City of Windsor Riverfront
Retention Treatment Basin Project

Tony Berardi, P.Eng.
Project Director
Stantec Consulting Ltd.

Dr. Jian Li, P.Eng., PE
Project Manager
Stantec Consulting Ltd.

Jake Renaud, P.Eng.
Project Administrator
City of Windsor

Presentation Outline

• Introduction
• Background Studies
• Detailed Design
• Construction
  ✓ CSO Interceptor Chambers
  ✓ CSO Collection Sewer
  ✓ Retention Treatment Basin (RTB)
  ✓ Outfall Sewer into Detroit River
  ✓ Detroit River Shoreline Upgrades

MWEA Annual Conference June 26th, 2012
Introduction

• As with many cities in North America, the older areas of the City of Windsor are still serviced by Combined Sewer Systems

• Combined sewer systems convey a mixture of municipal wastewater and storm water through a single pipe system to a wastewater treatment plant.

• During wet weather events, there may be insufficient capacity to convey all the flow to the treatment plant and/or they may be insufficient treatment capacity at the plant.

• This results in the excess flow to be discharged directly into the Detroit River untreated and are referred to as Combined Sewer Overflows (CSOs).

Introduction

• CSO’s are a significant source of pollution in the Detroit River and the Great Lakes leading to environmental degradation.

• The Detroit River is identified by the Canada and United States International Joint Commission on Great Lakes Water Quality (IJC) as an area of concern (AOC) in the Great Lakes basin.

• To address this concern, the City of Windsor developed and implemented a long-term pollution control strategy with the specific objective of reducing CSOs and total pollutant loadings into the Detroit River.

• This strategy included a number of studies followed by implementation of a high-rate retention treatment basin (RTB) to collect and treat CSOs generated along the old riverfront and downtown district.
Background Studies

- **Windsor Pollution Control Plan Study (1992 - 1999)**
  - evaluated alternative CSO control strategies and established a Preferred Pollution Control Plan
- **Windsor CSO Treatability Study (2000 – 2004)**
  - characterized CSO pollutants along riverfront and established RTB treatment options to meet Ministry of Environment Procedure F-5-5
- **Class Environmental Assessment (2001 – 2008)**
  - established preferred design for new CSO Interceptor Chambers, CSO Collection Sewer and RTB Treatment Facilities

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Class Environmental Assessment (2001 – 2008)

**Preferred Design**

1. Five (5) new CSO Interceptor Chambers
2. New CSO Collector Sewer from Ouellette Ave. to Devonshire Rd.
3. New valved interconnection at Ouellette Ave. between new CSO Collector Sewer and existing Riverfront Interceptor Sewer to drain new CSO Collector Sewer and RTB after storm event
4. New high-rate RTB Facility on Riverfront between Aylmer Ave. and Glengarry Ave. including a 180 MGD pumping station, flushing gate equipment, outfall sewer and chemical feed equipment
How RTB’s Work

Small CSO Events
• CSO flows contained in RTB without discharging to Detroit River
• Contained flows are returned to existing Interceptor Sewer system after storm event
• RTB facilities drained and flushed after CSO event

Large CSO Events
• Same as small CSO event, but CSO flows receive equivalent to primary treatment prior to discharge to Detroit River

Detailed Design (2009 – 2010)
• Design commenced in August 2009 immediately after Infrastructure Stimulus Funding (ISF) grant was secured
• Project designed and publicly tendered in 4 major construction contracts to:
  ➢ Provide best chance of meeting ISF’s tight completion dates
  ➢ Provide more opportunities to wider selection of Contractors
  ➢ Enable design and construction to proceed in staged manner rather than all at once
  ➢ Minimize risk to City from archaeological threats & financial overruns

Contract 1A – Excavation for new RTB Facilities (October 2009 – February 2010)
Contract 2 – Construction of new CSO Collector Sewer (February 2010 – May 2011)
Contract 3 – Construction of new Interceptor Chambers (May 2010 – October 2011)
Total Capital Cost = $66 Million + Taxes
Detailed Design (2009 – 2010)

Construction Contract No. 1A & 1B ($35.7 Million)
Construction of new high-rate Retention Treatment Basin Facility under existing riverfront parking lot with storage capacity of 2 MG and primary treatment capacity of 180 MGD with following major components:

- 30 foot deep CSO influent pumping station utilizing 4 screw pumps
- 30-inch diameter valved interconnection between new RTB and existing Riverfront Interceptor Sewer to drain new Collector Sewer and RTB after storm event
- New 92-inch diameter effluent outfall sewer extending ~350 feet into Detroit River with three 60-inch diffusers
- Polymer storage & feed facilities including all ancillary mechanical, electrical and control systems for proper operation of RTB facility

Construction Contract No. 2 ($18.5 Million)
Construction of new CSO Collection Sewer tunnelled along north side of Riverside Drive from Ouellette Ave. to Devonshire Rd. varying in diameter from 66 to 90 inch at depths over 30 feet over a length of approx. 7,900 feet.

Construction Contract No. 3 ($5.8 Million)
Construction of five (5) new CSO Interceptor Chambers downstream of existing CSO Interceptor Chambers between Caron Ave & Devonshire Road
**Construction**

**CSO Interceptor Chambers**

- Five new CSO Interceptor Chambers
- Captures & conveys CSO’s to new CSO Collection Sewer
Construction
CSO Interceptor Chambers

- Overflow weir, flow control gate, floatable control, energy dissipation, flow measurement

Construction
CSO Collection Sewer

- Collects and conveys CSO's to new RTB
- Diameter varies from 66 to 90 inch
- Approx. 7,900 feet long
Construction
CSO Collection Sewer

- Tunnel Boring Machine
Construction
CSO Collection Sewer
• Tunnel Boring Machine

Construction
CSO Collection Sewer
• Access Manholes
Construction
Retention Treatment Basin

Excavation

Construction
Retention Treatment Basin
Micro-Pile Foundation
Construction
Retention Treatment Basin

Floor & Wall Construction

Influent Pumping Station

- 30 feet deep
- utilizes 4 screw pumps for total pumping capacity of 180 MGD
Construction
Retention Treatment Basin

Outfall Sewer in Detroit River
- 92-inch diameter
- Extends ~350 feet into river
- Discharges thru 3 – 60-inch diffusers
Construction
Retention Treatment Basin
Chemical Feed & Storage Facilities

Polymer dosage control
Flushing Gates in action

Construction
RTB Facility & Shoreline Upgrades
Construction
Retention Treatment Basin

Construction
Retention Treatment Basin
Post Construction - Reflection

- The Windsor Riverfront RTB project is recognized as a showcase to other Great Lakes communities on how to address environmental impairment and degradation stemming from CSOs in a feasible and economical manner and what can be accomplished through the combined efforts of all levels of government, educational institutions, and private consultants.

- Development of the Windsor high-rate RTB project was a large, complex, highly innovative undertaking that required many years of preliminary work and an unusually high level of cooperation between the City, Stantec, various Provincial and Federal government agencies and Academia.

- This cooperation led to a significant technological advancement with the establishment of innovative and unique design criteria for designing and constructing high-rate RTB facilities requiring only 15% the footprint of conventional RTB facilities with substantial cost savings.

- Considering the high risks associated with designing and constructing the world’s largest high-rate RTB (and believed to be the first of its kind) in an area having an inordinate number of site constraints with extremely tight timelines; the project is considered a "screaming" success being completed on time, on budget, and without litigation.

- The successful development and implementation of an innovative space-saving and cost-effective high-rate RTB solution has not only fulfilled a major objective of Windsor’s Pollution Control Plan but has also been instrumental in advancing the art of designing and constructing small footprint high-rate RTB facilities that can be deployed throughout the world.

Questions

- If you would like to learn more about this project please contact the City of Windsor or the presenter by email at tony.berardi@stantec.com or by phone at (519) 966-2250