</b>	<b>\$89.76 M</b>	<b>\$161.15 M</b>

Federal Goods and Services Tax revenues, provincial Social Services Tax revenues, and resource royalties have not been quantified because multipliers are not available.

Provincial and municipal property taxes are included in Potential Proceeds from Land presented earlier in this report.

### **OTHER POTENTIAL BENEFITS**

In 1999, the Alaska Department of Transportation and Public Facilities released the Southeast Alaska Transportation Plan. The Plan proposes an integrated program of strategic investments in roads and ferries to complete a regional transportation system that links communities within Southeast Alaska, and links the region to other cities on the West Coast.

Where appropriate, these investments were identified to establish dayboat services on regional and local route segments in order to reduce operating costs, improve service frequency and travel time to the ferry user, and improve access and economic opportunity.

The Department of Transportation and Public Facilities has expressed an interest in relocating the Alaska Marine Highway System (AMHS) Ferry Terminal from Prince Rupert to Port Simpson. This relocation would result in significant travel time savings for travelers entering or leaving Alaska through Ketchikan and would result in a substantial cost savings for AMHS.

The State could offset a portion of the cost of new terminal facilities at Port Simpson by reallocating capital funds designated for the reconstruction of its Prince Rupert ferry terminal.



In 2001, the Department of Transportation and Public Facilities engaged Transportation Engineering NorthWest, LLC to complete a cost-benefit analysis of relocating terminal facilities to Port Simpson.

The Transportation Engineering NorthWest, LLC report indicates that the Access Project is consistent with the intent and ultimate vision of the Southeast Alaska Transportation Plan. It concludes that a present value benefit of between \$10 million (U.S.) and \$19 million (U.S.) would be derived for AMHS and system users if the Prince Rupert ferry terminal is relocated to Port Simpson. (Note - 20 year term)

### SUMMARY OF POTENTIAL BENEFITS

The potential project benefits quantified during the Planning and Feasibility Study are summarized in Table 9.

**Table 9**  
**Summary of Potential Benefits**

		PV
Program Savings		\$30.7 M
Savings for Airport Shuttle Users		\$7.6 M
Proceeds from Land		\$51.9 M
Social Benefits		\$17.7 M
<b>Sub-Total</b>		<b>\$107.9 M</b>
Economic Benefits		
<i>Pulp and Paper</i>	\$62.5 M	
<i>Log Exports</i>	\$10.7 M	
<i>Aquaculture</i>	\$267.5 M	
<i>Transportation</i>	\$23.4 M	
<i>Tourism</i>	\$59.9 M	
<i>Construction</i>	\$75.0 M	\$499.0 M
<b>Sub-Total</b>		<b>\$606.9 M</b>
Economic Benefits		
<i>Offshore Oil and Gas</i>	\$2,000.0 M	\$2,000.0 M
<b>Total</b>		<b>\$2,606.9 M</b>

## NEXT STEPS

This study has concluded that the development of a network of roads and connecting bridges to connect the Lax Kw'alaams and Metlakatla communities, the Airport on Digby Island, and Prince Rupert is technically feasible, and the infrastructure could be constructed for about \$138 million.

Project risks can be largely mitigated through avoidance and good engineering practice, or are accounted for in the capital cost estimate.

The benefits of completing the Access Project could be substantial. The present value of program savings, savings to airport users, proceeds from land, and social benefits may total \$108 million and there is reasonable certainty that these benefits would be realized.

There is significantly less confidence that the potential economic benefits could be realized. Benefits from incremental growth in the forest, aquaculture, transportation, tourism and construction sectors could be as much as \$499 million. If these benefits were to materialize, the economic impacts on the communities of Lax Kw'alaams, Metlakatla, and Prince Rupert would be substantial.

A further incremental benefit of \$2 billion is projected if offshore oil and gas exploration and development proceeds. However, benefits approaching this magnitude could only be realized if:

1. the moratorium on offshore oil and gas exploration and development is lifted
2. a consensus is reached among industry, stakeholders and regulators regarding exploration and possible development
3. Industry proceeds with exploration
4. oil and gas fields are identified that can be developed in a cost-effective and responsible manner, and
5. industry proceeds with development, using Prince Rupert as a base.

Given the high level of uncertainty surrounding the potential economic benefits, the Project Steering Committee decided that no further work on the overall scheme should be undertaken at this time. Instead, the funding partners agreed to pursue improvements to the transportation network involving consolidation of ferry services and construction of some components of the Access Project on Digby Island and the Tsimshian Peninsula.