



THE ROUGE RIVER PROJECT
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Hubbell-Southfield CSO Retention Basin

A publication of the Wayne County Rouge River National Wet Weather Demonstration Project

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Objective

The Hubbell-Southfield CSO project seeks to control CSO discharges and to meet applicable requirements including water quality standards.



Completed Hubbell-Southfield CSO Facility

Owner

City of Detroit, Michigan

Location

The facility is located east of the Southfield Freeway, south of Michigan Ave., and north of the Rotunda Drive in the City of Dearborn. The receiving water is the Rouge River.

Dates

Planning Start Date	October 1992
Design Start Date	October 1992
Construction Start Date	December 1994
Operation Start Date	February 1999

Construction Cost

\$49,400,000 - Basin only

Demonstration Aspects

- Basin size of 22 million gallons decided on by site constraints, not by a specific event.
- Trapezoidal cross section design to reduce problem of unstable subsoil strata and the presence of an artesian aquifer at the sand stratum.
- Two compartments with total volume of 22 million gallons. The basin compartments may be operated in series with compartment 1 filling first followed by compartment 2. Compartment 1 can be used as a first flush tank and compartment 2 as a flow through basin. Basin can be dewatered in 1.5 to 2 days.
- The basin is bounded by the Tournament of Players Championship Golf Course on three sides and the Rouge River on the fourth side.
- Decanting to the Rouge River from compartment 2 subject to the approval of the MDEQ.
- A pressurized water system and high velocity flushing nozzles to flush the settled solids from the basin's walls and floor.
- An extensive monitoring program to demonstrate basin performance.

Project Highlights

- Serves an area of 14,400 acres
- Eliminates 1 CSO outfall (the largest Rouge River outfall)
- Gravity flow through the facility
- Sodium hypochlorite disinfection system designed for 10 mg/l feed rate and 1 mg/l target residual for a peak flow rate of treated effluent of 3200 cfs.
- 3/4-inch mechanical screens with 1.5 inch bar spacing on the influent and skimming baffle for floatables control at the effluent
- Peak overflow rate of 4,000 gpd/sq. ft.
- Wet scrubber odor control system

Basin Treatment Results

[The MDEQ established a process for assessing compliance](#) with the NPDES permits and the Phase II and III control requirements. The process fully involved the Rouge Project and the CSO communities. The MDEQ established three CSO Retention/Treatment Basin (RTB) Committees to analyze discharge data from groups of RTBs. The RTB Committee reviews discharge data in relation to the [Phase II Criteria for Success in CSO Treatment](#) established by MDEQ with input from the Rouge Project and the CSO Communities. The Rouge Stream Data Committee evaluates receiving stream data for impacts from the individual RTBs. The Committee then determines whether the receiving water downstream from each individual RTB is achieving the Phase II criteria for success and, if not, to what extent the RTB discharge is contributing to the water quality problem. Finally, the CSO Workgroup compiles the information on success of the individual RTBs in meeting the Phase II and Phase III criteria for success and proposes what level of treatment should be considered adequate. The Workgroup is composed of MDEQ staff and representatives of the RTB communities.

In February 2001, the Rouge Stream Data Committee issued its [Interim Report](#) in which they analyzed the data collected to assess the effectiveness of the CSO demonstration basins

and whether the receiving water downstream from each basin is achieving Phase III criteria for success and, if not, to what extent are the basins contributing to the remaining water quality problems. The MDEQ Phase III criteria for success state that achievement of state water quality standards (WQS) at times of discharge will be measured by the following criteria:

- the dissolved oxygen (DO) standard;
- the physical characteristics standard;
- the total residual chlorine (TRC) standard; and
- the health of the biological community (as a surrogate for toxic materials and other pollutants).

Additional details of the in-stream evaluation process can be found in the paper titled [“Evaluation of In-Stream Impacts of CSO Control Facilities.”](#) For other reports on the CSO control program, please see [Products and Data, Combined Sewer Overflows](#).

It is very important to note that MDEQ has concluded that nine of the CSO retention treatment facilities are currently meeting the Phase II criteria of the elimination of raw sewage and the protection of public health. [A June 9, 2000 Letter of Approval for Phase II Review](#) focused on the following retention treatment basins: Acacia Park CSO Retention Treatment Basin, Birmingham CSO Retention Treatment Basin, and Bloomfield Village CSO Retention Treatment Basin. [The August 7, 2000 Letter of Approval for Phase II Review](#) focused on the following retention treatment basins: Inkster CSO Retention Treatment Basin, Dearborn Heights CSO Retention Treatment Basin, Redford Township CSO Retention Treatment Basin. [A February 14, 2002 Letter of Approval for Phase II Review](#) focused on the following retention treatment basins for the City of Detroit: Hubbell-Southfield CSO Retention Treatment Basin, Puritan-Fenkell CSO Retention Treatment Basin, and Seven Mile CSO Retention Treatment Basin. In addition, the three Oakland County CSO basins (Acacia Park, Birmingham, and Bloomfield) are achieving the Phase III goal of meeting water quality standards at times of discharge, except for meeting the yet-to-be-

evaluated total residual chlorine standard. This Phase III certification is expected on the other six basins very soon.

The River Rouge Basin, the tenth CSO basin, became operational in March 2002. Its performance will be evaluated over the next two years.

For additional and more detailed information on the performance of the CSO treatment facilities, go to [technical papers and professional presentations](#).

The operation of the CSO control facilities is critical to their overall success. Some very [important information on the operating experience of these CSO control facilities](#) can be viewed in a paper prepared on this topic.

The Project's CSO control program was summarized in a report and was included as a case study by USEPA in their recent [Report to Congress](#) on the nationwide CSO control efforts.

Environmental Results

As stated above, the MDEQ has concluded that the all six of the CSO treatment facilities that have completed their evaluations are currently meeting the Phase II criteria. MDEQ stated "...the data demonstrate that these facilities are capable of: 1) protecting public health, and 2) eliminating raw sewage, across the range of storms monitored, when operated correctly."

The following summarizes some of the key conclusions of the Rouge Watershed CSO Workgroup that support the determination by MDEQ:

1. Public health protection is achieved by disinfection (through the use of sodium hypochlorite) of the influent flows in order to reduce the presence of organisms in the discharge.
2. The elimination of raw sewage at the Rouge CSO facilities includes screening, skimming and settling of the flow. Screens contribute to the removal of larger debris from the flow.
3. Baffle walls installed in each facility help facilitate removal of floating materials,

capturing these materials in the basin for removal during dewatering.

4. The facilities were designed to allow for sedimentation to occur for the removal of heavy solids. The ability of the facilities to achieve removal of solids is typically related to the surface overflow rate and weir loading rate.
5. Elimination of raw sewage is determined by the elimination of sanitary trash from the facility effluent as measured by visual observation of what is captured in 6 mm mesh nets in the facility outfalls.

For a more detailed discussion of the environmental results being achieved by the CSO basins go to [Emerging Information on CSO Facility Performance](#) and [Environmental Results](#).

Emerging Information on CSO Facility Performance

The Rouge Watershed CSO Workgroup will compile the information on success of the individual CSO control basins in meeting the Phase II and Phase III Criteria for Success. The instream impacts of the discharge from the CSO basins is very important to any determination made by MDEQ. After assessing all available data, including recommendations from the Rouge Watershed CSO Workgroup, MDEQ will draw conclusions on what level of treatment from these basins should be considered adequate. The CSO Workgroup has not completed its evaluation yet. It expects to do so by the end of this calendar year. Preliminary information and conclusions are starting to emerge as discussed below. **The information below should be considered preliminary emerging information on CSO facility impacts on the receiving stream and is subject to revision based upon more complete data and upon the full evaluation of the CSO Workgroup.**

1. For six storm events, the treated effluent from the Oakland County CSO basins never caused the instream dissolved oxygen to fall below the MDEQ instream standard of 5

mg/l or below the pre-event dissolved oxygen at the two downstream dissolved oxygen sampling points.

2. MDEQ has chosen four parameters for use in CSO evaluation of impacts on the receiving stream. Those are suspended solids, oil films, turbidity, and sediment/sludge deposits. Based upon available data to date the following preliminary conclusions can be drawn:
 - a. In general, total suspended solids (TSS) concentrations in the basin effluent are lower than in-stream values.
 - b. Oil films have not been detected downstream from any of the CSO control facilities.
 - c. Total suspended solids and turbidity have a high degree of correlation. Therefore, if basin effluent and stream turbidity are measured during overflow events, the basin effluent turbidity would be lower than stream values as is the case with TSS.
 - d. The large majority of settleable material that used to enter the river from CSO outfalls controlled by the CSO basins is now kept out of the river. In addition, for those storms which do cause a basin to overflow to the river, the fact that the velocities in the CSO basin are significantly lower than stream velocities means that solids most prone to settle will do so in the CSO basin rather than in the receiving stream.

In summary, the available monitoring data show no evidence that the treated effluent from the currently operating CSO basins is causing any violation of the physical characteristic standard in MDEQ's water quality standards.

Award

The Hubbell-Southfield CSO Basin received the 2000 Outstanding Civil Engineering Achievement Award from the Southeastern Michigan Branch of the American Society of Civil Engineers at their Annual Meeting, April 29, 2000. (See *Detroit Water and Sewerage Department Receives Honors for Basin Project press release*).

To obtain further information on the Rouge Project, including documents, maps and general information, visit us at:

<http://www.rougeriver.com>

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