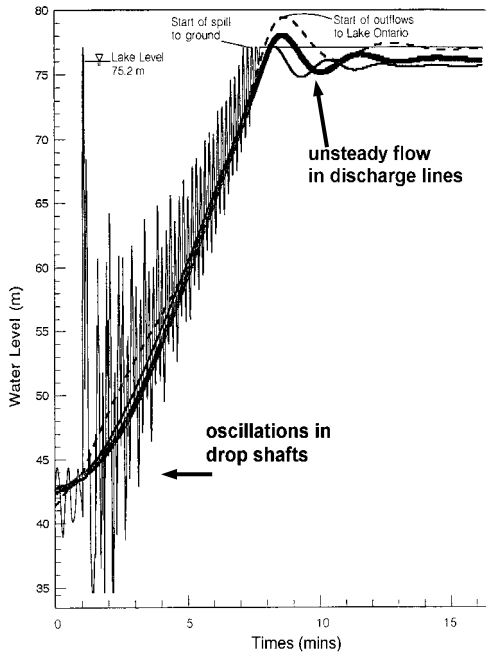




**Environmental
Hydraulics
Group**

**Hydraulic Transients (HT)
- Water & Sewage**

Project:	Western Beaches Storage Tunnel – Transient Analysis and Review	1999-083
Location:	City of Toronto (western beaches), Ontario	
Client:	MacViro Consultants Inc.	
Completed:	March 1999	



Description: The western beaches tunnel is 4km long and 40m deep with a storage capacity of 85,000m³. It receives inflows from municipal sewers along its entire length via large overflow chambers and small inflow drop shafts. Its purpose is to store storm water for short periods prior to pumping to the Humber STP – reducing overflows to the lake to approximately one per year to eliminate beach closures due to storm water pollution.

EHG was retained in 1996-1997 during pre-engineering and again in 1998-1999 for a review of the design-build project. EHG also facilitated a technical discussion of hydraulic transients and air handling inside the tunnel with the design-build team and their consultants as well as other experts from the Universities and hydraulic research institutions.

A significant volume of air may have been trapped during tunnel filling. Transients at depth ranged from mass oscillations or flow reversals (due to uneven tunnel filling) to potentially explosive waterhammer surges (due to trapped air release or water columns rejoining). Local sewer networks as well as the Canadian National Exhibition (CNE) needed protection from flooding and odours.

HAMMER simulation showing high-amplitude oscillations in response to corresponding tunnel oscillations.

Benefit to the Client: The client gained an understanding and appreciation of the possibility of significant hydraulic transients in CSO tunnel and connected the surface sewer systems.

