Long Term Control Plan Optimization

Grey vs Green Infrastructure Analysis for City of South Bend, IN

South Bend Combined Sewer Overflow (CSO) Long Term Control Plan Optimization project showcases innovative planning techniques and smart technology which enabled the City of South Bend to determine least-cost solutions to achieve complex planning objectives.

KEY POINTS

- 27% savings achieved against baseline LTCP
- 30% reduction in CSO volume
- Reduced number of CSO sites
- Evaluation of Green Technology/LID alternatives

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BACKGROUND

South Bend, Indiana is one of an estimated 772 U.S. communities that is served at least in part by a combined sewer system (CSS). The City of South Bend led by its Department of Public Works (DPW) began discussions with U.S. Environmental Protection Agency in 2003. At that time, CSO discharges into the St. Joseph River amounted to over 2 billion gallons during 80 events per year. By 2010, through early action projects implemented by DPW at a cost of $100 million, the City had reduced discharges to 750 million gallons per year.

In 2011 the City of South Bend, Indiana was completing negotiations on its Consent Decree (CD) with Federal and State regulators aimed at alleviating the frequency and volume of CSOs into the St. Joseph River. The City recognized that the estimated $510 million cost of the planned Long Term Control Plan (LTCP) would burden its rate payers with rising monthly utility bills.

The City decided to undertake an optimization study to review and modify its existing LTCP, with the goal of reducing the cost of the plan and efficiently staging the improvements.

ANALYSIS

The objectives of the Optimization Project included the following:

- Consider all feasible options to see if modifications to the current LTCP could reduce costs while meeting all agreed-upon performance criteria

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Optimize grey infrastructure and determine most cost-effective conveyance/storage strategy
Optimize LID alternatives and demonstrate how the LTCP may be affected by LID
Determine cost-effective LID runoff reduction targets for each CSO Basin
Perform LID sensitivity analysis and develop an adaptive planning strategy which allows near-term grey infrastructure projects to move forward with confidence

Size conveyance infrastructure to carry all typical-year flows without flooding under the LID scenario, assuming that all potential LID storage was occupied
Optimize real time controls (RTC) to maximize utilization of existing and future infrastructure
Prioritize improvement projects to achieve maximum CSO volume reduction within available budget for each planning horizon

“...when you are about to invest half a billion dollars over the next 20 years on a CSO Long Term Control Plan, you want to know it is the right plan—the smartest investment.”
Gary A. Gilot, P.E. President, Board of Public Works, City of South Bend, Indiana

RESULTS
For the purposes of comparison, the cost of South Bend’s existing LTCP was updated to an estimated lifecycle cost of $412 million, excluding the wastewater treatment plant upgrade cost (a fixed cost). The optimized grey infrastructure-only solution was estimated at $350 million and a grey-green infrastructure solution estimated at $300 million.

The optimized solutions represented cost savings of $62 million (15%) and $112 million (27%). In addition to reduced costs, CSO facility total overflow volume was reduced by over 30% in the Optimized Solution and the number of CSO locations was reduced from eight to five.

Prioritization of Projects for Maximum Impact

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