Northern Transportation Conference

November 9 & 10, 2005
Yellowknife, Northwest Territories

Post-Conference Report

THE VAN HORNE INSTITUTE

University of Manitoba
Transport Institute

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Post-Conference Report

Proceedings of the Northern Transportation Conference

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Executive Summary

The primary purpose of this report is to propose and outline an action plan for northern transportation in Canada. The action plan follows from the Proceedings of the Northern Transportation Conference, including expert presentations, discussions, roundtable sessions and a survey.

The Conference took place November 8 to 10, 2005 at the Explorer Hotel in Yellowknife, Northwest Territories. It featured 35 session chairs, panelists and speakers, organized into nine sessions. Session topics were: (1) northern vision, priorities and expectations; (2) transportation partnerships; (3) current northern transportation infrastructure; (4) air transportation challenges; (5) surface and marine transportation challenges; (6) pipeline development; (7) climate change; and (8) northern sovereignty and security. Session nine involved nine structured roundtable discussions on the issues. All of the groups reported the results of their discussions back to the entire conference.

The Northern transportation action plan includes nine elements, which are listed here and described in more detail on pages 32-37 of the Proceedings. The nine elements of the northern transportation action plan are:

1. *Identify and engage all relevant stakeholders in determining northern transportation needs*.

2. *Determine and prioritize the issues of concern and expectations of the stakeholders*.

3. *Resolve any political issues that constrain forward movement*.

4. *Harmonize transportation regulations across territorial and provincial jurisdictions*.

5. *Evaluate large-scale infrastructure projects using an integrated, holistic framework*.

6. *Develop a training and education program in transportation/logistics and supply chain management (SCM) for the North*.

7. *Conduct research on northern transportation issues*.

8. *Seek and create partnerships within the territories and with neighboring provinces and other entities*.

9. *Create a 3-W (who, what, when) matrix to guide implementation of the northern transportation action plan*.

The Conference

The Northern Transportation Conference took place November 8 to 10, 2005 at the Explorer Hotel in Yellowknife, Northwest Territories. The Conference was organized and put on by the University of Manitoba Transport Institute, the Van Horne Institute, and the Western Transportation Advisory Council (WESTAC).

The University of Manitoba Transport Institute builds on three decades of experience in transportation and logistics research and education. The Institute is a Canadian leader in transportation research, focusing on economics and policy issues, and the technical side of transportation. The Transport Institute's Certificate in Logistics program was developed in 1997 with the Canadian Institute of Traffic and Transportation (CITT). The Institute played a leading role in creating the Department of Supply Chain Management at the Asper School of Business in 2004. In addition, the Institute hosts conferences, seminars and workshops, providing neutral settings where senior industry, government and academic representatives address pressing concerns specific to the transportation and logistic industry (see http://umanitoba.ca/faculties/management/ti/).

The Van Horne Institute for International Transportation and Regulatory Affairs was established to assist industry, governments, and the public in addressing issues affecting transportation and regulated industries that are relevant to the well-being and growth of industry and commerce. Efficient and low-cost transportation services are essential to both industry and the public in our geographically large country, so the evolution of sound industrial strategy, public policy, and progressive legislation and regulations are increasing in importance as business moves further towards global-ization. The Institute was incorporated federally in 1991 as a not-for-profit organization. See http://www.vanhorne.info/ for more information on the Van Horne Institute.

WESTAC is dedicated to strengthening the Western Canadian economy by improving the region's transportation system. Founded in 1973, WESTAC maintains a cooperative

approach to resolving issues. The Council organizes workshops, conferences and meetings to explore timely and relevant issues, and produces high quality publications on topics of importance to the Western Canadian economy. WESTAC is a non-profit association funded through membership fees and earnings from professional services. For more information about WESTAC, see: http://www.westac.com/.

Additional sponsors of the Conference were: Alberta Economic Development, ATCO Frontec, ATCO Group, Canadian North, Edmonton Airports, Indian and Northern Affairs Canada, Natural Resources Canada, Northwest Corridor Development Corporation, Northwest Territories Transportation, Shell Canada, Transport Canada, and Yukon Highways and Public Works.

The Conference featured 35 session chairs, panelists and speakers, organized into nine sessions. The session topics were sequenced as follows: (1) northern vision, priorities and expectations; (2) transportation partnerships; (3) current northern transportation infrastructure; (4) air transportation challenges; (5) surface and marine transportation challenges; (6) pipeline development; (7) climate change; and (8) northern sovereignty and security.

Session nine, chaired by the writer of this report, consisted of eight to ten roundtable discussions on the issues. Summaries of the roundtable discussions, as created by small groups of participants, are included in the report as Appendix I.

The remainder of these proceedings is presented in three sections. The first section outlines general issues and important stakeholders involved in transportation. The second section summarizes all the conference presentations in considerable detail, session-by-session. Then, the third section suggests an action plan for the future, in light of presentations and discussions at the conference.

Issues and Stakeholders

> "transportation is the public-policy, lifestyle and business issue of the decade" (Joe Chidley in *Canadian Business* magazine, March 17, 2003).

Sussman (2000) discusses the social, political, economic and environmental importance of transportation. Transportation, as an industry, employs a large number of people, as providers of service, builders of infrastructure, producers of vehicles and equipment, policy makers and regulators, etc. The transportation industry also requires very large investments of capital over the long-term, especially for the construction of infrastructure.

Primary stakeholders in transportation decisions and public policy include the *financial community*, as providers of capital for infrastructure projects; *suppliers* of infrastructure construction services and materials, vehicle and equipment, fuel, etc. to the transportation industry; and *customers*, i.e. shippers and receivers of freight, and passengers. Another important group of stakeholders are *communities* that transportation vehicles and/or infrastructure pass through or over or near. People in these communities may or may not be "customers."

Additional transportation stakeholders are *governments* at all levels (national, provincial/territorial, and local); intra- and inter-modal competitors; labour unions; environmental groups; *academic institutions*; and the general public. While government agencies set public policy directions, enforce regulations, assess transportation needs, and monitor the transportation system; academic institutions study transportation systems and train/educate transportation leaders of the future.

In his holistic transportation planning framework, Poorman (2005) recognizes the social, environmental, economic and political influences of transportation. Poorman (2005, p. 30) writes: "A holistic or integrated transportation planning process embraces the knowledge that transportation facilities and services have a profound effect on community

structure and regional form, quality of life and expression, environmental sustainability, public health and economic productivity and competitiveness."

The dominant transportation mode (air, water, road or rail) is a primary determinant of the location and shape of communities. Transportation infrastructure and services also have a profound impact on quality of life and personal expression. Transportation brings supplies and opportunities to the people. It also brings noise, congestion and pollution. Transportation can be hard on the environment, by polluting land, air and water, and by depleting non-renewable resources. However, access to competitive transportation alternatives supports economic growth, and provides movement of goods and people at reasonable cost.

Poorman's (2005, p. 30) first characteristic of a holistic transportation planning process is "inclusion of a wide range of participants and perspectives." With a spirit of inclusion, a diverse group of transportation stakeholders assembled in Yellowknife in November 2005 for the Northern Transportation Conference. The next section presents detailed summaries of all conference sessions.

Conference Presentation Summaries

Peter Wallis, President and CEO of the Van Horne Institute, opened the conference by noting it has been 35 years since the Arctic Transportation Conference in Yellowknife. Thus, the November 2005 Northern Transportation Conference is timely, if not overdue. Mr. Wallis also briefly commented on the importance of the multi-modal transportation system to Northern communities and industries, along with the political, economic and social implications of transportation. Then, he introduced the Honourable Joe Handley, Premier of the Northwest Territories.

Session One: Northern Vision, Priorities and Expectations

Premier Handley recognized the close connection between the Northwest Territories and Alberta, in light of Alberta's role and position in the "opening of the North." The North—Yukon, Northwest Territories and Nunavut—provides 40 percent of Canada's land mass, two-thirds of Canada's coast line, and 14 percent of Canada's border with the USA. The North is a treasure-chest of renewable and non-renewable resources. The Premier predicted that two new pipelines are coming to the North: the Mackenzie valley natural gas pipeline (http://www.mackenziegasproject.com/) and the Alaska North Slope pipeline.

Next, Premier Handley outlined the issues and challenges in northern transportation. Additional transportation infrastructure is needed to support economic development in the Northwest Territories, and to facilitate territorial self-reliance. There is also a lack of effective multi-modal transportation service. Due to the sensitive ecology of the north, transportation initiatives must consider environmental issues carefully and have a plan for protecting the land (http://www.mvapg.com/). These initiatives must consider social issues and employment opportunities for northerners, as well.

The Premier addressed the Federal/Territorial government partnership in northern economic development. There is a need for fair negotiation of resource and revenue sharing between Canada and the Northwest Territories—and a move away from the current arrangement in which the federal government controls 100 percent of royalties. Premier Handley argued that per capita funding is not advisable for the North. (Only about 40,000 people live in the vast Northwest Territories.)

Other Northern transportation issues touched on by the Premier include globalization, Canadian security and sovereignty, climate change, response to possible environmental disasters, economic diversification, mobility of the people, and the high cost of living. Finally, Premier Handley expressed the need to revive plans for an all-weather road linking the Arctic port of Tuktoyaktuk with the territory's existing road system more than 800 km to the south. This road would replace existing "winter roads," constructed on ice-covered rivers and frozen ground to enable freight transportation by truck. Global warming and climate change are threatening the winter road system.

The next speaker was the Honourable Ethel Blondin-Andrew, Minister of State for Northern Development. The Minister acknowledged the critical role of transportation in economic and community development, stating: "everything depends on transportation."

During her discussion of the issues Minister Blondin-Andrew referenced "The Northern Strategy" (http://www.northernstrategy.ca/). The goals of the Northern Strategy focus on economic development, environmental protection, cost-of-living and quality-of-life in northern communities, national security and sovereignty, and preserving and promoting language and culture of the north.

Many northern communities are remote, and most of these communities depend on air transportation. Today, The North is a place of great change, from self-government and land claim settlements to rapid industrial growth in the diamond mining and oil and gas extraction sectors. The Minister mentioned some challenges and opportunities with respect to climate change in the North. While the thawing ground shortens the season

for freight transportation on winter roads, it may also make permanent solutions more feasible. Opening of the Northwest Passage lengthens the arctic shipping season but also gives rise to Canadian sovereignty concerns.

For more information, the Minister urged people to consult the Northwest Territories Department of Transportation web-site (http://www.gov.nt.ca/Transportation/index.html).

Session Two: Transportation Partnerships

This session was chaired by Peter Vician, Deputy Minister of Industry, Tourism and Investment for the Northwest Territories.

The first speaker of the session was the Hon. Dr. Lyle Oberg, Minister of Infrastructure and Transportation for Alberta. Building on Premier Handley's previous remarks, Dr. Oberg mentioned the Alberta/Northwest Territories partnership, and Alberta's position as a gateway to the Northwest Territories. Alberta sees opportunities in the growing oil and gas and precious gems industries in the Northwest Territories. Dr. Oberg offered the opinion that resource revenues from the North should stay in the North.

The Minister also discussed components of the Alberta transportation infrastructure focused on the North, including Highway 88, running from Slave Lake north toward Highway 35 at High Level, and the Mackenzie Northern Railway, running from Smith, Alberta to Hay River, Northwest Territories. Naturally, Alberta wants freight coming out of the Northwest Territories to travel south through Alberta—rather than north, on the proposed Mackenzie highway, to the Arctic port of Tuktoyaktuk.

Lucille McLaughlin from Manitoba Transportation and Government Services was the next speaker, delivering a presentation titled "Manitoba's Northern Transportation Partnerships." Northern Manitoba faces the following transportation challenges: remote communities with small populations; a harsh climate; long distances across rugged terrain, leading to higher road construction and maintenance costs. To meet the needs

of northern Manitoba, the province builds and maintains a network of all-weather and winter roads and 24 northern airports. The province also supports operation of the Port of Churchill. Churchill is Canada's only major international arctic port. The Hudson Bay Railway provides rail service to the port. This integrated port and rail system is one of the largest economic drivers in northern Manitoba, supporting a network of northern communities and industries. The Churchill Gateway Development Corporation (CGDC), funded by the Manitoba and federal governments, along with OmniTRAX, is working to diversify and grow traffic through the Port of Churchill. A priority for CGDC is the *Arctic Bridge*, a proposed global trade route between the ports of Churchill and Murmansk, Russia.

There is a special trade and transportation relationship between Manitoba and Nunavut. Nunavut communities are supplied through the Port of Churchill. In addition, a road to Nunavut via Churchill has been proposed. The Nunavut road initiative is a partnership between the governments of Manitoba and Nunavut, the Kivalliq Inuit Association (KIA), Indian and Northern Affairs Canada (INAC), and Transport Canada. Ms. McLaughlin noted that in Manitoba, the Port of Churchill is viewed as the northern end of the Mid-Continent Corridor, which extends southward through the United States to Mexico.

The third speaker in session two was the Honourable Michael McLeod, Minister of Transportation for the Northwest Territories. The Minister spoke about investments in transportation required to support economic development in the Northwest Territories. Additional infrastructure is needed to enable diamond and natural gas production in the territory. Economic development offers employment opportunities for Northerners, and can facilitate northern independence.

Minister McLeod referred his audience to the *Corridors for Canada II* report, which is available at: http://www.gov.nt.ca/Transportation/documents/index.html. The report calls for an additional investment of $162 million, directed at two types of transport needs: (1) resource development and (2) connecting communities. According to the report, "$117 million is required to improve all-weather and winter roads that serve

existing and future oil and gas and mineral development in the Northwest Territories. These investments are critically and urgently needed to facilitate and to respond to the pressures of resource development." In addition, "$45 million is required to promote economic diversification, provide better access to essential services, increase mobility and intercommunity travel and lower the high cost of living for Northerners."

At end of session two, there were questions from the floor and considerable discussion ensued. Cece Hodgson-McCauley of Norman Wells, Northwest Territories, founding chief of the Inuvik Dene band, made a strong statement in support of the Mackenzie Valley highway extension from Wrigley to Tuktoyaktuk. This highway would provide all-weather road access for Sahtu communities and facilitate development of the resources of the Mackenzie Valley. In her "Northern Notes" column, Hodgson-McCauley (2005) writes: "in Sahtu where I live, we still depend on barges and maybe two months of ice roads! Everything is flown in, four litres of milk is $4 in Yellowknife and Edmonton, but costs $17 in Norman Wells."

Hodgson-McCauley (2005) credits Alberta as being the "gateway to survival" for the Northwest Territories. She hopes Alberta will propose a deal to Ottawa to complete the Mackenzie Valley highway extension. Hamlet of Tuktoyaktuk Mayor Jackie Jacobson mentioned the need for additional infrastructure to upgrade the port and link it to the highway. While the proposed road to Tuktoyaktuk is expensive—one estimate puts the cost at $1 million per kilometer—another proposed road, the Nunavut-Manitoba link is controversial. This proposed road would extend from central Manitoba to Churchill, and then on to Rankin Inlet, Nunavut. One conference participant, in questioning Northern infrastructure investment priorities, called the proposed Nunavut-Manitoba link "the road to nowhere."

Session Three: Current Northern Transportation Infrastructure

Andrew Gamble, Project Leader for the Deh Cho Bridge Corporation, chaired session three.

"Nunavut Transportation Infrastructure" was presented by Alex Campbell, Nunavut's Deputy Minister of Economic Development and Transportation. Nunavut endures the highest cost of living in Canada, and the territory still has no land links with the rest of Canada. Improvements in overland (surface) transportation would increase access to both communities and resources, enhancing the quality of life. The people of Nunavut have always used the waters for food and marine transportation. The air transportation system serves all 26 Nunavut communities.

Nunavut's primary needs are for improved community accessibility and reduced cost of living. Effective and efficient transportation services are critical to meeting both of these needs. Some specific surface transportation improvement projects under consideration include the Manitoba-Nunavut road, the Bathurst Inlet road, and the Community Access Road Program. The important marine transportation projects are the Iqaluit Deep Port, the Bathurst Inlet Port, and the Community Breakwaters and/or Small Crafts Harbours Program. Finally, aviation projects include improvements or relocations at the following airports: Iqaluit, Arctic Bay, Pangnirtung, Cambridge Bay, Kimmirut and Repulse Bay.

According to Deputy Minister Campbell, Nunavut needs investment in transportation infrastructure and more efficient transportation services to address its two greatest challenges: community accessibility and a high cost of living.

Next, John Stecyk, Deputy Minister of Highways and Public Works for the Government of Yukon, spoke about the "Yukon Transportation System." His presentation covered current infrastructure, the changing context, investment priorities, and considerations for the future.

Alaskan ports are important, strategic links to Yukon's transportation system, especially for the mining and tourism industries. Yukon maintains more than 140 kilometers of road per 1,000 residents—the highest per capita road network in Canada. More than 535,000 tons of freight per year are carried on Yukon's highways. In addition, Yukon

operates 29 airport facilities, serving nearly 200,000 passengers per year. The territory also has a rail line that carries over 400,000 passengers per year. The Deputy Minister reported that Yukon has been investing in a number of bridge rehabilitation and highway construction projects to improve its transportation system.

Mr. Stecyk discussed five factors in the changing transportation context. The first factor, global economic growth, implies potential opportunities for Yukon as a trade route. The ports along the West coast are at full capacity, and demand for steel, grain and timber is growing. Climate change is the second factor. As the Northwest Passage becomes an alternative shipping route, Yukon must be ready to respond to possible increases in shipping traffic. The third factor, global technology, is making Northern locations more valuable. Whitehorse could become an attractive hub for international flights. Northern economic development is the fourth factor. The mining and tourism industries require transportation infrastructure to flourish, and make Northern economies self-sustaining. The fifth and final factor, sovereignty and security, also implies a need for transportation infrastructure to support strategic assertion of sovereignty.

The third speaker in the session was Russell Neudorf, Deputy Minister of Transportation for the Northwest Territories. There are 2,200 kilometers of all-weather road and 1,450 kilometers of winter road in the Northwest Territories but only 16 out of 33 communities have all-weather road access. In addition, there are 27 public airports in the Northwest Territories, with Yellowknife serving as the gateway hub to the south. Marine and rail service is primarily used to re-supply communities and to serve the oil and gas industry.

Deputy Minister Neudorf discussed six transportation challenges for the Northwest Territories: (1) pressures of resource development; (2) aging infrastructure; (3) fiscal and human resource pressures; (4) rising public expectations; (5) regulatory burden; and (6) the natural environment. These challenges give rise to many opportunities to improve infrastructure, such as the Deh Cho Bridge, the Mackenzie Valley All-Weather Road, and other improvements to roads and airports.

Luncheon Keynote Address

Margaret Purdy, Special Advisor to the Deputy Minister at Transport Canada, delivered the luncheon keynote address. Ms. Purdy spoke about five challenges in Northern transportation: (1) infrastructure; (2) transportation workforce skills; (3) science and technology in transportation; (4) resource-based projects; and (5) climate change.

Ms. Purdy noted that transportation is the third largest sector in Canada, in terms of employment. There is a need to promote transportation as a career, and to increase the skill level of the transportation workforce. Several federal government initiatives make funds available for infrastructure improvement projects. Two such initiatives are the Strategic Highway Infrastructure Program (SHIP) and the Strategic Infrastructure Fund (SIF).

The Strategic Highway Infrastructure Program (SHIP) is a $600 million initiative to be completed between 2001 and 2006. SHIP funds are allocated to four types of projects, as follows: (1) $500 million for strategic **highway** construction improvements; (2) $65 million for improvements at or near **border crossings**; (3) $30 million for **intelligent transportation systems** (ITS) initiatives and (4) $5 million for planning and modal integration **studies**. SHIP is funding four projects in Nunavut, two in the Yukon, and one in the Northwest Territories (see http://www.tc.gc.ca/SHIP/menu.htm).

Session Four: Air Transportation Challenges

Session four was chaired by Donald Brownie of PROLOG Canada Inc.

The first speaker on air transportation was Tom Ruth, President of Canadian North airline. Canadian North is headquartered in Yellowknife, and owned by more than 30,000 Northerners (see http://www.cdn-north.com/Home/default.asp).

Canadian North serves a diverse mix of customers, including air cargo shippers, the mining industry, oil and gas companies, the military, and passengers. Northern airlines link northern communities by moving people and products 365 days a year. Canadian North employs more than 400 people and contributes over $600,000 per year to support communities. Northern Airlines are deeply involved in the communities they serve by offering or sponsoring charity events, bursaries, sponsorships, sporting events, and community activities.

Mr. Ruth asked: "What can communities/industries/airports/the Government do to assist northern airlines?" His answer: "Keep supporting airlines that are based in the North."

Marvin Zaozirny, Director of Airports Division for the Northwest Territories Department of Transportation was the second speaker in session four. The mission of the NWT airports program is to provide "safe, accessible and reliable movement of people and goods." The airport system consists of one gateway hub (Yellowknife), two regional hubs (Norman Wells and Inuvik) and 24 community airports.

Mr. Zaozirny discussed four broad air transportation challenges. *Economic* challenges include the financial burdens of rising energy costs and the costs to maintain or replace and operate aging infrastructure, along with a shortage of skilled transportation workers. There are also *regulatory* challenges, such as the new baggage and cargo screening requirements for security, approach bans and take-off weight limits. In general, these regulations increase the costs of providing air transport service. *Political* challenges impacting air transportation include the allocation of resource revenues, pending land claims, rising public expectations, and conflicting priorities in search funding and other support. Finally, there are some *environmental* challenges, e.g. the need for hazardous contaminant clean-up, glycol management, and disposition of fuel drums and spills.

The Director closed by briefly describing five types of air transportation initiatives in the Northwest Territories: partnerships, an airport marketing strategy, the Public Airports Act, energy conservation, and maintenance management.

The third speaker on air transportation was Joe Sparling, President and CEO of Air North. Mr. Sparling noted the following challenges of aviation in the North: "Distances are greater, markets are smaller and costs are higher and because other options are often not available, air transportation matters more to the community. There is often room in the market for limited competition at best and with or without competition air travel costs tend to be higher in the north. Northern routes are often served with less frequency, multi-stop service and combi aircraft."

Mr. Sparling presented an air fare and service model based on inter-relationships between market size, aircraft size, cost structure, capacity, load factor and pricing. Small northern communities typically generate 4,000 to 6,000 passengers per year, limiting air service capacity provided. Adequacy of service is rated in terms of price, frequency, and aircraft type. Pricing is ultimately determined by the cost of providing the service. Market size determines cost of service, which in turn determines pricing. The use of combi aircraft provides economy and efficiencies for both passengers and cargo, but also introduces a load factor penalty due to the one-way nature of cargo movement.

Air North was started in 1977. The airline has a history of customer service, close connection to the local community it serves, providing aviation service to the Yukon Government—and perseverance. For more information on Air North, have a look at their website (https://www.flyairnorth.com/).

The last two speakers in session four were Jeanett Flynn, Manager of Marketing and Passenger Air Service Development for the Edmonton Regional Airports Authority and Gordon Stewart, President and CEO of BBE Ltd. Ms. Flynn described the position of Edmonton as a logistics hub to the North. Approximately 15 percent of passengers departing Edmonton travel north. Also, air cargo traffic out of Edmonton is growing. Edmonton airports have a prominent role in facilitating northern development. BBE performs air cargo operations at the Edmonton and Yellowknife airports. Mr. Stewart

focused on the needs of service providers, and offered the following words of wisdom: "to fail to plan is to plan to fail."

Session Five: Surface and Marine Transportation Challenges

Kells Boland of PROLOG Canada Inc. chaired session five. He made a presentation titled "Crossing Canada's other Border: Northern Perspective on a Multi-use Trans-border Corridor through Canada to Alaska." Mr. Boland discussed several multi-modal infrastructure projects to connect Yukon and Alaska. These projects and proposals include several Canadian National Railway expansions, an Alaska Railroad extension, Alaska Highway and port access projects, pipeline construction (Alaska Highway and Mackenzie Valley pipelines) and marine connections.

Mr. Boland observed that "the business case is frail" for some proposed projects, such as the Alaska-Canada rail link. However, transportation infrastructure and access is needed to support northern development requirements (energy transmission, resource development and economic diversification). The Alaska-Canada rail link may become more feasible as one component of an overall economic diversification plan, including an inter-modal hub; integrating marine, rail, road and air transportation and logistics; and a "land bridge," creating an international trade route from the Alaskan coast to the Atlantic Ocean.

The next speaker, Carmen Loberg, President of NorTerra Inc., discussed challenges the company faces in serving its customers. NorTerra Inc. (http://www.norterra.com/) is a Canadian management and holding company, owned by the Inuvialuit Development Corporation (IDC) and Nunasi Corporation (Nunasi), representing the Inuvialuit of the Western Arctic and the Inuit of Nunavut. The NorTerra Group includes Canadian North and the Northern Transportation Company Limited (NTCL). "NTCL's scheduled maritime route system, which extends over 5,000 kilometers, is served by a large fleet of tugs and dual purpose barges. The Mackenzie Western Arctic sector comprises by far the largest segment of the Company's marine operations. Cargo arrives by rail or truck

at NTCL's main receiving terminal, located at Hay River, Northwest Territories. It is (then) transported from Hay River on Great Slave Lake down the Mackenzie River to Tuktoyaktuk, east along the Arctic Coast to the lower Arctic Islands and the Boothia Peninsula and west to Point Hope, Alaska" (http://www.ntcl.com/). Beginning July 2006, NTCL will commence shipping containerized cargo to customers in Kivalliq communities. These freight movements will be truly multi-modal; by truck to Thompson, Manitoba, then by rail to the Port of Churchill, and finally by barge to the north. NTCL plans two trips to Arviat, Rankin Inlet and Baker Lake and one trip to the following communities: Chesterfield Inlet, Repulse Bay, Whale Cove and Coral Harbour.

Transportation challenges discussed by Mr. Loberg include: low utilization of vehicles and equipment due to the short (four-month) shipping season; scheduling and timing of deliveries; coordination of interdependent supply chain management (SCM) activities; procurement practices, e.g. three-year contracts despite requirements for much longer term investments; and a shortage of skilled workers.

The third speaker on surface and marine transportation was Ray Anderson, Director of Matco Transportation Systems. "Matco Transportation Systems Ltd. is a fully integrated Canadian transportation services company that has operated since 1966 and offers household goods relocation services as well as freight, courier, airport ground handling and warehousing services with its major focus on Alberta, the Northwest Territories, Yukon and Nunavut market places" (http://www.matco.ca/). Matco offers scheduled less-than-truckload (LTL) service from Edmonton to Norman Wells; from Edmonton to Whitehorse and Inuvik; and from Edmonton to Hay River, Fort Smith and Yellowknife.

Like the previous speaker, Mr. Anderson noted the shortage of skilled transportation and logistics labour in the North. He also mentioned the competition among various interests for resources, as well as the need for both transportation and communication infrastructure to support northern economic development.

Don Hayley, Principal Engineer, Arctic Practice Group for EBA Engineering was the fourth speaker in session five. Mr. Hayley presented three case studies on dealing with permafrost and ice during construction and operation of northern roads and highways.

The first case was on construction of the Dempster Highway in the 1970s. The second case involved reconstruction of the Yellowknife Highway from 1999 to 2005. This was a 100-kilometer upgrade south of Yellowknife, costing about $1 million per kilometer. Mr. Hayley described engineering challenges of the terrain, and the availability of materials, in technical terms. The third case was the 600-kilometer Tibbitt to Contwoyto winter road in the Northwest Territories. Winter roads require high annual maintenance costs but low capital costs. These roads also have a relatively low environmental impact.

Mr. Hayley concluded with the following message: (1) highways in the north are costly, environmentally disruptive and require long lead times; (2) the resource industry has learned to live with the seasonality of winter roads; (3) properly managed winter roads over ice are not a high risk operation; and (4) application of good engineering planning and monitoring principles can result in further optimization and improvement in use of ice covers for transportation.

The final speaker on surface and marine transportation was Brent Harris, President of Premay Equipment LP and Northern Underwater Systems LP. Mr. Harris discussed four categories of challenges: infrastructure, alternate transportation, regulatory, and harmonization.

Specific infrastructure challenges include seasonal road variability, roadbed quality, and water crossings (bridges and barges/ferries). Alternate transportation challenges are about limitations of surface versus marine transportation, and difficulties in combining surface and marine transportation. While some surface routes are only available in the winter; marine routes are only open in the summer. Regulatory challenges include the different regulations in place across different jurisdictions (i.e. provinces and territories). For instance, jurisdictions have different rules on day versus night travel, certification of

escort vehicles, and trailer weight restrictions. Adhering to different regulations across multiple jurisdictions increases the cost of transportation.

Session Six: Pipeline Development

Robert Reid, President of the Aboriginal Pipeline Group, chaired session six. He also delivered a presentation on the proposed Mackenzie Valley pipeline. At a projected cost of $7 billion, the gas pipeline would run 1,200 kilometers from Inuvik to the Alberta border. Approximately 870,000 tonnes of cargo will be required to complete the project. The plan is to transport all pipe and fuel for the project by rail from Alberta to Hay River. At Hay River, cargo will be loaded on barges and move north on the Mackenzie River. The project will also require approximately 22 storage sites for materials, equipment and pipe, along with 20 fuel storage sites.

An important objective of the Mackenzie gas project (MGP) is to maximize Aboriginal participation. The Aboriginal Pipeline Group (APG), a unique alignment of Aboriginal groups in the Mackenzie Valley, has negotiated a one-third ownership in the pipeline. The oil companies own the remaining two-thirds. Even though only three of the four Aboriginal Groups involved have reached agreements, the project appears ready to move into the public hearings phase (Weber 2005). Mr. Reid discussed the current state of the project, and requirements to move forward, in more detail. Public hearings could begin as early as January 2006.

The next speaker on pipeline development was Stephen Clark, Director of Sales and Marketing for TransCanada Corporation. He delivered a presentation titled “Pipelines – The Critical Enabler in Achieving Canada’s Energy Potential.” Mr. Clark started with a list of the members of the Canadian Energy Pipeline Association (CEPA). For further information about CEPA see http://www.cepa.com/. CEPA’s members operate over 100,000 kilometers of pipeline in North America and transport 95 percent of the crude oil and natural gas produced in Canada.

North American oil and gas demand is growing. New sources are needed to maintain supply security—and meet the growing demand. To develop new sources of supply, new pipeline infrastructure is required. The two large proposed infrastructure projects in the North are the Alaska Pipeline and the Mackenzie Valley Pipeline.

According to a study commissioned by CEPA, a two-year delay in the construction of natural gas pipelines and storage infrastructure required to meet forecast demand from 2006 to 2025 would cost Canadians $57.7 billion. Mr. Clark closed with suggestions for the policy and regulatory regime. Policy and regulation should facilitate timely, cost-effective resource (oil and gas) access, provide for safe and environmentally-sound operation of pipelines, enable economically viable projects to attract investors, promote open and free markets, and ensure access to human resources.

Dr. Paul Metz, Department Chair of Geological Engineering at the University of Alaska, was the final speaker on pipelines. He presented the case for the development of North Slope (Alaska) natural gas, including infrastructure requirements, markets to be served, and the portfolio of products related to natural gas. Dr. Metz noted many advantages of a Fairbanks/North Pole site location, including proximity to proposed pipeline routes, proximity to abundant fresh water, proximity to the Alaska Railroad, proximity to trained workers, and proximity to major airport facilities. However, very large infrastructure investments are needed, especially in terms of railroad re-alignments and extensions, to maximize the benefits of North Slope gas production.

Session Seven: Climate Change

Session seven was chaired by Kathleen Nadeau, Acting Manager of Climate Change for Transport Canada.

Anick Guimond, Transportation Planner for Ministère des Transports du Québec, was the first speaker on climate change. She gave a presentation titled “Vulnerability of Nunavik Airports to Climate Change and Adaptation Strategies.” The average annual

temperature is rising in Nunavik. Warming of the permafrost causes settlement across airstrips and access roads, and changes airstrip drainage.

Ms. Guimond remarked that the existing airstrips in Nunavik were designed assuming constant temperature. The rising temperatures are increasing maintenance costs. In response, research has identified the impact of permafrost thawing on transportation infrastructures. Settlement plates have been installed where major depressions in the road or airstrip occur. Research is ongoing to monitor permafrost temperature evolution, status of settlement plates, and snow accumulation.

The Québec Strategy on Climate Change includes the following five actions: develop public awareness about sustainable transportation; support the creation of new public/ private partnerships to reduce GHG; foster enhancement of energy efficiency of various transportation modes; encourage public transport of persons and car pooling; and foster eco-energy efficiency and inter-modal freight transport.

The second speaker in session seven, Shane LeBouthillier, Transportation Planner for the Northwest Territories, presented “Climate Change in the NWT: A Transportation Perspective.” He discussed the impact of climate change—and the response to it.

The primary impacts of climate change on transportation pertain to movement of the permafrost boundary, changing sea levels, and an increase in extreme weather events. The air transportation industry is experiencing higher airstrip maintenance costs due to permafrost degradation, as well as greater use of de-icing agents. While the changing water levels impact community re-supply along the Hay River route, melting ice opens the Northwest Passage for a longer arctic shipping season. Annandale (2005) notes the good and the bad news about the melting polar ice cap. Generally, it is bad news for the environment. On the other hand, it may be good news for ocean shippers in search of an alternative to the Panama Canal. Leung (2006) discusses economic, social and sovereignty implications of melting ice along the Northwest Passage.

Climate change is shortening the season for moving freight along winter roads and over ice bridges. Mr. LeBouthillier reported trends toward shorter seasons on the Mackenzie Valley winter road and later opening dates of the Mackenzie River ice crossing. Annual average number of days in operation along the Mackenzie Valley winter road has fallen from 75 days to 45 days per year. The Department of Transportation has responded by building more permanent bridges at certain locations (e.g. the Deh Cho Bridge, an all weather bridge crossing the Mackenzie River at Fort Providence) and by initiating an impacts and adaptation study. By increasing our understanding of physical, economic and social implications of climate change, the study is designed to create a framework for making decisions.

Don Kuryk, Manager of Technical Services for Manitoba Transportation & Government Services, delivered the third and final speech on climate change. His presentation was titled “Climate Change and Effect: Seasonal Transportation to Remote Communities in Manitoba.” In Manitoba, 27 remote communities are served by winter roads.

Mr. Kuryk described the effect climate change is having on winter roads in Manitoba. The number of days per year winter roads have been open became highly variable starting in 1997. Indeed, in 1998, an airlift was necessary because winter roads were not available to serve 12 of the communities.

In response to climate change, Manitoba is building more permanent (Meccano or Acrow) bridges over rivers and creeks, instead of ice bridges. Examples include the Acrow bridges over the Cochrane River, Gods River and Hayes River. Mr. Kuryk also commented on the long lead times, for receiving permits, licenses and environmental approvals, prior to building a bridge. On a new project, environmental approval can take as long as 24 months.

Session Eight: Northern Sovereignty and Security

Ruth Sol, President of Westac, chaired session eight. She introduced the first speaker on Northern sovereignty and security, the Honourable Paul Okalik, Premier of Nunavut. The Premier's compelling, powerful speech is printed in its entirety on the following pages. The speech is also available at http://www.gov.nu.ca/Nunavut/English/premier/.

"Thank you for that introduction. Let me begin by recognizing my fellow panel members and the previous speakers from this conference. We have heard thoughtful and challenging presentations about the opportunities and impediments to growth in the North. We have had detailed discussions about land, air and sea transportation, we have reviewed infrastructure development and economic partnership opportunities.

The question we have yet to address is the political and regulatory environment in which this is to occur. Done right, political and economic development in the North will reinforce Canada's northern sovereignty. Done wrong, we increase the likelihood of challenges to our northern security.

At the risk of telling you what you already know the Inuit of Nunavut are a seafaring people with the largest coastline in Canada. We have lived for millennia off the knowledge of our land and the bounty of our seas. Ever since Europeans got lost looking for Asia, the world has known of the riches and strategic importance of our waters. Any discussion of Northern sovereignty and security must begin from this point and recognize continuous Inuit use and occupation of our traditional territory.

In the last century we hosted a robust Canadian and American military presence in the Eastern Arctic. Throughout the territory you can find airstrips and the Distant Early Warning Sites. The cold war has thawed but once again there is growing interest in the circumpolar world. The Russians, Americans and Danes are all attempting to encroach on our territory. I am pleased to see that Canada has responded. One example was

last year's expedition of Canadian soldiers and Inuit rangers who completed an 18-day, 1,700 kilometer snowmobile reconnaissance of Nunavut's high arctic.

While our national government is clear on the international stage regarding our Arctic sovereignty, I fear it's undercutting its position with domestic policies that threaten this position. It seems there may be a contradiction in how Canada treats Nunavut domestically and internationally. On the world stage it's claimed that the North is integral to Canada. However on the national stage we are treated more like a colony. The most blatant example of Nunavut being denied full partnership in confederation can be seen in the administration of our internal waterways. Provinces have the authority to manage this jurisdiction and collect royalties from resource development in this area. Yet Nunavut with the largest internal waterway in the country is denied these same rights and responsibilities. If Canada treats Nunavut like a colony or some 'off-shore' territory is it any wonder that other countries do the same?

As Inuit and Nunavummiut we share Canada's international position that the arctic islands archipelago is an internal water way. Our presence since time immemorial supports Canada's claim to exclusive arctic jurisdiction. However it must be said that without a full partnership for Nunavut Canada's position is weakened. It's my hope that the Northern Strategy discussions that are occurring between the federal and territorial governments will clarify that Nunavut is a full and equal partner in Canada. We have agreed that the Northern Strategy will advance the goals of reinforcing sovereignty over the Northwest Passage, effective northern based search and rescue capability and recognizing northern interests.

The Northern Strategy includes the potential to be more than just a lofty statement. We are looking for a real action plan. What Mr. Martin refers to as a 'transformative initiative'. It's a chance to fundamentally alter Canada. The Northern Strategy offers Nunavut an end to our less-than-equal status. This must be done or it will be used by those who deny Canada's claim to the arctic. The federal government recognizes that it must devolve to Nunavut provincial-like authorities over or natural resources and this

must include our internal waters. Nunavut's authority over the resources beneath our arctic island waters will strengthen Canadian sovereignty in the Arctic.

Through domestic legislation we can demonstrate to the world that the Northwest Passage is internal to Canada and is governed by a people whose continuous use and occupation of the land cannot be denied. In fact it would be difficult to imagine any other position by the federal government. How could it argue sovereignty based on Inuit occupancy and the use Inuit Rangers, with a refusal to devolve resource management to an Inuit majority public government? We can't ask other governments to do what we refuse to do ourselves. Using devolution to strengthen our international position also recognizes what is already Canadian constitutional law. Devolution will also clear the way for the rapid economic growth.

National estimates peg Nunavut with 15% of Canada's oil & gas reserves. These are found primarily in the High Arctic on and between Nunavut's islands. In our world sea-ice and land are continuous. The extensive permanent ice between the High Arctic islands makes it nearly impossible to distinguish between onshore and frozen marine areas. Attempts to draw lines in the snow are a management nightmare for both government and industry and will halt development in Nunavut. Resource development companies require management regimes that recognize geographic realities.

Establishing a seamless administrative structure under Nunavut would produce certainty and minimize jurisdictional overlap which in turn will strengthen investor confidence. This is what Nunavut needs to move our economy forward. It also reflects the Northern Strategy's commitment to making the north 'a place where …northerners manage their own affairs' and are provided with 'greater control over decisions central to their future.' These Northern Strategy elements of sovereignty, devolution, our Land Claim and economic development will allow Nunavut to be a full partner in Canada.

It's our presence in the North that gives Canada an unmatched expression of Northern sovereignty. It is from that basis that we can go on to meet the challenges of

developing infrastructure, providing economic opportunities, protecting our culture and contributing to the security of Canada. The struggle we face in the North today is akin to the situation of Western Canada 100 years ago. Saskatchewan and Alberta had to fight to gain control of their natural resources and look what they now contribute to Canada. British Columbia needed a railway to join Canada. We built that railway and in the process we built a country.

I like to believe that the nation-building dream is still alive in this country. From the ideas and dedication to the North that I have heard at this conference I see that I am not alone. Thank you for inviting me to speak to you today. I look forward to working with all of you in realizing the stirring words of our national anthem "Our True North Strong and Free..."

The next speaker in session eight was Captain Sarah-Jo Doucet, EA Commander for the Canadian Forces Northern Area (CFNA). The original mission of CFNA is to provide a Canadian Forces presence in The Yukon, The Northwest Territories, and Nunavut. Its updated mission involves capability to command, control, coordinate and facilitate all military activities in the three territories.

More specifically, CFNA asserts Canadian sovereignty through land, sea and air patrols; and maintains security through surveillance. CFNA also assists territorial governments, upon request. While Northern Canada currently faces no direct military threats, there are sovereignty concerns and security issues in the North. Captain Doucet mentioned thawing and greater use of the Northwest Passage, along with the Hans Island dispute, as Canadian sovereignty concerns. For more information on the Hans Island dispute see http://en.wikipedia.org/wiki/Hans_Island. Security issues in the North stem from the increased shipping activity, increasing economic activity (mining, oil and gas), increased air traffic, and activities of organized crime and illegal immigrants in the North.

Captain Doucet closed with a brief description of future technological developments in northern surveillance, such as *polar epsilon* surveillance of arctic waterways and high frequency surface wave radar.

Dr. Barry Prentice, Professor of Supply Chain Management (and former Director of the Transport Institute), University of Manitoba, was the third and final speaker on Northern sovereignty and security. Dr. Prentice briefly reviewed the prevailing conditions in the North, including vast distances, small markets, harsh weather, fragile environment, limited transportation infrastructure, one-way traffic, and monopoly service providers. He then compared the traditional transport alternatives in the North (sea-lift, barge, airplane and truck) in terms of freight cost, seasonality, delivery speed, flexibility and environmental impact.

Next, Dr. Prentice promoted cargo airships as an alternative to the traditional modes. He presented two business cases of cargo movement via airship: (1) fuel supply to the Ekati diamond mine in the Northwest Territories, via airship versus ice road; and (2) re-supply of remote communities in Northern Manitoba. Dr. Prentice concluded “airships make sense for the North;” due to their year-round (rather than seasonal) availability, minimal requirements for infrastructure, unlimited flexibility of access, and minimal environmental impact. He also argued that airships could facilitate enforcement of Canadian sovereignty in the Arctic.

Northern Transportation Moving Forward: An Action Plan

This final section suggests an action plan to help keep northern transportation moving forward. The plan primarily draws on Northern Transportation Conference roundtable discussion summaries (Appendix I) and survey results (Appendix II), along with session presentations and follow-up discussions. The plan also reflects input from several relevant websites (Appendix III), and other stakeholders and experts not in attendance at the conference, e.g. the Northern Development Ministers Forum (NDMF).

The Northern Transportation Action Plan adopts a holistic approach to transportation planning. According to Poorman (2005, p. 32), a holistic approach is driven by three core activities: "(1) sharing and listening in many settings; (2) seeking to understand broadly held community values and reflect them in planning activities; and (3) applying transportation planning and implementation resources cost-effectively." The following paragraphs list and briefly discuss components of the action plan.

1. *Identify and engage all relevant stakeholders in determining northern transportation needs*. These stakeholders include First Nations or Aboriginal communities in the North; all people living and working in the North; users of transportation services, e.g. business firms, passengers, government agencies; providers of transportation services across all modes; transportation policy makers and regulators; financial institutions; engineering firms; diamond mines; oil and gas companies; environmental interest groups; etc. Many of these stakeholders were represented at the Northern Transportation Conference in Yellowknife. However, some participants observed that transportation users seemed to be under-represented at the conference. The Northern Transportation Conference was successful in initiating engagement of many relevant stakeholders. Several ideas about continuing the engagement emerged from conference roundtable discussions. These ideas include: developing a process for sharing information, creating a clearinghouse for research and other intelligence, and holding a similar conference in 2007, perhaps in Iqaluit.

A first step toward identifying all stakeholders is to define "the North." Is it limited to the three territories (Yukon, NWT and Nunavut)? Or, does it include the much larger area of focus of the NDMF (see http://www.focusnorth.ca/)?

2. *Determine and prioritize the issues of concern and expectations of the stakeholders*. Participants at the November 2005 Northern Transportation Conference heard about a variety of issues of concern and stakeholder expectations. Though inter-related, these issues can generally be placed into one of the following categories: economic, political, social, environmental, regulatory, and security/sovereignty. For instance, the economic issues range from cost-of-living and employment opportunities in northern communities to development and growth in the mining and oil and gas industries. There are trade-offs between economic objectives and environmental objectives. Climate change is altering the economics and seasonality of road and water transportation in the North. Action is needed to determine the entire range of issues, assess the expectations of stakeholders on these issues, understand inter-relationships and trade-offs between the issues, and prioritize appropriate responses. It was noted during conference discussion that there are different priorities across (and within) the three northern territories.

3. *Resolve any political issues that constrain forward movement*. Certain political issues must be resolved for northern transportation to move forward. Outstanding land claims should be settled with the federal government as soon as possible, to facilitate the fast-tracking of large-scale infrastructure projects that cut across vast stretches of land. In addition, the federal government should immediately negotiate a new resource revenue sharing formula with the territories. What's good for Alberta and Newfoundland should also be good for Nunavut and the Northwest Territories. The status of the territories, i.e. their progression toward (autonomous) provincial status, is a related issue in devolution. Ibbitson (2006) urges the Prime Minister to make a devolution deal with the Northwest Territories, a deal that "would involve handing over responsibility for, and access to the revenues from, the territory's natural resources." He suggests the Mackenzie Valley pipeline project could be in jeopardy without such a deal.

4. *Harmonize transportation regulations across territorial and provincial jurisdictions*. In general, transportation regulation constrains service options and reduces efficiency. If regulations; e.g. vehicle length limits, weight restrictions, hours of operation, registration of vehicles and operators; vary across jurisdictions, service providers often adopt the most restrictive/least efficient equipment. It is expensive to maintain (and underutilize) equipment dedicated to each jurisdiction. To minimize cost of service and to maximize service alternatives, regulatory burdens should be reduced. Also, remaining regulation should be harmonized across jurisdictions to the greatest extent possible. Initially, it might be more sensible to seek cross-jurisdictional agreements across pairs or trios of provincial/territorial jurisdictions (e.g. Yukon and British Columbia; NWT and Alberta; Manitoba, Nunavut and Quebec) rather than across all northern jurisdictions.

5. *Evaluate large-scale infrastructure projects using an integrated, holistic framework*. This means including all issues of concern (economic, political, social, environmental, regulatory, and security/sovereignty) in the minds of all stakeholders (communities, industry, government agencies, transportation service providers, etc.) during project evaluation. A consultative, team-oriented approach to project evaluation is needed. In addition, project proposals should be evaluated using qualitative as well as quantitative measures of performance, and conflicting objectives must be recognized and balanced (Poorman 2005). Proposals should also completely identify the financial, labour and material requirements and implications of the project. Where will the money and the workers come from?

6. *Develop a training and education program in transportation/logistics and supply chain management (SCM) for the North*. This is a critical element in economic development of the North, as well as creation, maintenance and utilization of northern transportation networks. Given the remoteness of many northern communities, the training program must be available in both traditional (classroom) and distance (on-line) delivery modes. This type of training program could likely be designed and delivered by a consortium of Canadian academic institutions, e.g. the University of Manitoba Transport Institute and

Department of Supply Chain Management, the Grant MacEwan College SCM program in Edmonton, the Mount Royal College international supply chain curriculum, and the University of Calgary/Southern Alberta Institute of Technology (SAIT) transportation and logistics program.

7. *Conduct research on northern transportation issues*. Additional research is needed to complement and extend existing research on northern transportation challenges and requirements. One important area in need of further research is the cost-of-living in northern communities, along with the role of transportation infrastructure and services in reducing cost-of-living in these communities. A related research topic is accessibility of communities throughout the year and availability of products and services. Research is also needed to compare costs and benefits of various transport alternatives in the North. For instance, under what conditions do airships become a viable alternative to road and/ or airplane transportation? Other fruitful future research areas could include: the impact of changing technology on northern transportation alternatives, forecasting demand for various forms of transportation, and benchmarking transportation services in northern Canada overtime and vis-à-vis other northern regions. There is also an opportunity to monitor performance of the transportation system and link this performance to northern economic, social and environmental objectives.

A final, critical northern transportation research item involves integrating the various northern transportation plans and strategies in existence. This research agenda item implies many important research questions, including the following. What other plans and strategies have been created (e.g. the NDMF Northern Transportation Investment Strategy)? What priorities do various federal, local, provincial and territorial jurisdictions have? Are there common priorities across jurisdictions? What federal programs exist to fund transportation projects? Is it feasible (and sensible) to combine transportation plans and strategies across jurisdictions into a single northern transportation strategy /plan for Canada?

8. *Seek and create partnerships within the territories and with neighboring provinces and other entities*. Many cross-jurisdictional partnerships, focused on transportation in the North, have been developed. One example is the close, long-standing relationship between Alberta and the Northwest Territories, discussed by Premier Handley and Dr. Oberg. Additional examples include the connection between Manitoba and Nunavut, described by Ms. McLaughlin; and the link between Yukon and Alaska, mentioned by Mr. Stecyk and Mr. Boland. Many of the large infrastructure projects in the North are moving forward and being managed by partnerships between communities, government and industry. In similar fashion, research and training initiatives could get off the ground more quickly and more effectively through partnerships between academic institutions, industry groups and government agencies.

9. *Create a 3-W (who, what, when) matrix to guide implementation of the northern transportation action plan*. A 3-W matrix specifies *what* needs to be done, *who* is going to do it, and *when* they are going to do it, i.e. it assigns people (individuals or groups) to tasks and activities within time periods. The following table is an example of a 3-W matrix. The inner boxes of the table are used to assign people to activities by week.

The 3-W (Who, What, When) Matrix

	Week							
Activity	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1.								
2.								
3.								
4.								
5.								
6.								
7.								

Perhaps the first step in moving forward with the northern transportation action plan should be to bring important stakeholders together to create a 3-W matrix. The matrix must focus on assigning people to implement action plan activities within an aggressive but feasible timeframe.

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Appendix I. Roundtable Discussion Summaries

Group A

1. What are expectations of northerners?

    A. self-reliance
    B. reduce isolation
    C. increase sense of social community

2. Strategic vision—frontier (not just solving short term problems)

3. Engagement of stakeholders

    A. understanding of southerners
    B. governments should not develop plans in isolation

4. Strengthen transport infrastructure and responsiveness of governmental transport based agencies to changing northern needs.

5. View transportation system as an integrated multi-modal whole.

Group B (for explanation contact Kathleen Nadeau)

1. Establish an authority to develop action plan

    A. pulls together research in the North—clearinghouse
    B. taps into relevant networks
    C. deals with environmental, economic, social (issues)

2. Develop master action plan—vision for North

    A. sub-action plan
    B. master plan develops guide (priorities, long-term goals and identify players)

3. Technology—open mind focus on infrastructure and vehicles (i.e. amphibious vehicles, bridges)

4. Governance—resource revenue

5. Seek out government and industry partnership.

Group C

1. Identify individual priorities of the three territories.

2. Identify northern sovereignty and security issues.

3. Develop sustainable infrastructure.

4. Promote short-sea shipping (create an off-shore flag for Canadian shipping).

5. Make social/environmental assessments.

6. Review revenue sharing formula to retain greater share of resource revenues.

Group D

1. Determine changing transport demand.

    A. community re-supply
    B. resource development

2. Identify changing technology to meet demand.

    A. roads—winter and all-weather
    B. marine—river and ocean
    C. air

3. Funding

Group E

1. Develop a coordinated, integrated & comprehensive northern transportation strategy.

2. Identify & prioritize infrastructure requirements.

3. Increase political awareness of importance of transportation in the north (i.e. include transportation in Northern Strategy).

4. Be innovative in financing infrastructure.

5. Develop process for sharing ideas and practices.

Group F

1. Sustainable funding that recognizes needs of North

    A. vast distances
    B. climate change
    C. limited infrastructure
    D. small markets
    E. high cost of living

2. Improved infrastructure—existing and new

    A. connect communities better
    B. support economic diversification and resource development
    C. support sovereignty

3. Devolution—transfer of federal control/power to territorial/aboriginal governments

4. Education/training in transport related fields (engineering/construction, operators, etc.)

5. Streamline regulatory burden—minimize regulatory requirements and tailor those requirements to northern needs

Group G (Is there a unified northern strategy?)

1. Define governance (devolution, etc.) and partnerships (local, territorial, federal)

2. Consultation/prioritization of projects based on community/territorial needs—road, rail, air and marine

3. Funding (devolution—territorial vs. federal)

4. Human capacity/capability

    A. doability (training)
    B. need for projects
    C. political/economics; socio-economic

5. Balance regulatory requirements with needs; timing to implement

Balance political/business needs

Group H (NT Action Plan)

1. Air transportation

    A. standards for all airports
    B. construction/renovate/relocate
    C. sovereignty/security

2. Marine infrastructure

    A. port facilities; all communities
    B. standards
    C. sovereignty/security

3. Access roads to Nunavut

    A. central arctic—Manitoba/Nunavut
    B. western arctic—Bathurst Inlet

4. Human resources

    A. training
    B. attracting and retention

5. Inter-community roads

    A. resource roads
    B. community connections

Proposal: similar conference, 2007 in Iqaluit

Group I

1. Streamline regulatory process for new resource development and settle land claims.

2. Better access to training and education within northern communities.

3. Encourage commitment to longer-term contracts that stimulate private sector to improve capabilities.

Appendix II. Survey Results

Federal Government – 11 Provincial/Territorial Government – 4

Industry – 2 Academic – 1 Other – 1

Question I – What do you see as the top 3 issues in Northern Transportation?

1. Cost of developing the transportation infrastructure.

2. Over-regulation.

3. Lack of federal government support.

1. Transport's link to economic development.
   Criticality of ready access to salt water for economic bulk transport to markets.

2. Environmental concerns.

3. Involvement of northerners.

1. More details need to be presented that show exactly what is being done or planned to make the Port of Churchill a port for off-loading import cargo as opposed to loading grain for export. Without facilities for discharging the cargoes from inbound ships, the future for expanding the Port of Churchill will be severely hampered.

1. Transportation partnership.

2. Current northern transportation infrastructure.

3. Particularities and priorities of each territory/region in transport issues.

1. Mackenzie pipeline; outstanding issues/sovereignty issues; identify major issues in each and every territory; infrastructure sustainable.

2. Access issues and aboriginal groups.

3. Human resources and infrastructure; safety and security; environmental effects.

1. Making development responsive to real needs rather than political whim.

2. More money.

1. Lack of infrastructure in Nunavut.

2. Economic and social issues related to increased accessibility to transportation.

3. Political motivation to treat territories similarly to provinces.

1. Infrastructure development, improvement and sustainability.

2. Environmental considerations; socio-economic impact.

3. Human resource management – recruitment, training, retention.

1. Infrastructure investment.

2. Public expectations for levels of service.

3. Balancing economic development with infrastructure development.

1. How to build a sustainable multi-modal transportation system in northern Canada. (distances, costs, population density, climate)

2. Have resources (money & people) to build and operate these required infrastructure in northern transportation.

3. Short timeframe to really take advantage of all of these opportunities. Communication to make sure this is really promoted in Canada at all levels of government.

1. Coherent strategic plan (air, surface and marine).

2. Workforce training and experience.

3. Understanding and engagement from southern Canada.

1. Build up core infrastructure and support to maintain the transportation sector.

2. Set standards and regulations that are fair and common sense.

3. Leader to link everyone together.

1. Traffic density not enough to support certain types of transportation infrastructure.

2. Who should pay for infrastructure? (Feds, territories or private sector)

3. Climate change – effects on infrastructure.

1. Funding – importance of getting percent of resource but also to get share of federal infrastructure programs that recognize the magnitude and extreme cost of arctic projects.

2. Lack of recognition of arctic issues by Canadians; very hard to be top political priorities if only a minority of voters are sensitive and believe that it should be.

3. Multiple priorities; multitude of projects; major investments needed in most modes—road, rail, marine, air—competing between themselves; delays until list of priorities and timelines are established.

1. Lack of transportation infrastructure.

2. Sovereignty and security.

3. Global warming.

1. Infrastructure funding.

2. Political will for Government of Canada to recognize the opportunities in the north and dedicate the funds.

1. Cost, e.g. $3.50-$4 per litre of milk.

2. Availability – lack of infrastructure for economic development of oil & gas and mining.

3. Climate uncertainty – literal: impact on permafrost/winter roads; figurative: will infrastructure investment be made?

1. Market size/volumes versus vast distances/remoteness.

2. Human resource availability and development; training and motivation (attract people to remote jobs).

3. Cumbersome regulation/bureaucracy/decision making.

Question II – What do you feel was not addressed in the conference discussion on the following topics (A-E)

A) Air Transportation Challenges

1. Green transportation; environmentally sensitive transportation.

2. To support network by providing them subsidies and priority in evaluating alternative means (marine, roadways, railways).

3. No NAV Canada representation (very disappointing). Need more around the clock weather monitoring for aviation operations. Need to discuss economic and health care implications of approach ban.

4. Airports and airlines (including government) working together to meet the challenges of air transportation. Everyone seems to work in isolation; airport building everywhere and expanding in some cases to the detriment of air carriers and traveling customers.

5. Content of a national air transportation strategic plan.

6. Small airport viability; is there a need for subsidies?

7. We heard a lot about existing infrastructure and problems but not enough about possible solutions.

8. I think the transportation challenges were addressed very well.

9. How to gain efficiencies; decrease air freight and air travel expense.

10. The aging fleet of aircraft and the absence of replacement aircraft was not addressed.

11. Unnecessarily onerous TDG regulations, which is a variant of a theme that was mentioned.

B) Surface and Marine Transportation Challenges

1. Older equipment in marine transportation; lack of ports and terminals; security.

2. Needed more input on deep-sea transport sector.

3. Marine charting of various areas is outdated. The role of coast guard (CCG) support to industry and to local development. Ice breaker service fee: GN and industry request its removal for North of 60 in Eastern Arctic.

4. Provide priorities to the companies based in the North by giving them business priorities. To invest in new initiatives and challenges by developing new infrastructure, e.g. why Mackenzie (River) depth cannot be maintained by dredging, etc.

5. Cost/benefit analysis may have been insufficiently addressed.

6. Existing rail infrastructure.

7. Off-season utilization due to the short period of usage for marine. Aging human resources.

8. Disappointing session—no coast guard presence. Marine concerns seemed severely under-represented. Consider a presentation from transport and/or coast guard (i.e. issues in arctic).

9. Marine lacks the basic elements: vision, planning and core infrastructure for support.

10. Too much technical engineering information.

11. More information on deep-sea ports; possibility and possible advantages.

12. We will have to continue working with all levels of government to improve our surface and marine transportation.

13. How to achieve sustainable funding for marine infrastructure in Nunavut.

14. Permafrost is a topic that deserves more attention.

15. While touched on, the challenges of seasonality of both marine and surface transport-ation weren't emphasized. This is intertwined with the human resources challenge, which came out load and clear.

C) Pipeline Development

1. Aboriginal consent and satisfaction with the pipeline.

2. Settlement of claims by various aboriginal groups and ensuring them their part in assets which will be taken out from the North.

3. Some discussion on the socio-economic and environmental impact analysis would have been informative. Economic analysis of the international market prices for LPG/LNG would have strengthened the case for the pipeline proposal. Comparison of supply and demand of the international market was unfortunately absent.

4. Where to find the people to be able to put this in place? What about the environmental impact?

5. The feeder routes were not discussed. Are there issues to tie in the individual wells to the pipeline?

6. The economic premises presented seem dubious. Projects seem to be evaluated in isolation—I didn't see sufficient attention to evaluation of cumulative impact of project timing, i.e. develop projects in a delayed, sustainable manner.

D) Climate Change

1. Global warming.

2. More on impact (positive and negative) on shipping in the Northwest Passage.

3. Global warming; to use our knowledge base to mitigate the environmental effects. Instead of fearing the environmental effects, we should proceed with caution and with our best available technology and techniques.

4. Minimal discussion on effects of climate change on marine mode of transportation.

5. Should make Canadians more aware of the climate change impacts on the transportation infrastructure and what governments have to do to improve the situation.

6. Very little (if any) marine transportation effects/plans, etc. No overview from professional organizations of current state of climate change science—meteorology or ice climatology.

7. Start now—proactive rather than reactive.

8. Best session—very good speakers.

9. Very good overview of impacts but more about mitigation strategies would have been great.

10. We need to determine the potential causes of climate change and plan our infra-structure accordingly.

11. Teeth—fines.

12. The issue of permafrost needs more understanding.

13. Response (adaptation) needs to be well thought out so that there is wise allocation/ use of money.

E) Northern Sovereignty and Security

1. Nobody is there to take care of security issues.

2. Could have had representation from Transport Canada Security Branch to look at their programs.

3. Define and bring all the players to the table to become part of consensus.

4. More discussion required vis-à-vis territorial retention of revenues from natural resources.

5. More emphasis could have been placed on the legal issues facing Canada on our legitimate claim to the islands in the Canadian North. What is the federal government's strategy towards legitimizing our claims?

6. No coast guard (CG) presence as speaker—CG is the largest and most consistent sovereignty presence in arctic waters, yet is not represented on any panel.

7. Hot topic but maybe too much profile.

8. We need to discuss this more. We have to do something about it.

9. More recognition of how Canada will have to pay for facilities to express sovereignty and security.

10. The defense of the North depends on mobility—this was not properly addressed.

11. Arctic island oil/gas development would be a demonstration of sovereignty. If economics alone don't warrant it, perhaps sovereignty considerations should complement decision making.

Question III – Other comments

1. Speakers needed more time discipline – not enough time left for questions and discussions.

2. Overall good forum to bring diverse stakeholders, partners together and to raise awareness about various issues. More aboriginal participation should be encouraged in such events, especially key personnel.

3. Such conferences should occur on annual basis so it will help to raise the profile of potential issues and will provide an informal forum to discuss various issues and look for common grounds and learn from each others' experiences.

4. Conference could take place every second year.

5. Have summary wrap-up of Day 1 presentations to tie together the issues discussed.

6. There are two aspects that should be covered in future conferences: (1) views of users of the transportation system were not presented, they should be invited to present their views; and (2) lack of young people attending the conference. This is a conference on the future of Northern transportation.

7. All sessions ran long—little time for questions; some speakers seemed a bit self-indulgent; sound was somewhat inadequate—sometimes could not hear well; no translation; first day was too long by far; speakers need to be aware of limitations of sound system.

8. Talks went on too long; maximum (should be) 15-20 minutes.

9. Excellent conference; only complaint is for those speakers who went over 20 minutes.

10. Fantastic idea to hold the conference in the North. It made the issues much more realistic for "southerners."

11. I think the speakers should limit their presentations to what (time) they were allotted, so there would be more questions and comments from the floor. We should have this type of conference every 2 years and (the) next one should be in eastern arctic.

12. The final day with flip chart input was excellent. Excellent topics; some speakers too long. Disappointing: no time for discussion questions.

13. Users/customers: public and industry were under-represented on panels. Energy is probably a bigger challenge for society; transportation is one facet of this bigger challenge.

Appendix III. Web Sites

http://www.mackenziegasproject.com/ (The Mackenzie Gas Project)

"The Mackenzie Gas Project is a proposed 1220-kilometre natural gas pipeline system along the Mackenzie Valley of Canada's Northwest Territories to connect northern onshore gas fields with North American markets. We are committed to respecting the people of the North and the land and environment that sustains them. Our goal is to have natural gas moving through the pipeline by 2010."

http://www.mvapg.com/ (The Aboriginal Pipeline Group)

"The Aboriginal Pipeline Group was created in 2000 following meetings in Fort Liard and Fort Simpson. Thirty Aboriginal leaders from all regions of the Northwest Territories signed the resolution that created the APG and set its goals. The APG represents the interests of Aboriginal people in the Northwest Territories in maximizing the ownership and benefits in a Mackenzie Valley natural gas pipeline."

http://www.mveirb.nt.ca/ (Mackenzie Valley Environmental Impact Review Board)

"The Review Board's guiding principles are: (a) the protection of the environment from the significant adverse impacts of proposed developments; and (b) the protection of the social, cultural and economic well-being of residents and communities in the Mackenzie Valley."

http://www.northernstrategy.ca/ (The Northern Strategy)

"Vision: The North is a place where self-reliant individuals live in healthy, viable communities, and where northerners manage their own affairs. It is a place where strong, responsive governments work together to build a prosperous, vibrant future for all. It is a place where northern traditions of respect for the land and the environment are cherished, and actions and decision-making are anchored in the principles of responsible, sustainable development. It is a place where citizens celebrate their diversity. The North is a place where the territories and their governments are strong contributing partners in a dynamic and secure federation."

http://www.gov.nt.ca/ (Government of the Northwest Territories)

On January 1, 2003, 41,389 people lived in the Northwest Territories. Approximately half the population is Aboriginal. These people live on a land mass of 1,171,918 square kilometers.

Following are the core values of the Government of the Northwest Territories.

Self-reliance – Northern people, families and governments having the tools and resources they need to function and live independently and to exercise self-determination.

Respect – Treating all residents with respect, dignity, compassion, and fairness, and having respect for the value of our natural environment.

Partnership – Working with others to maximize our resources and potential and to achieve the best results for Northerners.

Identity – Supporting the development of strong individual, cultural and territorial identities.

Accountability – Enhancing the fiscal responsibility, effectiveness and credibility of governments through openness and transparency.

Integrity – Decision-making that is fair, balanced, transparent, and consistent, and a public service that continues to be professional and impartial.

http://www.gov.nu.ca/Nunavut/ (Government of Nunavut)

Nunavut (the Inuktitut word for “our land”) was created April 1, 1999 as a result of the Nunavut Land Claims Agreement. For millennia a major Inuit homeland, Nunavut today is a growing society that blends the strength of its deep Inuit roots and traditions with a new spirit of diversity.

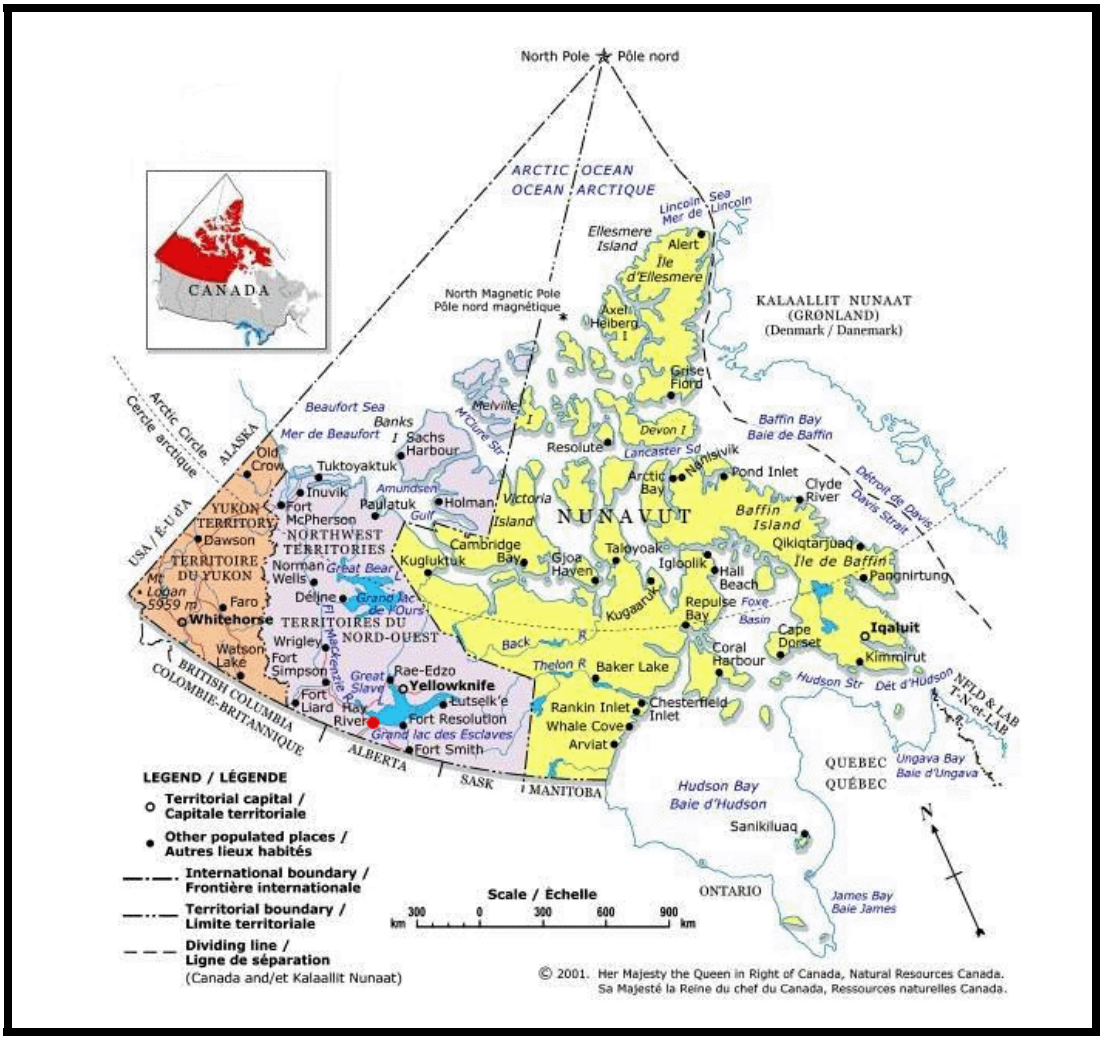
It is a territory that spans the two million square kilometres of Canada extending north and west of Hudson’s Bay, above the tree line to the North Pole. With landscapes that range from the flat muskeg of the Kivalliq to the towering mountain peaks and fiords of North Baffin, it is a Territory of extraordinary variety and breathtaking beauty.

With a median age of 22.1 years, Nunavut’s population is the youngest in Canada. It is also one of the fastest growing; the 2001 population of just under 29,000 represents an increase of eight per cent in only five years. Inuit represent about 85 percent of the population, and form the foundation of the Territory’s culture. Government, business and day-to-day life are shaped by Inuit Qaujimajatuqangit, the traditional knowledge, values and wisdom of Nunavut’s founding people.

Our 26 communities range in size from tiny Bathurst Inlet (population 25) to Iqaluit, the capital (population almost 6,000). Grise Fiord, the northernmost settlement, lies at 78 degrees North: the hamlet of Sanikiluaq in the Belcher Islands is actually further south than Ontario’s northern border. None are accessible by road or rail; everything, from people to fuel to food, arrives by plane or sealift. This physical isolation accounts for the highest cost of living in Canada, reflected in prices throughout the Territory.

Appendix IV. Maps

Yukon, Northwest Territories and Nunavut



APPENDIX V: CONFERENCE PROGRAM

Wednesday
November 9, 2005

7:00 am **Registration & Continental Breakfast**

8:00 am **Opening Remarks**

Peter Wallis, *President & CEO,* The Van Horne Institute

Session One
8:15 am **Northern Vision, Priorities and Expectations**

Hon. Joe Handley, *Premier*
Government of the Northwest Territories

Hon. Ethel Blondin-Andrew, *Minister of State for Northern Development*
Indian and Northern Affairs

9:00 am **Networking Break**

Session Two
9:30 am **Transportation Partnerships**

Chair: Peter Vician, *Deputy Minister, Industry Tourism and Investment*
Government of the Northwest Territories

Panelists:

Hon. Dr. Lyle Oberg, *Minister, Infrastructure and Transportation*
Government of Alberta

Lucille McLaughlin, *Manager, Sustainable Transportation*
Government of Manitoba

Hon. Michael McLeod, *Minister, Transportation*
Government of the Northwest Territories

Discussion

Session Three
10:45 am **Current Northern Transportation Infrastructure**

Chair: Andrew Gamble, *Project Leader,* Deh Cho Bridge Corporation
Panelists:

Alex Campbell, *Deputy Minister, Economic Development and Transportation*
Government of Nunavut

John Stecyk, *Deputy Minister, Highways and Public Works*
Government of Yukon

Russell Neudorf, *Deputy Minister, Transportation*
Government of the Northwest Territories

Discussion

11:45 am **Lunch**

Keynote: Margaret Purdy, *Special Advisor to the Deputy Minister*
Transport Canada

Session Four
1:00 pm

Air Transportation Challenges

Chair: Donald Brownie, *Principal*
PROLOG Canada Inc.

Panelists:

Tom Ruth, *President*
Canadian North

Joe Sparling, *President & CEO*
Air North

Jeanett Flynn, *Manager, Marketing & Passenger Air Service Development*
Edmonton Regional Airports Authority

Marvin Zaozirny, *Director, Airports Division, Department of Transportation*
Government of the Northwest Territories

Gordon Stewart, *President and CEO*
BBE Ltd.

Discussion

2:30 pm

Networking Break

Session Five
3:00 pm

Surface and Marine Transportation Challenges

Chair: Kells Boland, *Principal*
PROLOG Canada Inc.

Panelists:

Carmen Loberg, *President*
NorTerra Inc.

Ray Anderson, *Director*
Matco Transportation Systems

Don Hayley, *Principal Engineer, Arctic Practice Group*
EBA Engineering

Brent Harris, *President*
Premay Equipment LP & Northern Underwater Systems LP

Discussion

6:00 pm

Networking Reception & Dinner

Dinner Entertainment:

Lee Mandeville, *Former Métis National Fiddle Champion*

Thursday
November 10, 2005

7:00 am **Continental Breakfast**

Session Six
8:00 am **Pipeline Development**

Chair: Robert Reid, *President,* Aboriginal Pipeline Group

Panelists:

Stephen Clark, *Director of Sales & Marketing,* TransCanada Corporation

Dr. Paul Metz, *Department Chair, Geological Engineering,* University of Alaska

Discussion

Session Seven
9:00 am **Climate Change**

Chair: Kathleen Nadeau, *Acting Manager of Climate Change,* Transport Canada

Panelists:

Shane LeBouthillier, *Transportation Planner, Planning & Policy, Dept. of Transportation*
Government of the Northwest Territories

Anick Guimond, *Transportation Planner*
Coordination du Nord-du-Québec. Ministère des Transports du Québec

Don Kuryk, *Manager of Technical Services*
Manitoba Transportation & Government Services

Discussion

10:00 am **Networking Break**

Session Eight
10:30 am **Northern Sovereignty and Security**

Chair: Ruth Sol, *President,* WESTAC

Panelists:

Hon. Paul Okalik, *Premier,* Government of Nunavut

Capt. Sarah-Jo Doucet, *EA Commander,* Canadian Forces Northern Area

Dr. Barry Prentice, *Professor, Supply Chain Management*
University of Manitoba

Discussion

Session Nine
11:30 am **Northern Transportation Moving Forward: An Action Plan**

Chair: Dr. Paul Larson, *Director, Transport Institute,* University of Manitoba

Dr. Paul Larson to lead a roundtable discussion

12:30 pm **Closing Lunch**

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