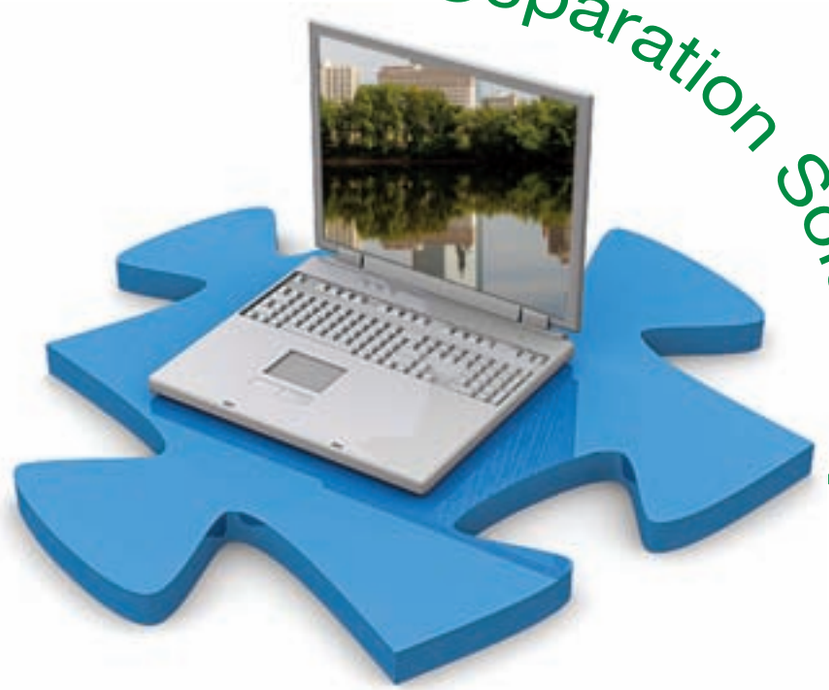

Separation Solution Triumphs

Refining a Massachusetts city's combined sewer overflow (CSO) relief plan using hydraulic modeling

By Gregory Heath, David Minard, Donald Walker, Amanda Roberts & Joshua Schimmel

The city of Springfield, the largest community in southwestern Massachusetts, needed to protect receiving waters from CSO discharges.

With the aid of InfoWorks CS, the Springfield Water and Sewer Commission (SWSC) in southwestern Massachusetts has been able to find a cost-effective and environmentally sustainable alternative to a proposed CSO relief project.

Springfield is the largest community and major urban center in southwestern Massachusetts. As in many cities with combined sewer systems, discharges from CSOs have polluted receiving waters—a problem which resulted in inceptor sewers being built while excess flows during wet weather still discharged via the CSOs.

The SWSC and city of Springfield have undertaken a number of CSO control and mitigation activities, including a regional CSO study. The long-term control plan, drawn up in 2000, sets out a range of projects in a number of phases that have to be implemented to meet an administrative order schedule negotiated with the Massachusetts Department of Environmental Protection (DEP) and the U.S. Environmental Protection Agency (EPA).

The SWSC decided to update baseline conditions in the project area ahead of ongoing works, and as a result, it defined a series of projects that aligned better with the goal of upgrading its collection system infrastructure.

The commission's Clinton Street screening and disinfection facility project—the first one called for in the long-term plan—is an example of this approach. Following this work, discharges from one CSO would cease and those at another be eliminated for storms up to and including the two-year, 24-hour storm. Construction was due to begin in 2009.

InfoWorks Model

The InfoWorks model was updated with all collected field information, and the level of detail was expanded to include pipes 24 in. or more in diameter. Once updated and expanded, the model was recalibrated using the 32 flowmeters deployed for the project.

After this, the model was used to define the baseline conditions for designing the Clinton Street facility. The difference in total discharge volume predictions was minimal, but it was seen as clearly appropriate to increase the level of detail, accuracy and confidence in the model to support the design of the facility and the assessment of alternatives.

Modeling Alternatives

Upon completing the model calibration and update of baseline conditions, a review of hydraulic profiles and flow conditions in the interceptor and CSO tributary trunk

sewers was undertaken. Based on the profiles and system storage, as well as input from the SWSC, a list of alternatives was identified for further evaluation.

A number of options were rejected because of relatively modest reductions in discharge or because modeling found them to be complex and costly. Because of the storm water separation already found, it was decided to re-examine the previously rejected option of sewer separation as an alternative.

The model was used to assess the feasibility of closing outfalls from two regulators by comparing peak hydraulic grade lines and flooding against baseline conditions. The modeling showed complex results from the proposed changes, with improvements for some aspects and worse conditions for others.

The model was then used to optimize performance of this alternative. By changing various factors, the peak hydraulic grade lines were brought down below baseline conditions. Now a very high level of CSO control could be achieved at one outfall. Additional simulations showed that the outfall could be closed in the future if the next downstream area tributary to the interceptor was separated.

Original Plan vs. Alternative

In terms of all the factors—reductions in surcharges and flooding, CSO activation and volume, *E. coli* loading and receiving water impacts—the alternative was found to perform as well or better than the Clinton Street facility. This option will allow the SWSC to have more flexibility to implement further CSO controls along the Connecticut River while staying within the long-term control plan.

Both the facility and the alternative plan costs were found to be nearly the same, though the facility would have additional operation and maintenance overheads. The alternative could also be designed and constructed in time to meet the anticipated 2011 completion date.

Following these evaluations, SWSC sought and obtained approval from the DEP and EPA to substitute the sewer separation project for the previous screening and disinfection project. SWS

This article is based on a paper by Gregory Heath, David Minard and Donald Walker, Metcalf & Eddy, and Amanda Roberts and Joshua Schimmel, Springfield Water and Sewer Commission. For more information, visit www.wallingfordsoftware.com or e-mail sales@wallingfordsoftware.com.

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