

A terminal situation

By Correspondent Tonia Jurbin

BC Ferries is currently well into its ambitious 15-year plan to modernize the crown corporation. In fact, it has already committed several millions of dollars for each future fiscal year to upgrade everything from its fleet of ships to ferry terminals. The various projects are being scoped out in five-year periods of time.

For the next couple of fiscal years, for example, the focus is on marine structure replacement projects, dock upgrades and some vessel replacements. Most of the existing terminals currently being upgraded are timber pile structures that were built around the mid 1960s to the mid 1970s and are nearing the end of their useful life. While modernizing the terminals, they are also being upgraded to accommodate current building codes for seismic and commercial traffic loading and, of course, improving customer service.

As already mentioned, most of the existing terminals were built using a system of fixed timber piles, many of which are aging and becoming infested with toredos, shrimp-sized wood eating bugs.

Bruce Fisher, project manager for BC Ferries says: "The cost to replace these docks using similar designs are high, and the existing docks and ramps require many mechanical linkages which result in

higher future maintenance costs."

In addition, says Fisher, is that existing ramps can only handle commercial vehicles up to 23 700 kg while new design codes require ramps that can accommodate vehicles of up to 63 500 kg. Quite simply,

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Aerial view of a new loading ramp designed to handle heavier vehicle loads.

commercial vehicles that are too heavy for the existing facilities are turned away.

"The most economical way to upgrade a single level dock that has a single or a two-lane ramp is to build a floating dock. Fewer piles





Ferry service continues as contractors work in adjacent waters.

sultants Inc. of North Vancouver designed the pontoons and wingwall systems. Several of the terminals also got new ramps. Vancouver Pile Driving (VPD) has been the successful bidder on seven of these upgrading jobs as either the general contractor or the marine sub contractor.

Earls Cove is one of the smaller terminals being upgraded. It serves passengers travelling north along the Sunshine Coast to Powell River, a coastal sawmill town of about 14,500. The job is to replace the old-fashioned timber and steel pile wingwalls on the older of the two berths that was built in 1967. At some of the smaller terminals there are two berths. However, one is for emergencies and is rarely used.

This contract was for \$1.3 million and will take about



Pre-fabricated concrete pontoons and wingwalls were built in dry-dock and later shipped to their new locations.



Different shape structures were built to accommodate different-shaped vessels.

are needed and the result is a more flexible terminal," says Fisher.

For the 2000/2001 fiscal year, five terminal upgrades were planned and are either complete or under construction. All of these upgrades are being built at terminals in the heavily

used south coast routes, each one costing between \$1.3 to \$1.6 million and taking about four months to complete from fabrication to installation. Most of the upgrades include new pre-fabricated floating concrete pontoons and wingwalls. Westmar Con-

three months to complete. It includes demolition and removal of the old piles, installing the new steel piles, building the concrete pontoon and wingwalls in the VPD drydock in North Vancouver and towing it into position about 15 hours away. This is

A welder works on a pile and steel cage combination.

Replacing older wooden piles with new concrete components required lots of drilling and equipment.



the annulus filled with grout. After that, 711 mm dia pin piles were drilled another 5 m deeper than the bottom of the 1067 mm vertical piles.

Reinforcing steel cages were dropped into the pin and the vertical piles. Holes were punched in the battered piles and welded to the vertical piles. The whole assembly was filled to the top with concrete.

The biggest challenge on this job was drilling the rock sockets. "The life of the drill bits in this rock is extremely limited. It depends on the rock and if there is any stray steel around," says Sue Laforest, project manager for Vancouver Pile Driving.

"If there has ever been work in a given area, you are almost sure to hit stray steel which can damage a drill bit in a matter of minutes. It is also difficult to maintain a location when drilling in such hard rock.

"We were drilling one of the battered piles for a full day before we realized that the bit was following a previous steel pipe pile. The drill bit finally fused right into the discarded steel pipe pile so the hole had to be abandoned."

Along with the bad comes some good and the designers were able to incorporate an existing abandoned footing on the rock slope to install a pipe strut to one of the vertical piles in place of a battered pile.

Drilling was done using a 4600 Manitowoc (200 ton) crane with vertical travel leads and a BHD 90 rotary drill with several variations of up to 16 tricone bits. Because of the hard rock, they were drilling through about four tricone bits and about eight smaller bit segments were replaced when drilling the rock sockets. ♦



the fifth pontoon that VPD has built for BC Ferries and they recently won the contract to build a double pontoon for yet another future upgrade.

All of the pontoons are slightly different to accommodate the different ships in the fleet and the varying water depths. The new pontoons use a modern "sliding ship berthing fender system" which allows the berth to be adjusted to fit several different vessels. It will give BC Ferries much more flexibility with the fleet. But the system requires accurately set piles.

The pontoons are cast-in-place concrete slabs and walls with internal styrofoam or polystyrene filled billets. The volume of styrofoam ranges from about 130 to 170 m³,

The pontoon at Earls Cove has about 130 m³. The depth of these pontoons range from 2.7 m to 3.1 m. The pontoon at Earls Cove is 2.8 m deep.

The main components of the berth at Earls Cove are the port and starboard anchor dolphins. Each dolphin is made up of two vertical 1067 mm dia thick wall open-ended pipe piles that are about 21 m long and are braced or tied together with a horizontal strut for accuracy and stability. Two 762 mm dia thick wall batter piles about 22 m long are welded to the vertical piles.

Because there is no overburden at this site, the vertical piles were set in 2 m deep, 1168 mm dia rock sockets. The holes were located, drilled and inspected and the piles were set and