Wet & Wonderful

By Correspondent Tonia Jurbin

One of the benefits of shoreline construction along the Fraser River in British Columbia's lower mainland is the environmental compensation that is required by regulatory authorities for work that negatively impacts the natural habitat.

Compensation is calculated based on the area of habitat that is lost and the value of that habitat. Different habitat, however, has different values. Wetlands, for example, have a higher value than mudflats. Compensation usually involves substantial reclamation projects that may include habitat creation for fish or wildlife such as marshlands and tidal flats, or recreational improvements like hiking and bicycle trails.

On a recent project to accommodate the foundations for a section of the Vancouver Skytrain's elevated guideway in New Westminster, the shoreline of the Fraser River was extended. This construction destroyed some of the low productivity habitat and shoreline vegetation for which environmental compensation

had to be built by the project owners. However, rather than building the minimum compensation required, this construction provided an opportunity to build a larger community enhancement project.

The $10-million riverside park promises to be a jewel along the Fraser River in a few years when the vegetation is well established and the tidal marsh is thriving with marine life.

The 800-m long, three ha Sapperton Landing Park will create a new greenway. The general contractor is T.Y.M. Joint Venture made up of the Tsleil-Waututh First Nation, the Yiasulth Management Corporation Limited partnership, and Matcon Excavating Limited.

The park features an extended riverbank, a bike path, a walking path, picnic areas, three lookouts, two pedestrian bridges to an island built in the middle of the marsh, a new pier with a gangway and docks, and trees, shrubs and grasses to vegetate the riverbank and the island.

The prime contractor did all of the landscaping, but wetland specialists selected and cultivate the vegetation that was planted in the tidal areas under separate contracts. The project owners are responsible for monitoring and maintaining the planted marsh for five years.

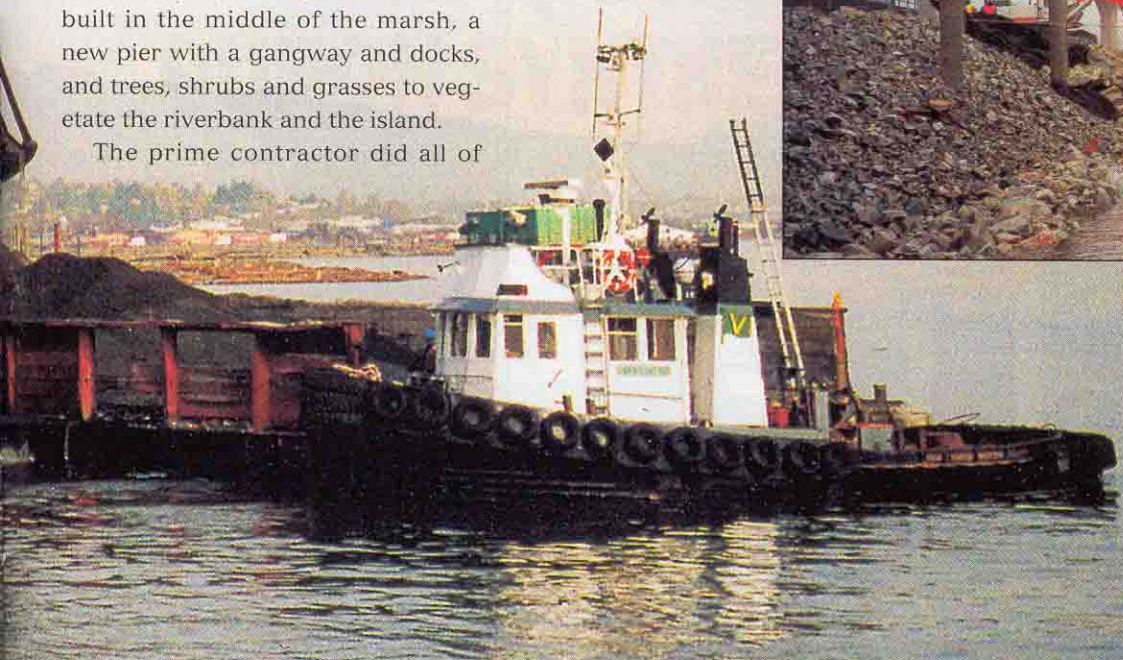
Concurrent with the land and marine related park construction, the Skytrain's elevated guideway was also under construction and about half way through the park construction schedule, the Greater Vancouver Regional District (GVRD) tendered out a contract to install a one-km-long section of a 1.68 m dia forced sanitary main.

"When all of the contractors are on site at the same time, coordinating them and ensuring safe access to the respective areas of the site was the biggest challenge," says David Leitch, T.Y.M.'s project manager.

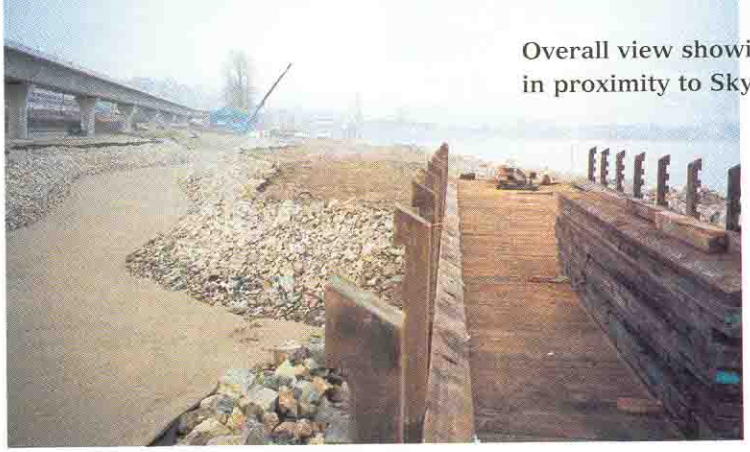
Marine works, including building the island, pedestrian bridges, lookouts, ramp, pier, float and all of the dredging, was worth almost half the value of the contract ($4.2 million) and was awarded to Vancouver Pile Driving.

The first stage of the marine work was to dredge out a keyway along the whole length of the park about 40 m out from the newly created shoreline. The keyway ranged in width from 5 to 8 m and in depth from mudline to 6 m depending on where the till layer was reached. About 21 000 m^3 of loose saturated material was dredged using a six yard clamshell derrick.

Material was stockpiled on another barge during the day and towed to a nearby storage site overnight. The loose saturated material was removed because of liquefaction concerns. The keyway was filled in with 152 mm of clear crush by a second clamshell derrick working about



Adjacent photos show vast amounts of dredged materials being stockpiled on barges while on shore, excavators place heavier materials close to Skytrain's elevated guideway.



Overall view showing island and walkway in proximity to Skytrain's guideway.

three days behind the first one to allow sufficient room between derricks for the crews to operate the construction equipment and the support equipment including crew skiffs and tug boats.

All of the shoreline survey was done using a lead line at slack tide. Shore survey was done using a GPS and an electronic sounder.

The most unique feature of this park is the island in the middle of the marsh. When completed, it will be about 200 m long, about 15 m wide at the crest and offset from the new shoreline by about 25 m.

Location of the soil-improving keyway is directly underneath the outside shoulder of the island. For building the island, 152 mm clear crush was used for the outside shoulder of the island up to the low water level. That part of the island was placed first to help contain the fines from the 152 mm minus that was used as general fill which makes up most of the rest of the island.

"Containing fines at this site was not a big issue because the currents are not that strong at this location, and because of the gradation of the material," says Kevin Giberson, project superintendent for VPD.

No geosynthetics were used for most of the island, however, T.Y.M. lined the channel between the island and the shoreline, the inside slope of the island as well as the marsh area downstream of the island.

The difference between high and low tide along this stretch of the river in the fall is about 3.6 m. The crest to the toe along the whole outside length of the island was armored with 0.8 m rock while the more protected inside face of the island was protected with much smaller 0.24 m riprap.

During full production, up to 6000 tonnes of material was placed daily using a combination of clamshell buckets for the clear crush and self dumping scows for the general fill. No compaction was required for any material beneath the low water level.

About 150 000 m^3 (301 000 tonnes) of fill including the clear crush for the keyway, and 21 000 m^3 (38 000 tonnes) of riprap was placed over a period of about five months. Some compaction of the general fill above low water was called for, but final grading and compaction above low water was up to T.Y.M.

A total of 70 salt-treated vertical timber piles were driven for the two pedestrian bridges to the island and the three lookouts along the shoreline. Pile lengths range from 10 – 13 m with embedment lengths of 5 to 10 m. An aluminum ramp was installed to connect a new (design/build) concrete float and an arrow shaped pier supported on four steel piles.

Standard environmental procedures were followed, and no special containment instructions or restrictions were ordered on this job.

The project owner arranged all of the approvals before the contractors mobilized. "This is really a pretty straightforward job for us," says Giberson. "I guess the biggest challenge here was to place such a large volume of material in such a short period of time." ◆