Association of Consulting Engineering Companies (Award of Excellence 2012)
No. 4 Road Drainage Pump Station and Park Plaza

A 2010 Olympic City and a truly Island City by Nature, the City of Richmond is entirely surrounded by water and as such, Richmond's flood protection system is crucial to the City's well-being. The City operates and maintains 39 drainage pumps stations with a total of 110 pumps that have a combined operating capability of pumping over 1 million Gallons Per Minute. This system can be operated through the City's SCADA system and is monitored on a 24/7 basis.

Fundamental to the City of Richmond's ability to provide flood protection service is a world class system of dikes, gravity mainlines, ditches/canals/sloughs and drainage pump stations. Existing and considerable planned growth in the West Cambie area following Canada Line construction and the 2010 Winter Olympics has resulted in the need to upgrade existing flood protection system capacities.

Completed Pump Station- Back-up Generator Building (Left) and Control Building (Right)

The existing No. 4 Road Drainage Pump Station was constructed in 1974 and accordingly housed ageing and antiquated pumping related equipment. The existing station pumping capacity of 3.3 cubic metres per second was far less than the required capacity upgrade to approximately 6.0 cubic metres per second required to meet the service levels in the re-developed West Cambie area.

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The No. 4 Road Drainage Pump Station is located on the popular, highly utilized Fraser River Middle Arm dike/trail system. This pump station site is also immediately adjacent to a current major residential development. The existing pump station area was very basic from a public trail and pump station access viewpoint – this area was transformed into a significant architectural feature with a large public plaza viewing area offering spectacular views associated with the Fraser River Middle Arm and all its amenities.

Public Art on the Control Building

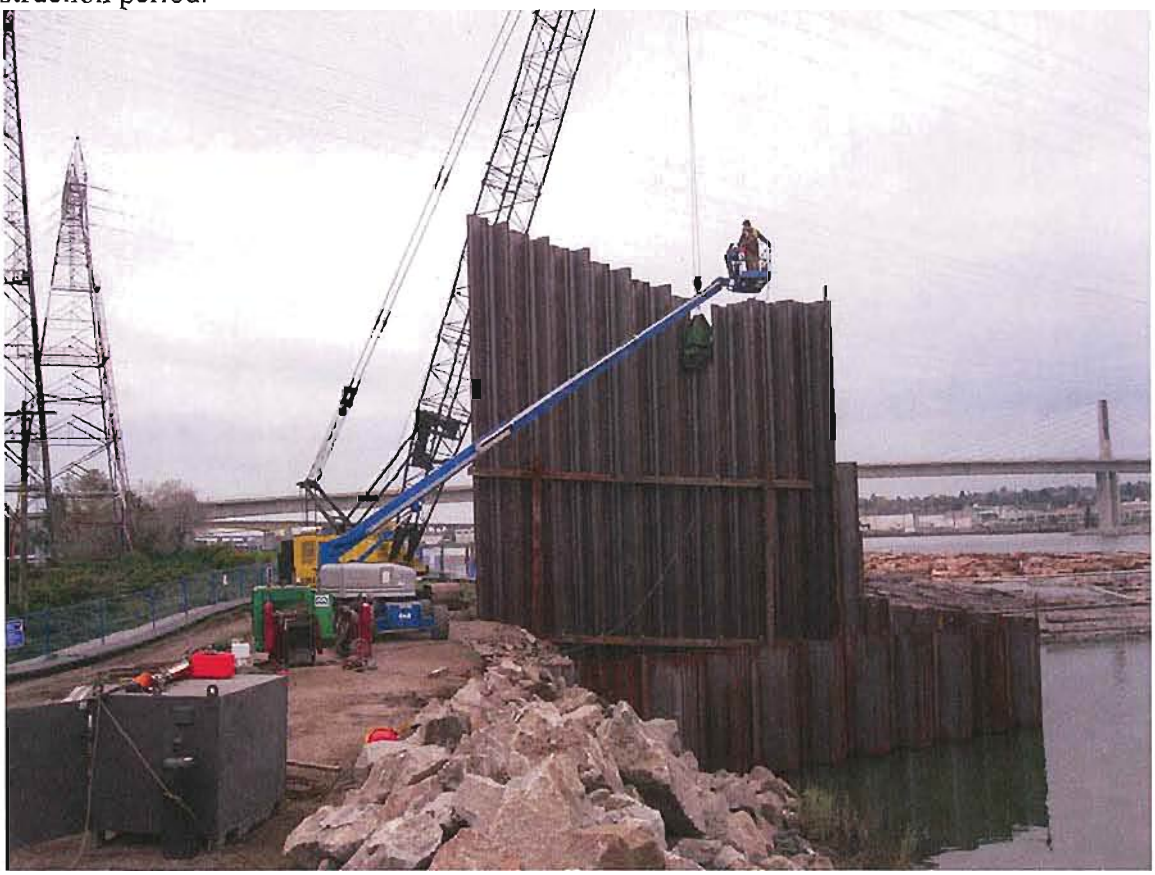
This project presented numerous opportunities involving synergies not normally available on municipal infrastructure upgrade projects.

- A pumping capacity upgrade from 3.3 cubic metres per second to approximately 6.0 cubic metres per second through the use of 4 – 127 HP KSB variable frequency drive pumps
- Removal of the PCB filled BC Hydro transformer, conversion from 480 volt to 600 volt service and associated infrastructure upgrade
- Spectacular architecture complementing the adjacent residential development plan and former industrial nature of the immediate area which is also in plain view from the Canada Line Fraser River Crossing Bridge
- Construction of the large public plaza/pump station maintenance area and a pier over the Fraser River
- Construction of glass MCC and generator rooms to allow full, but protected view from the public.

- Construction of a gantry crane for pump and hatch removals.
- Elevated public viewing platform from the MCC and pump station gantry crane roof tops.
- Use of energy efficient LED lighting where possible.
- Upgrade of the adjacent dike system to meet sea level rise projected to Year 2100
- Construction of a combined pump station access road with a vibrant park trails system
- Installation of a public art feature in the form of an artist's rendering of a historical aerial photograph with industrial picture insets, all inlaid on the two MCC building concrete walls.
- Installation of a permanent back-up generator

This project posed numerous difficulties and challenges to construct. One of the more difficult areas was the installation of a new 1524mm (60") diameter outfall structure at elevations well below the lowest tide. Construction at this depth required numerous worker safety related challenges most of which were addressed through installation of a temporary cofferdam, acquisition of temporary working space and coordination with log-boom storage.

Particularly challenging to the project was the need to provide a bypass system to deliver a minimum of 50% of the existing station capacity. This portion of the project was delivered by City forces by cutting a section of the concrete transmission box culvert and installation of three submersible FLGT pumps powered by a portable generator via a portable Motor Control Centre, sonar level detection and a SCADA system. No flooding was experienced during the construction period.



Cofferdam construction

Schedule was a significant factor during the construction process. The City was very fortunate to receive Flood Protection Program base funding to complete the work – a significant stipulation was that all work had to be complete by March 31, 2011. This meant all design and construction had to be complete within a period of 9 months. The work was 95% complete by the imposed deadline and slightly under budget with final costs coming in slightly under the $4.8 million budget.

The City project management team for the Cambie Drainage Pump Station project were Mile Racic, Pat Talmey, Jim V. Young, P. Eng., Aplin & Martin (Robert Wridgway, P. Eng., and Terry Cheng, EIT) were the lead designers and construction was completed by Merletti Construction Ltd. The completed project cost was approximately $4.6 million and was substantially complete in May 2011.

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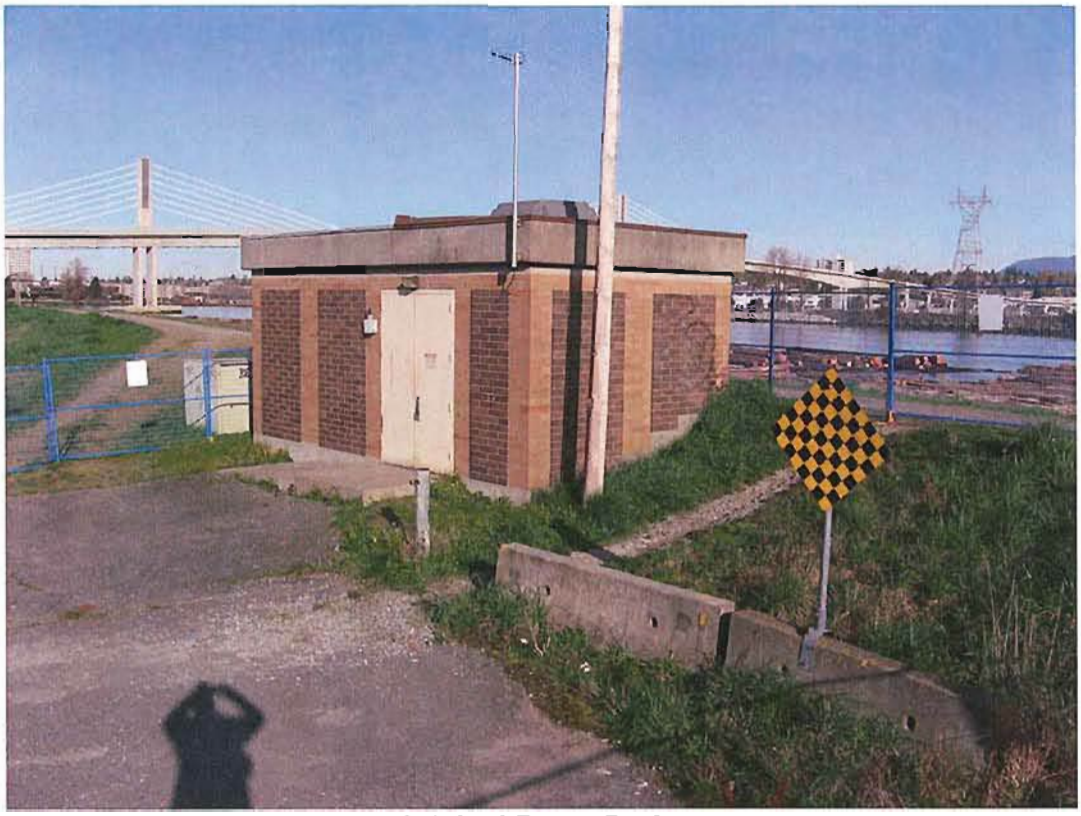

Original Pump Station

Flood Box Demolition/Construction

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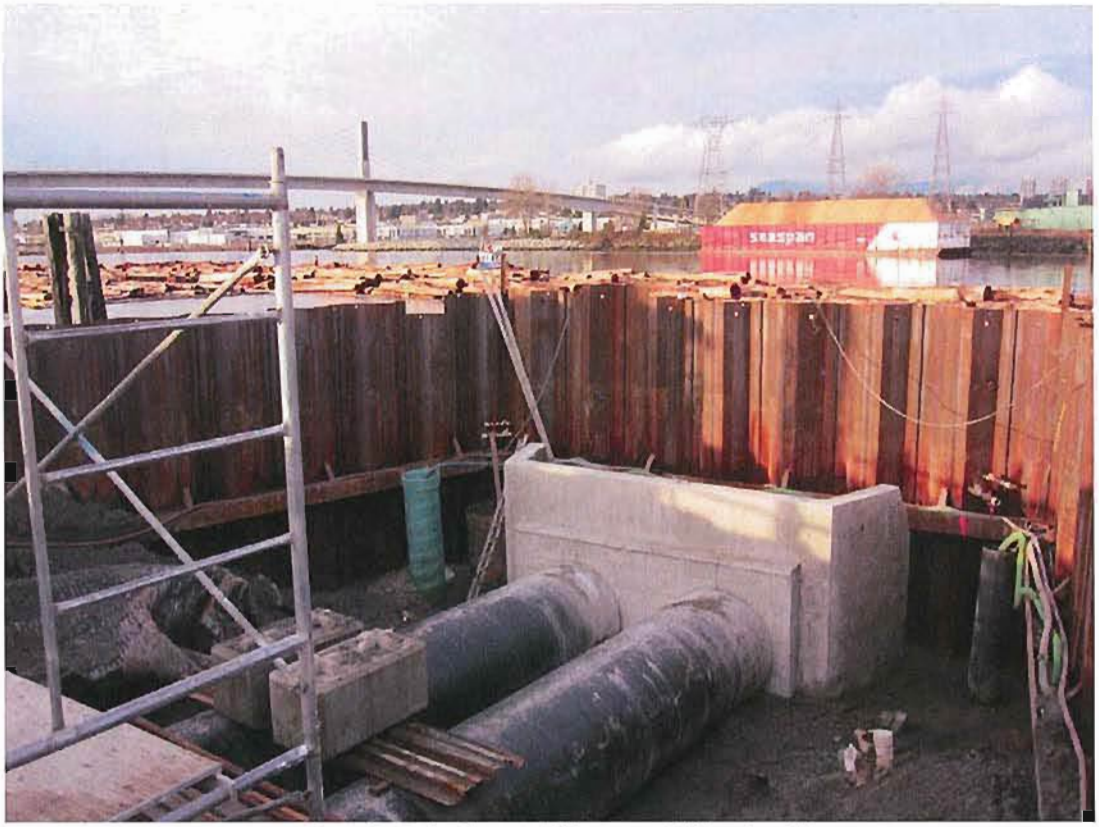
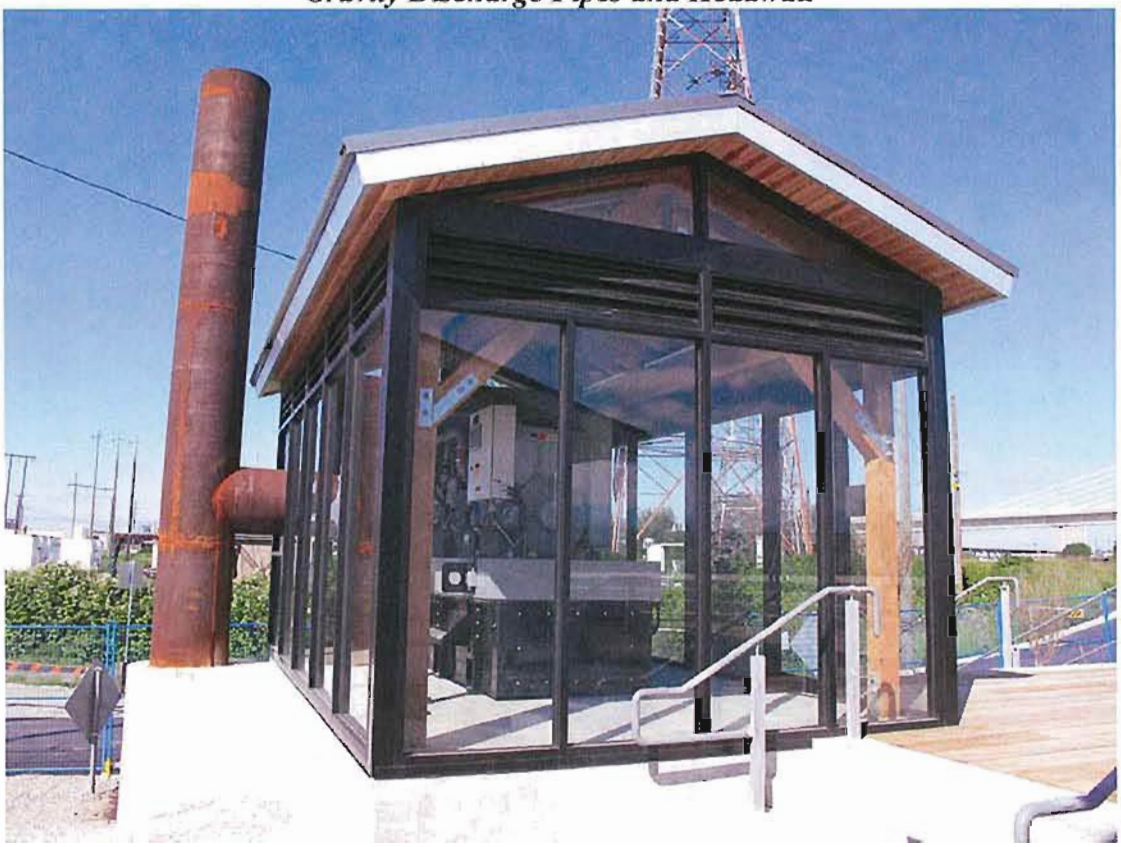


Gravity Discharge Pipes and Headwall



Completed Back-up Generator Building

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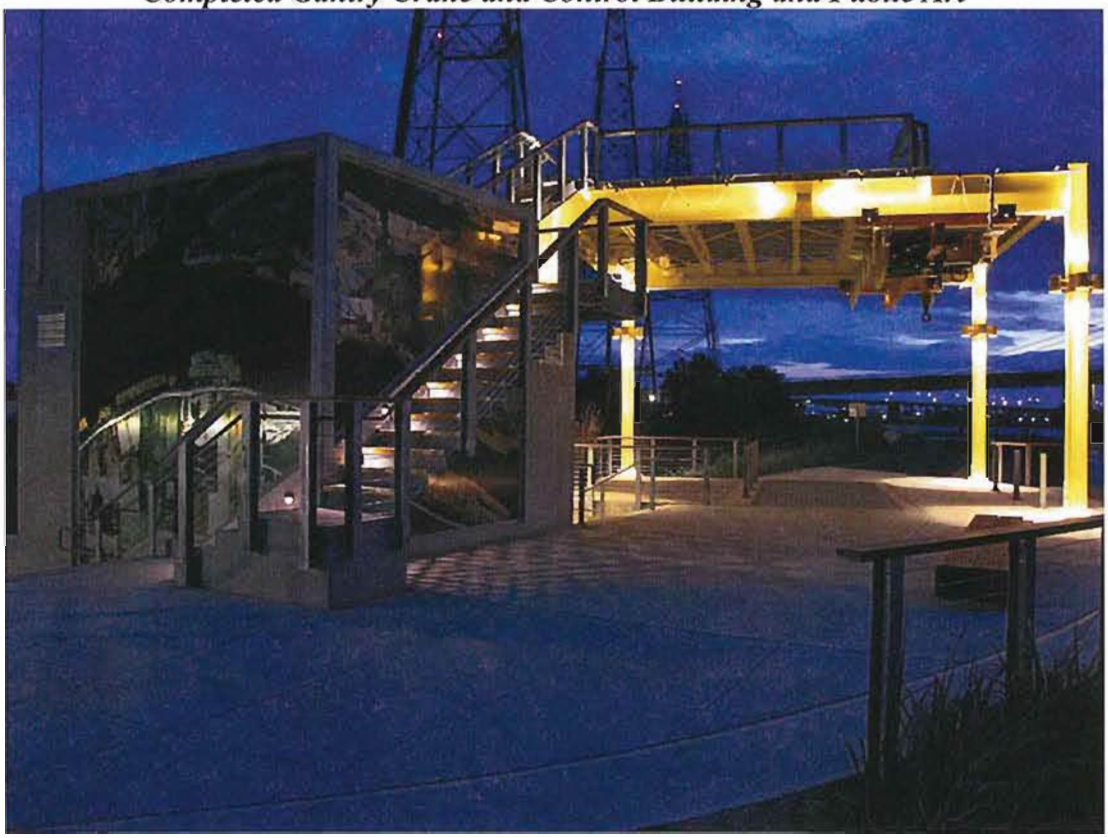
Completed Gantry Crane and Control Building and Public Art



Completed Pump Station