CITY OF RICHMOND, EMERGENCY SOUTH DIKE

PARTICIPANTS

Owner: City of Richmond
Engineering and Environmental: An integrated design team was assembled with expertise in dike construction and ecological foreshore management.

KEY WORDS: green dike, erosion control, sea level rise, estuary, marsh, native riparian plantings

PROJECT OBJECTIVE

To protect the City of Richmond dikes from erosion from projected flooding. in a green manner by upgrading a 1 km stretch of dike while enhancing habitat value. Access to a popular fishing location was also to be improved.

PROJECT LOCATION

City of Richmond, BC, Fraser River estuary, South Dike between No. 7 and No. 8 Roads.

PROJECT BACKGROUND

The City of Richmond is entirely surrounded by water. For this reason, Richmond's dike system represents one of the City's most important assets. Larger than normal predictions for the 2007 Spring Freshet resulted in significant concern surrounding the stability of portions of Richmond's dike system to withstand higher water velocities. While the water was not likely to breach the City's 49 km of dikes, the increased flow and velocity posed a significant threat of erosion to the dyke system.

OVERALL DESIGN STRATEGY

In contrast to conventional straight-line dikes, the alignment of the structural works for this project was designed to vary and avoid functional riparian and intertidal areas. During these works, foreshore benches on the water side of the dyke were constructed to improve ecological function. The re-instatement of the low flow intertidal

areas provides an ideal environment for fish to 'rest' as they are navigating the river. Numerous riparian plantings and log and wood debris complexity was done to further enhance the fish habitat, the natural estuarine environment, and to contribute to an aesthetically pleasing final product. Dike raising took into consideration potential sea level rise resulting from climate change. Rather than solely relying on current provincial guidelines, Richmond adopted a proactive approach and set dike heights based on current Provincial guideline plus an allowance for sea level rise over a 100-year period as projected by the Intergovernmental Panel on Climate Change.

EROSION AND POLLUTION CONTROL

All work was done during low tide. Standard sediment control measures were used, such as silt dams, and muddy water was pumped onto grassy areas to achieve natural filtration. The City also addressed key challenges presented from underlying contamination. Contaminated soil was exposed during construction, which triggered construction, regulatory and health requirements.

PLANTING PLAN

Over 900 native plants, including 7 species, were planted and natural marshes were protected.

LESSONS LEARNED

Project participants learned the importance of customized dike design, which considered and responded to actual site conditions. New construction techniques were also learned, which enabled the retention of existing ecological functionality.

Participants also learned to implement a "Net-Plus" approach with a focus on ecological health rather than solely impact mitigation. The works were designed to achieve an overall net improvement in flood management and ecological function.

Ultimately, this project demonstrates the ability to employ practical, on- the-ground techniques that can be employed to better advance community sustainability, even under emergency conditions.

KEY CHALLENGES

The key challenges were completing the project in a green manner within 10 weeks. Through partnerships with the Federal and Provincial governments, the City of Richmond was able to conduct a major dike upgrade along 1 km of its shoreline within this highly compressed timeframe. Despite the significant time constraints, the city team was able to achieve new standards in habitat protection and restoration.

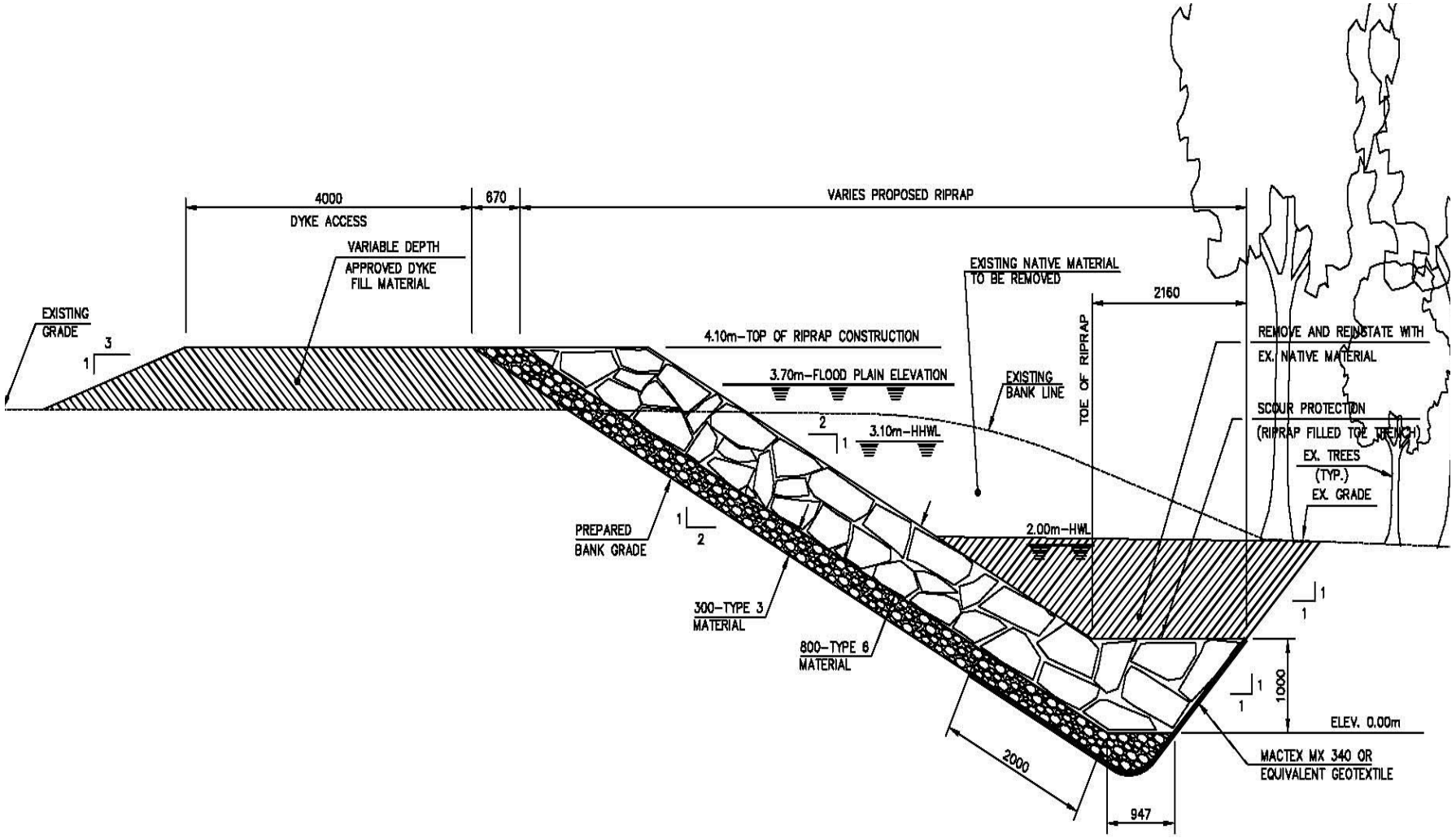
COST

Through partnering with both the Federal and Provincial governments, funding of approximately $1.4 million allowed the City to upgrade approximately 1km of dike protection.

OUTCOME

Through partnership and the use of creative and integrated approaches, the City of Richmond was able to deliver a major dike upgrade under emergency conditions and major on-site challenges. The project resulted in the City being better protected from flooding and enhanced natural foreshore.

CONCEPTUAL DESIGN GRAPHICS



Pre-Construction

Construction Phase

Post-Construction

Contact for More Information:

Jim V. Young, P. Eng. Manager Engineering Design and Construction, City of Richmond
604-247-4610

Margot Daykin, MRMCity of Richmond
Sustainability Manager, City of Richmond, 604-276-4130