Supporting Canada’s Trade Agenda
RIDLEY TERMINALS INC.

- Loads ships @ 9,000 tonnes per hour
- 12 million tonne annual shipping capacity
- 1.2 million tonne storage capacity
- Handling metallurgical coal, thermal coal and pet coke
- Modernization and expansion to 24 million tonnes is well underway. Completion in 2016

PRINCE RUPERT GRAIN LTD.

- 7 million tonne annual capacity
- 4,000 tonne/hr loading rate
- 202,000 tonne storage capacity
- Grain cleaning capabilities
FAIRVIEW CONTAINER TERMINAL –

Prince Rupert Port Authority, in partnership with Maher Terminals and Canadian National Railway

- Phase 1 Design Capacity 500,000 TEU
- Through an effective operation management the Port has exceeded capacity by a good margin and achieved 600,000 TEU
- Phase 2A Northern Expansion will enable the Port to increase its operation capacity to 1,400,000 TEU.
- Phase 2B Southern Expansion will enable the Port to increase its capacity to 2,200,000 if built as container terminal. It could be build as brake bulk, project cargo as market demands.
FAIRVIEW CONTAINER TERMINAL –

Prince Rupert Port Authority, in partnership with Maher Terminals and Canadian National Railway

- Phase 1 Design Capacity 500,000 TEU
- With the addition of the fourth Panamax Crane in 2013 the Port will be able to achieve 750,000 TEU
PINNACLE PELLET EXPORT TERMINAL PROJECT

PRPA, in partnership with Pinnacle Renewable Energy Group, has completed the constructing a new wood pellet export terminal on Prince Rupert’s waterfront. The terminal will provide the capacity to export two million tonnes of wood pellets annually.

**Phase 1** of the project, the waterfront site, consisted of four 15,000-tonne galvanized steel pellet silos standing 39 meters high, a tower housing, a bucket elevator; and a series of conveyors to load the silos and ships that will dock at Westview Terminal.

**Phase 2** of the project will add three more silos.
Prince Rupert’s Strategic Advantages

- Closest North American port to Asia
- Deepest natural harbour in North America
- Safe, sheltered and efficient access from International shipping lanes
- Superior and uncongested rail connection to North American heartland
- Exceptional community and labour support for expansion

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<th>Pilot Time</th>
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<td>Prince Rupert</td>
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<tr>
<td>Seattle</td>
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Projects Under Construction

- **Ridley Terminals Inc. Expansion** – $200 million
  - Increase capacity to 24 million tonnes/annum
  - Second dumper pit, expanded yard, expanded rail
- **Pinnacle Renewable Energy Wood Pellet Terminal** - $45 million
  - Redevelopment of Westview Terminal site
  - 2 million tonne/annum bulk terminal
- **Ridley Road Rail Utility Corridor (RRUC)** - $90 million
  - Road and rail loop around Ridley Industrial Site as common use infrastructure

Near Term Projects 2013 - 2014

- **Fairview Container Terminal Phase 2a** – $235 million
  - Northern Expansion to achieve 1,400,000 TEU’s of capacity
  - Expanded terminal footprint, rail and second berth
- **Canpotex Potash Terminal** - $400 million
  - 10 million tonne/annum bulk terminal
- **Cow Bay Development** - $31 – $75 million
  - Retail, office, community and cruise related buildings and spaces
- **Ridley Connector Road** - $39 million
  - Road connecting Fairview terminal and Ridley Industrial Site (CEF and logistics park)
Medium/Long Term Expansion 2015 - 2020

- **Ridley Logistics Park** - $50 - $100 million
  - Concept design and development plan to be completed in 2013

- **Bulk Terminals** - $500 million - $10 billion each
  - 3 project proponents actively advancing projects in Ridley Area C and D, and
  - Lelu Island Industrial property
  - BG Group / Spectra Energy – LNG Terminal
  - Petronas / TransCanada – LNG Terminal

- **Fairview Container Terminal Phase 2b South** – $600 million
  - Southern Expansion to bring capacity up to in excess of 2 million TEUs
  - Expanded terminal area, rail capacity, third berth, permitting approved

- **Ridley Terminals Inc.** – $500 million
  - Potential to expand and increase capacity to 40 – 50 million tonnes/annum
  - Third dumper pit, expanded yard, expanded rail, second and third berth
  - Area A, development planning underway

- **General Cargo/Break bulk** – $1 billion
  - General Cargo/Break bulk terminal market assessment completed
  - Project Cargo analysis underway

- **LPG Terminal** - $100 million
COW BAY DEVELOPMENT LANDS
Prince Rupert Port Authority

- PRPA is in the process of acquiring two sites from the City of Prince Rupert as part of a plan to develop the Cow Bay lands to support community use, commercial, retail, and office opportunities. A new office building for the Port is also included.

Cost: $35 million.

COW BAY MARINA
Prince Rupert Port Authority

- The marina facility is part of the overall Cow Bay development as per the concept layout below.

Cost: $2.3 M.
MARINE INFRASTRUCTURE ENGINEERING ASSESSMENT

- The preventive maintenance schedule is based on a 5-year cycle and include the structural assessment of the underwater infrastructure, including x-raying Fairview Terminal’s steel piles.

NEW WATER PUMP STATION #3

- A new, more efficient Water Pump Station will be constructed to address current and future water demand on Ridley Island. The existing Water Pump Station #2 will be retained as the backup facility/system. The project also includes a 600 kW stand-by emergency diesel generator. A structural engineering condition assessment was also conducted on the water reservoirs.
FAIRVIEW CONTAINER TERMINAL
PHASE IIA EXPANSION - NORTH
Prince Rupert Port Authority, in partnership with Maher Terminals and Canadian National Railway

- The federal environment minister announced environmental approval for the expansion project to proceed. The first phase of the project will see the terminal expand northward with the infilling of the old Okabe Shipyards, extending the wharf's structure an additional 800m and increasing the dock area to 56 hectares.

Cost: $160 million
To further support existing and future container terminal operations, the PRPA is considering the development of a Logistics Park along both sides of the Ridley Island Road, on the east side of Kaien Island. The Logistics Park would be directly connected to Fairview Terminal via a connector under separate development along the existing CN mainline. The interface between the Logistics Park and Connector Road would allow for all, or a portion of the Logistics Park to be designated a “Free Trade Zone” (i.e. a bonded area), adding flexibility to the way goods are handled within the site.
Detailed design continues for the proposed potash export terminal which calls for dock and marine infrastructure to receive 180,000 tonne vessels, a 180,000 tonne potash storage building with conveyor and dust collection system, an automated railcar unloading and conveyor system and buildings for administration, maintenance, personnel in addition to site services like water and hydro. Awaiting Canpotex’s Board approval.
PRINCE RUPERT LNG PROJECT
Prince Rupert Port Authority, in partnership with BG Group and Spectra Energy

PRPA has approved BG Group to secure a 200-acre (80-ha) section of land on Ridley Island to construct a LNG export facility. Over the next few years the PRPA and BG will continue to meet with stakeholders, at the same time completing both federal and provincial environmental assessments. Project construction is expected to start in 2017 with service starting by the end of 2021. The LNG will be loaded on ships bound for consumers in Japan, South Korea and China. Due to the long construction period, the LNG will be shipped in 2020.

Cost: $15 billion.

PRPA and BG Group have signed a Project Development Agreement with Spectra Energy to jointly develop plans for a 850-km large diameter pipeline from northeast BC to serve BG’s proposed LNG export facility on Ridley Island. The natural gas pipeline will be transporting up to 4.2 billion cubic feet per day of natural gas vapour from Northeastern BC to the terminal on Ridley Island. Spectra Energy is currently in the pre-application stage, filing their project description in October, 2012. Based on the results of these efforts, project construction is currently expected to commence in 2015 with service starting by 2020. Spectra has launched a website, www.energyforbc.ca and will soon be commencing a series of open houses along the proposed route. Over the next several years the companies will continue to meet with stakeholders, at the same time completing both federal and provincial environmental assessments.
PRPA, in partnership with Petronas / Progress Energy plans to build a LNG plant on Lelu Island. The company has completed a feasibility study, is moving ahead with the front-end engineering design stage, and has submitted their project description to federal regulators. Progress was recently acquired by Malaysia’s state-owned energy company, Petronas. Progress hopes to ship its first LNG exports by the end of 2018.

TransCanada Corporation has been selected to design, build, own and operate the proposed Prince Rupert Gas Transmission Project, an approximately 750-km pipeline to deliver natural gas from the Fort St. John area in Northeastern BC to the proposed facility on Lelu Island. The company has completed a feasibility study, is proceeding with front-end engineering design stage, and has submitted project description to federal regulators.

Cost: $15 billion.
Redevelopment of historically industrial lands adjacent to residential areas that were unoccupied for several decades;
◆ With little or no activity along much City’s waterfront through the 80’s and 90’s, the public perception of what constitutes “the norm” becomes that of limited noise/activity and public access;
◆ Redevelopment of these areas, which were historically heavily used for industrial purposes are met with increased pushback due to the changed perception of normal (Westview Terminal);
◆ Public access to waterfront areas is somewhat limited in the Prince Rupert area, further exacerbating this challenge;
◆ Poor Records, both on decommissioning and construction;
◆ Incomplete and/or incorrect drawings of the grain terminal at Westview Terminal lead to several instances of re-design during the construction phases;
◆ Tight budgets for projects during the “Lean Years” meant that As-Built drawing may never have been completed;
◆ Mitigation includes working to provide enhanced access and public space in areas more suitable waterfront locations.
◆ Mitigation includes enhanced scrutiny of existing conditions during all phases of any redevelopment/renovation projects;
Fairview Container Terminal Construction Challenges

- Project Management – It was felt the design team (Westmar) did not have the necessary experience to manage the project, so a consultant we felt capable (M&N) was engage to manage the project. This was not a common arrangement to have two consultants working in tandem to oversee a project.

- Pile Installation – The length of the piles (depth of water 16 m and overburden thickness up to 16 m) and the seabed slope were a concern as the construction required the piles to be equidistant and parallel to the dock. The contractor build a jig with temporary piles to ensure pile spacing was correct, and used an auger to cut into the slope to establish the pile did not slip.

- Contractor experience – At the time there were no contractors capable of building the terminal with their own resources. There was pressure to ensure the project was completed as financially economical as possible. The Port elected to parcel the work by category (i.e. Marine, Civil, Building, Electrical, Transmission Line), guaranteeing qualified contractor for the best price (no sub-contractor mark-ups)

- Contractor interface – given there were numerous contractors independent of one another working on the same site, there was considerable effort and negotiation performed to ensure the contractors would integrate their associated works without filing a claim for extras.
This project will extend current limits of road and rail service to loop the perimeter of Ridley Island.

**Phase 1:**
- Road and five rail lines installed (three inbound and two outbound). Each 8.25 kilometer rail loop will have the capacity to hold 450 rail cars each, or 2,250 combined at any given time.

**Phase 2** (full build out), is based on the demand from terminal projects
- 14 more incoming tracks and 12 more outgoing. Ultimately the design includes an extension to the existing 69 kV BC Hydro grid, water, telecom and an access road with a rail overpass and underpass.

Original rail construction for Ridley Island included infilling of the marine environment, without the removal of underlying soft sediments; With the current project a large geotechnical program is being implemented which included a vast array of piezometers, settlement gauges and slope indicators to keep constant monitoring of movement, along with a phased in-fill plan.

**Topography of Bedrock on Greenfield Lands/Challenges**
- Due to the land being in greenfield, data regarding depth to bedrock, rock characteristics and other geotechnical issues is limited, high cost and limited access. Underlying bedrock on Ridley Island is highly variable; while averages tend to be accurate over a large area (ex. the entire Island), over a small area they can differ substantially.
- Mitigation: A “Peat Probing” program was successfully implemented but missed few pockets of blue clay;
- In situ Blue Clay is as hard as bedrock, but exposed to water it liquefies so construction practises needed to be modified in the field to deal with this challenge;
Geotechnical Setting/Challenges

◆ Slope hazards, primarily debris flows and debris slides often within the thin veneer of organic soils overlying bedrock.

◆ Organic soils, for land facilities, at depths greater than 3m, may be too costly to remove and often require installation of deep foundations, such as pilings.

◆ Clay soils can be compressible and sensitive. Compressible soils can lead to significant long term settlement. Sensitivity of the soil, which is the ratio of peak to remolded shear strength can lead to collapsing of the soil structure with strain. This can lead to issues with embankment construction over these soils, and significant landslide concerns.

◆ The highly variable nature of the bedrock elevation, and presence of long persistent steep joints can results in significant variations in soil thickness at sites, and ground improvement or deep foundations such as piling for land structures can be difficult due to these irregularities. If the bedrock is highly weathered or fractured, pile tip depths may be significant in order to overcome tensile forces and establish a sufficient uplift capacity, particularly in pile groupings.

◆ Shortage of sand, gravel and aggregate. Structural fills are either barged, dredged, or more commonly crushed from local quarries using the meta-sedimentary schistose bedrock. The high mica content in the rocks can break down over time, resulting in long term durability issues and generation of high fines content in processed aggregate. In addition, the presence of sulphide minerals may lead to Acid Rock Drainage and Metals Leaching (ARD/ML) issues for aggregate placed in riparian areas or near sensitive receptors. The presence of gypsum on joint surfaces indicates that there may be an amalgamation of the oxidizing sulphides and naturally occurring carbonate minerals that are present in the rock. This mineralogy change does have a significant volume increase, and may result in heaving of aggregate placed in areas where oxidation can occur.
Geological Setting/Challenges

- The geology consists of early Mesozoic to late Paleozoic metamorphic bedrock with a long continuous band of younger coast plutonic intrusive granitic rock. The bedrock consists primarily of schistose meta-sedimentary rock of varying sedimentary grade. Mineralogy contains primarily quartz and mica minerals, with varying amounts of amphibole, local carbonate, graphite and garnet, and accessory minerals that do include sulphides.

- Surficial geology is dominated by organic soils or “muskeg”, with late Quaternary glacial and raised marine sediments often found underlying the organic soils, overlying bedrock. Raised beach deposits, glacial till, and raised marine silt and clay soils are commonly found up to the marine limit defined by post glacial sea levels that were higher than current levels.

General Challenges

- Poor as built drawings/records
- Poor contractor experience
- Higher costs due to lack contractor firms
- Unqualified work force
- No local professional consulting support
- First Nation element and negotiations
- Annual precipitation in the order of about 3m per year,
- Tidal fluctuations that are often in the range of 7 m per day
- High winds

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A sound and realistic vision and growth planning
An effective marketing and business development and partnerships
Strong and viable HR policies that enables the Port to recruit talents as well as strengthen the organization through training and reorganization.
social license
An effective finance and budget management
A strong and effective Capital Project Management
An effective asset management through an well utilized preventive maintenance program (CMMS) …etc
Thank You