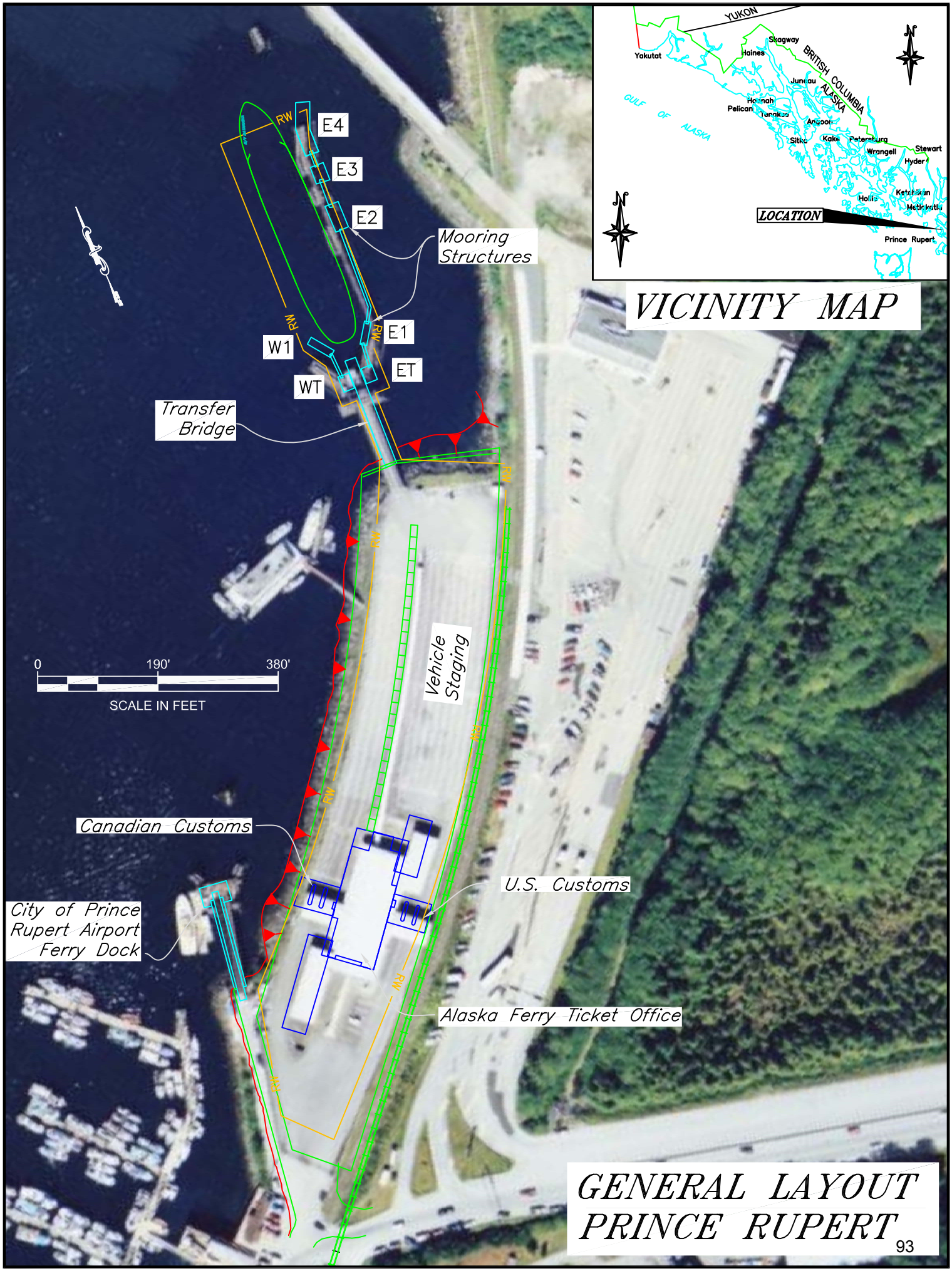

E4
E3
E2
E1
ET
W1
WT
RW
Mooring Structures
Transfer Bridge
Vehicle Staging
Canadian Customs
U.S. Customs
City of Prince Rupert Airport Ferry Dock
Alaska Ferry Ticket Office
0
190'
380'
SCALE IN FEET
YUKON
Yakutat
Skagway
Haines
BRITISH COLUMBIA
ALASKA
Juneau
Pelican
Angoon
Sitka
Kake
Petersburg
Wrangell
Stewart
Hyder
GULF OF ALASKA
LOCATION
Prince Rupert
VICINITY MAP
GENERAL LAYOUT
PRINCE RUPERT

Prince Rupert Ferry Terminal

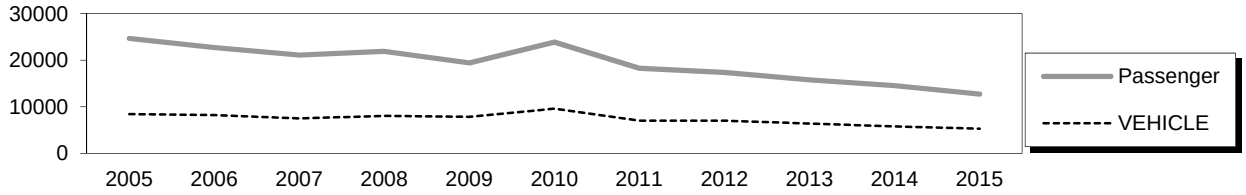
2100 Park Avenue

Owner: City of Prince Rupert / Prince Rupert Port Authority

Terminal Manager: Cathy Basdeo – 250-627-6523

Terminal Description: Prince Rupert Ferry Terminal is a stern-loading facility consisting of a timber transfer bridge, supported by a timber framed lift tower and counterweight system at the seaward end, with two timber stern dolphins, and three timber breasting dolphins connected by timber catwalks. Uplands include a terminal building built in 1992, with US & Canadian customs stations, paved parking and overhead lighting. The facility was originally constructed in 1963 to service AMHS vessels. Terminal is owned by the Prince Rupert Port Authority (PRPA). The City of Prince Rupert also had interest in the terminal building. As of April, 2013, AMHS now leases the entire facility under a fifty-year term for exclusive AMHS operations. AMHS is now responsible for all operation and maintenance of the marine and upland structures.

The past 10 years of total passenger and vehicle traffic counts for Prince Rupert are shown below.



The most recent above water survey was completed on September 30, 2013.

Vessels	
Name	Berthing, Alignment
All AMHS Vessels	Stern

Tidal Data
No data available at time of printing.

Utilities		
	at terminal	at ramp
Electrical:	Yes	Yes
Water:	Yes	Yes
Sewer:	Septic	No
Telephone:	Yes	No
Cable TV:	No	No
Fuel:	Yes	No
Wireless Bridge:	No	No

Generator & building
This facility does not have a generator.

Bridge Lift System	
Type:	Timber framed lift tower and counterweight system.
Year Built:	1963
Lift Towers:	15 timber piles with cross bracing (each side)
Lift Beams:	(2)-20.5'x44" glulams
Bridge lift:	Cable supported counterweights (2:1) w/ electric motor hoist (6:1)
Apron lift:	Hydraulic
Condition:	Poor

Uplands	
Short-Term Parking:	5 cars
Long-Term Parking:	0
Staging Area:	1000 lineal feet, 3 lanes; 10,000 lineal feet of pre-staging
Paint Striping:	Yes
Driving Surface:	Asphalt

Terminal Building	
Year Built:	1992
Square Footage:	8500 s.f.
Heating System:	Furnace (Natural Gas)
Fuel Storage	City Supply (Natural Gas)
Fire Protection:	Alarm
Condition:	Good

Vehicle Transfer Bridge	
Type:	18' x 140' Glue-Laminated Twin I-beam
Year Built:	1963
Shoreward Support:	Rocker bearing on piles
Seaward Support:	Counterweighted cable support
Pedestrian Access:	Separate 4' wide on bridge
Lighting:	Light on overhead beam
Condition:	Poor
Load Posting Sign:	N/A
Original Design Load:	H20 - Rated in 2008 to 70,000 lb max vehicle load.

Dolphins							
Dolphins	**Rubbing Piles**	**Fender Piles**	**Dolphin Piles**	**Anchor Piles**	**Built**	**Cond.**	**Notes**
W1	24V	31V	18B, 28V	18V	1963	Poor	Green navlight (Rubbing 7 Fender piles replaced - 2007)
E1	22V	29V	18B, 28V	18V	1963	Poor	Crushed.
E2	18V	24V	18B, 28V	18V	1963	Poor	
E3	9V	12V	10B, 12V	12V	1963	Poor	Three anchor piles share with E4.
E4	30V	40V	28B, 45V	18V	1963	Poor	Red navlight

LEGEND
B = Battered Timber Piles V = Vertical Timber Piles

Catwalks / Gangways								
#	**From Struct.**	**To Struct.**	**Lenth / Style / Main Members**	**Built**	**Safety Chains?**	**Cond.**	**Lighting**	**Notes**
C1	Bridge	E4	200' / Catwalk / Timber stringers on piles spaced 10' (roughly) apart	1963	No	Good	Jelly Jars	Sringers, metal grating and handrails were replaced in 2007
C2	Brige	W1	200' / Catwalk / Timber stringers on piles spaced 10' (roughly) apart	1963	No	Good	Jelly Jars	

Terminal Projects			
Year	**Project #**	**Project Name**	**Description**
1963	N/A	Prince Rupert Ferry Terminal Construction	Original fill onto tidelands; built transfer bridge and lift system and six timber mooring dolphins (W1, E1-5).
1998	N/A	Prince Rupert Ferry Terminal Apron Replacement & Miscellaneous Repairs	Replaced original 15; timber apron with steel 15; apron and 10; articulating extension to fit Kennicott. Steel was added to counterweight boxes due to increased weight of new apron. Replaced old apron cable, lift gears and motors; replaced shoreward bridge bearings; replaced rotten bridge decking; relocated electrical bridge controls.
2002	N/A	Prince Rupert FT Repairs	Catwalk repairs: new stringers, expanded metal decking and aluminum railings.
2003	N/A	Prince Rupert FT Maintenance	Replaced bridge hoist cables, shackles and blocks after the existing shackle broke.
2008	N/A	Prince Rupert Ferry Terminal Rehabilitation	Replaced fender panel on E1 dolphin, added reflective markers on dolphin caps, steel pipe support piles on outboard side of counterweight towers, replaced overhead & cap beams, repainted lift beams, replace hoist cables and the hoist block connecting the cables to the counterweight box, cut off the pedestrian walkway on the RT side of the transfer bridge, removed asphalt pavement from the transfer bridge, replace the bearing pad and rocker on both sides of the abutment.

Observations

1. A combined terminal and customs building was completed in 1992. This facility is approximately 8,500 square feet and houses passenger waiting areas, restrooms, ticket offices, terminal operator offices, customs agent offices, and a customs clearance room. In 2002, AMHS helped fund a secure room for Canada Immigrations to house the computer used by Canadian Police Information Center (CPIC). The terminal building is in good condition.

   The roof over the Canadian Customs vehicle inspection area has minor surface rust along the gable edges and on structural members exposed to the elements beneath. The paint coating is failing on the vertical and horizontal tube supports for the covered walkway between the terminal building and the bridge.

2. The transfer bridge was built in 1964 and consists of twin glue laminated I-shaped girders, and a nailed laminated deck. The 5-foot wide pedestrian walkway was cutoff the RT side of the transfer bridge in

   2008. A steel apron structure is attached to the seaward end of the bridge. The bridge is supported at the shore abutment on bearings and at the seaward end by a cross girder. The original glue laminated cross girder was replaced in 2008 with a welded steel girder. The cross girder is attached to a cable lifting structure. New bearing pads and rockers were installed on the bridge abutment.

   In 1997 the timber deck was overlaid with an asphalt topping lift, 2-1/2" thick in the driving lane and 1" thick in the walkway. The asphalt was removed in 2008, along with the ped. walkway, to decrease Dead Load on the bridge supports

3. A new hydraulic apron was installed in 1998 to accommodate the Kennicott. The apron is 15 ft. long, with an articulating 10 ft. extension for the Kennicott mounted below. The new structure weighs considerably more than the original 15 ft. timber apron. All of the UHMW wear strips on the underside of the extension have come off and the tube girders have been bearing and rubbing against the vessel sponson. The wear has removed the galvanized coating and the steel is freely corroding.

4. The lift towers consist of 15 timber piles with cross bracing, with two steel support piles installed in 2008 on the outboard end of the towers. The original structural timber support piles from 43 years ago are covered in barnacles up to the mean high water line. The through-bolts that connect the diagonal braces to the timber piles should be checked for corrosion throughout both towers, and the bolt holes checked for marine borer infestation.

5. The overhead beams are 7-1/4" x 30" creosote-treated glue-laminated (glulam) timber and support the cable sheaves for the counterweight-lift system. Two of the beams span the distance between the two towers, while the short middle beam spans between the pile caps on each tower. Combined, the three beams on each tower support the weight of a counterweight box and a quarter of the weight of the vehicle transfer bridge. Work on the 2008 project removed the lichen/moss buildup and added a new coat of paint to the overhead beams.

6. The only light source along the bridge is a high-pressure sodium fixture bolted midspan beneath the overhead beams.

7. Two creosote-treated glulam lifting beams support the seaward end of the bridge. The beams are 20.5" x 44" and support half the bridge weight & up to 100% of the vehicle loads. Cables tied to the counterweight system support the bridge lift beams at each end. We were not able to inspect the lift beams as access requires a skiff.

8. The counterweight boxes are made of 3/8" steel plate with a bulkhead/stiffener that divides the box into quarters. The boxes were filled with steel ingots and topped with concrete. 2 tons of steel were added in 1998 after the installation of the new apron. Loose chain was piled on top, most likely due to the increase in weight of the asphalt topping lift, higher moisture content of structural timber, etc. All that remains is loose rebar after they reduced the bridge weight in 2008. The block and wire ropes to the counterweight boxes were replaced in 2008.

   Critical welds between the hangar plate and the box, as well as the cable attachment to the hangar plate, could not be checked by visual inspection due to the items within the box. The hangar plate was re-painted in 2008, but we're not sure if the welds to the counterweight box were inspected during the project.

9. The stern dolphins W1 and E1 center the vessel on the bridge, to allow transfer of vehicles and crew. They are skewed at roughly a 45^{o} angle to the centerline of the bridge to fit the rounded sterns of AMHS vessels. The stern dolphins are built of creosote-treated timber piles and consist of 24 fender

piles, 28 vertical piles, and 18 anchor piles. Two smaller 7 & 9-pile dolphins were built on either end of each stern dolphin, although the 7-pile dolphin is missing on the seaward side of dolphin W1.

In summer of 2007 a project was completed that included replacing fender piles for dolphin W1 and capping the tops of vertical piles with aluminum flashing. The same work was performed on dolphin E1 in 2008. BC Ferries is interested in using the AMHS ferry terminal as a lay-up berth for the M/V Queen of Prince Rupert. Modifications to these dolphins may be necessary to fit the apron to the vessel's stern door as well as properly fender the outside corners of the vessel.

10. There are four breasting dolphins on the East side of the berth. Their construction is similar to the stern dolphins. Several front fender piles are missing; dolphin E2: 10 of 18 remain; dolphin E3: 7 of 9 remain; dolphin E4: 5 of 12 remain. This facility was originally designed to handle 79-foot wide vessels (MALASPINA, MATANUSKA, and TAKU) which fit the three eastern dolphin groups. This properly aligns the stern with the transfer bridge. The facility is too narrow for the 85-foot wide Kennicott to use all of the breasting dolphins and allow proper alignment of the stern opening and the transfer bridge. When moored, the Kennicott is skewed so that the stern is centered correctly against the stern dolphins and then made snug against the first eastern starboard breasting dolphin. All lateral loading is applied to the first group of breasting dolphins E1. During gusty or high wind conditions it is possible for the vessel to damage this dolphin group.
11. On March 28, 2007, the terminal was closed for structural repairs to dolphin W1 and elsewhere noted. During shutdown, the M/V Taku was able to dock in the BC Ferries' Prince Rupert Ferry Terminal, next door to the AMHS terminal. In order to keep the apron centered on the Taku car deck, the ship was tied off skew from the fender line, and only rested on the two stern fenders and the nearest dolphin on the west side of the bridge.

Summary: Elements of the mooring structures, transfer bridge, and lift system have remained in service since 1963 and are showing signs of years of use and degradation from the marine environment. Several inspection reports from AMHS and consulting engineering firms in recent years have recommended that elements of these timber structures be replaced or repaired. The repair work performed in 2008 was to stabilize the major structural elements. Complete replacement of all marine structures is needed (and currently under design by AMHS with construction funding established for FY15).

The following list of recommendations include those provided by consulting engineers reports and are focused on repair/replacement of existing structural elements. They are numbered starting with the highest priority. These issues will no longer be of concern once the facility is replaced.

Inspection Summary

Structure	Priority	Recommendations
Category I - Safety Repairs		
Timber Transfer Bridge	1	Horizontal cracks in the top flange of the glulam bridge girders shoule be treated, sealed and monitored. The cut edge of the bottom flange should be treated and sealed. Install a steel sleeve around a new timber bearing block, beneath the masonry plate of the east rocker bearing. Repair the bridge abutment by replacing the tie-back bolts for the abutment retaining wall and the steel transition plate and steel box beam support at the head of the bridge. Horizontal tie-rods between bridge girders should be replaced where they are not long enough to be fully threaded onto the nuts. Replace tie-rods were corrosion is severe. Repair the galvanized coating of the wear area on the underside of the apron and reinstall the UHMW wear strips with larger diameter mounting studs.
Timber Mooring Dolphins	2	Replace damaged and deteriorated front fender piles and mounting hardware as necessary. These structures have been in use for 43 years.
Maintenance & Annual Inspections	3	Institute a rountine detailed inspection cycle and more frequent maintenance schedule for greasing cables, blocks and fittings on lift system parts. Perform annual/biennial inspections of primary structural elements of the facility and provide a report/loading limitations (if any) to the owner and AMHS.

Inspection Summary (continued)		
Structure	Priority	Recommendations
Category II - Rehabilitation Work		
Terminal Building & Uplands	4	Re-paint the gable edges and underneath the rood over the Canadian Customs vehicle inspection area. Re-paint the vertical and horizontal tube supports for the covered walkway between the terminal building and the bridge. Other miscellenous items also on file with terminal manager.
Category III - Upgrades Needed		
Marine	5	Replace all marine facilities with new, modern structures to service current and future AMHS service. This project is under active planning and design (Project 68531) with construction obligation scheduled for August, 2015.

REFERENCES:

Coast Isle Engineering Ltd. (November, 2003). *Prince Rupert Port Authority, Alaska Ferry Terminal 2003 Condition Review*. Prince Rupert, B.C., Canada.

Coast Isle Engineering Ltd. (February, 2004). *Alaska Ferry Terminal, Prince Rupert; Interim report II: follow-up of Marine Structures Inspection.* Prince Rupert, B.C., Canada

Coast Isle Engineering Ltd. (June, 2004). *Alaska Ferry Terminal, Prince Rupert; Further Investigation into condition of components.* Prince Rupert, B.C., Canada

Appendix A: Foreshore Technologies Inc. (June 2004) *Alaska Ferry Terminal, Headframe Towers Pile Inspection Report.* North Vancouver, B.C., Canada

Appendix B: Equilibrium Consulting Inc. (May 2004) *Alaska Ferry Terminal, Prince Rupert, B.C.; Superstructure Assessment.* Vancouver, B.C., Canada

Project #68531 – Prince Rupert Ferry Terminal Replacement:
The final design is complete for a project to remove and replace the entire marine facilities with new structures to provide a new stern berth. Project was advertised once, and bid documents were pulled due to Buy America issues. The project is on hold until a resolution is found.