

**Sewer System Rehabilitation Projects**

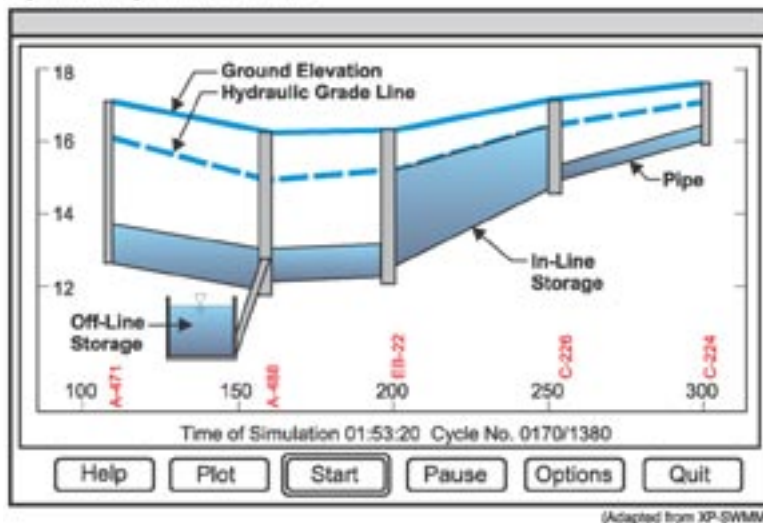
Carollo assisted the Portland, Oregon Bureau of Environmental Services with several projects related to a 20-year program to reduce CSOs to the Willamette River and Colombia Slough. Work included:

- HIGHLIGHTS**
- Replacement of 34,250 feet of 6-inch to 48-inch sewer in Portland city streets to reduce CSO discharges.
  - Design of 30,000 feet of new storm sewer.
  - Hydrologic and hydraulic modeling of the collection system.
  - Design of sewer separation, new storm sewer, and storage facilities.

**Alder Basin Relief and Reconstruction.** This project consisted of three phases involving reconstruction and adding capacity to the upper reaches of the Alder basin. The project included approximately 5,500 feet of sewer replacement ranging in size from 24 inches to 48 inches in diameter, plus house branch laterals. One element of the project was to calibrate and refine the existing Storm Water Management Model (SWMM) to eliminate the surcharges that appear in the recommended alternative. The recommended alternative eliminated the off-line storage in one area, upsized some of the existing trunk sewer, and included storage in other areas.

**Wheeler Basin Relief.** This project incorporated the design of combined sewer separation and capacity augmentation. The Wheeler Basin is an area of approximately 900 fully urbanized acres adjoining the northeast quadrant of Portland’s central city area. Constructed in phases, the project included 28,750 feet of sewer replacement, 103 groundwater recharge sumps, and miscellaneous improvements for a total construction cost of \$5.5 million.

**Dynamic Hydraulic Profile**



Carollo uses models such as US EPA’s SWMM to evaluate wastewater collection systems and recommend improvements for CSO control.

**St. Johns A Storm Sewer Separation.**

This project included the design of a separate storm sewer to reduce the flow in the existing combined sewer and reduce CSO discharges. It included the approximately 30,000 feet of storm sewer ranging in size from 12 inches to 42 inches in diameter at a construction cost of \$2.9 million. The project also involved hydrologic and hydraulic modeling of the basin to determine design flows and size the collection system.