



MINNEAPOLIS COMBINED SEWER OVERFLOW PROGRAM ANNUAL REPORT

APRIL 29, 2004

I hereby certify that this plan, specification, or report, was prepared by me or under my direct Supervision and that I am a duly Registered Professional Engineer under the laws of the State of Minnesota.

Registration No. 41869

PREPARED BY THE PUBLIC WORKS DEPARTMENT, ENGINEERING SERVICES DIVISION

TABLE OF CONTENTS

APRIL 29, 2004

NPDES/SDS Combined Sewer Overflow Permit.....	1
Combined Sewer Separation History.....	1
Goals and Strategy.....	3
Program Funding and Staffing	3
Rainleader Disconnection Program	4
Capital Improvements and Maintenance Program.....	4
Additional Ongoing CSO Efforts.....	6
Regulator Elimination and Maintenance	8
Street Sweeping.....	9
Sanitary Sewer Collection System.....	9
Storm Drain Collection System	10

BACKGROUND

APRIL 29, 2004

NPDES/SDS COMBINED SEWER OVERFLOW PERMIT

The 1972 amendments to the Federal Water Pollution Control Act (known as the Clean Water Act) provided the statutory basis for the National Pollutant Discharge Elimination System (NPDES) permit program designed to regulate the discharge of pollutants from point sources to waters of the United States. The Minnesota Pollution Control Agency (MPCA) has issued joint NPDES Combined Sewer Overflow (CSO) permits to the City of Minneapolis (City) and the Metropolitan Council (Met Council) since 1985. These permits regulate CSOs by stipulating procedures to follow in the event of an overflow from the sanitary system, efforts to eliminate these overflows, and reporting requirements for overflow events and elimination efforts. A separate interagency agreement between the City and the Metropolitan Council Environmental Services (MCES) details the responsibilities of each party with respect to operation of the collection system and notification in the event of an overflow from the sanitary system.

The most recent CSO permit was issued on February 26, 1997 and expired on June 30, 2001. The City and the Met Council applied for renewal of this permit in December 2000, and began negotiating with the MPCA on the terms for a new permit. In the absence of direction from the MPCA, we have continued to operate under the expired permit requirements and have developed a new plan to control CSOs.

COMBINED SEWER SEPARATION HISTORY

The oldest sewers in Minneapolis were built in 1870. These sewers were designed to carry both sewage and stormwater in one pipe. It was not until 1922 that construction of a separate storm drain system was built; initially around Minneapolis lakes and new developments. Older areas continued to be served by combined sewers. Sewer separation began in earnest in the 1960s, in conjunction with a citywide residential street paving program.

In 1986, the City began an accelerated sewer separation program now referred to as Phase 1 of the Minneapolis Combined Sewer Overflow Program. This program supplemented with federal and state funds, separated more than 4,600 acres in Minneapolis that was served by combined sewers. Less than 5% of the area within City limits still requires sewer separation.

Even though overflows had been greatly reduced by Phase 1 separation work, some overflow events continue to occur every year. As part of the 2000 Minneapolis Comprehensive Plan approved by the Met Council, the City entered into a Memorandum of Understanding that included both parties funding a joint infiltration and inflow (I/I) study of the CSO problem.

BACKGROUND

APRIL 29, 2004

The joint study project report, *Combined Sewer Overflow Separation Elimination* was published in April 2002. Inflow, rather than infiltration, was identified as the main culprit contributing to overflows. Recommendations for the Met Council included:

- Raising selected overflow weirs
- Inspection and repairs of the interceptor along Minnehaha Creek
- Pilot and implement in-line storage improvements
- Redesign of selected regulator structures

Recommendations for the City of Minneapolis included:

- Disconnect remaining public sector inflow sources: isolated catch basins (inlets), alley drains, and storm drains
- Disconnect remaining private sector inflow sources: rainleader, area drain, or other clean water discharges
- Study/implementation of storage or conveyance improvements

Phase 2 of the Minneapolis Combined Sewer Overflow Program was developed in 2002 based on the above study recommendations for implementation in 2003-2007. The City then submitted a comprehensive sewer plan (Tier II) to the Met Council for approval. The Tier II Sewer Plan documents the City's implementation plan for Phase 2 CSO improvements. The Met Council approved the Minneapolis Tier II Comprehensive Sewer Plan on January 29, 2003.

COMBINED SEWER OVERFLOW PROGRAM - PHASE 2

April 29, 2003

GOALS AND STRATEGY

The goal of the Minneapolis Combined Sewer Overflow Program - Phase 2 is to eliminate CSOs at the remaining eight regulated locations:

Regulator Site Location	NPDES Permit Number	Responsible Party
39 th Av S & Minnehaha Pkwy	M001	MCES
38 th St E & 26 th Av S	M002	MCES
Southwest Meters	M004	MCES
Northwest Meters	M005	MCES
East Meters	M006	MCES
26th St E & Seabury Av	M007	MCES
Oak St & 5th St SE	M012	City
Portland & Washington Av S	M020	MCES

The elimination of overflow structures may not be feasible in every case without causing a public health or safety hazard. Some overflow regulators may need to remain operational for emergency bypasses necessitated by extreme storm or flood events, or to minimize damage due to accidents or system failures. The minimum goal is to meet or exceed the EPA's current sewer overflow control policy.

PROGRAM FUNDING AND STAFFING

7 new positions were added in 2003 to the original 6 in 2002. This included 5 RDP inspectors and 2 engineering technicians. A budget request was made and approved in 2003 for 3 more RDP positions to begin in 2004. Total program staff positions now approved stands at 16 FTEs.

Operating budget increases also accompanied staff additions to provide equipment and supplies, and fund modeling and monitoring studies. The total budget for 2003 was \$1.5 million – operating and \$2 million for capital improvements.

*Combined Sewer Overflow Program - Phase 2 Funding (all amounts in 000's)**

	2002	2003	2004	2005	2006	2007	Totals
Operating Budget	\$567	\$1,454	\$2,368	\$2,368	\$2,368	\$2,368	\$11,493
Capital Improvement Projects		\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$10,000
Total Program Funding	\$567	\$3,454	\$4,368	\$4,368	\$4,368	\$4,368	\$21,493

* Based on 2002-2004 Minneapolis City Council Approved Budgets. Because additional information and modeling studies are needed to fully understand potential costs, this budget does not represent all possible future funding levels.

COMBINED SEWER OVERFLOW PROGRAM - PHASE 2

April 29, 2003

RAINLEADER DISCONNECTION PROGRAM

The Rainleader Disconnection Program's (RDP) objective is to identify and complete disconnection citywide of all private sources of clear water inflow to the sanitary sewer system. The Environmental Management division of Minneapolis Regulatory Services is responsible for the RDP. A new ordinance was drafted and approved, effective August 1, 2003: *Chapter 56. Prohibited Discharges to Sanitary Sewer System*. Previous City ordinance and State Plumbing codes only affected new construction, but not existing connections. Prohibited connections under the new ordinance include both new and preexisting roof drains, area drains, or other clear water connections. Property inspections for private stormwater connections to sanitary sewers began in February of 2003:

- Priority Area Inspections → The RDP has mapped out 41 priority neighborhoods based upon the 2002 Brown and Caldwell Sewer Separation Study. In 2003, twelve neighborhoods were inspected. This totaled 15,460 separate inspections, yielding 1219 violations.
- Institutional Inspections → The RDP completed inspections of facilities owned by Minneapolis Public Schools, Minneapolis Park and Recreation Board, the City of Minneapolis, and Hennepin County. This totaled 324 inspections, yielding 58 violations.
- Public Works Street Projects/Special Flood Project → Twelve street projects were inspected in 2003. These inspections are undertaken in advance of planned street reconstruction and renovation, providing property owners notice to plan disconnection work in conjunction with Public Works operations. This helps to save property owners money on street restoration costs and minimizes damage of newly constructed infrastructure.
- Site Plan Inspections → Late in 2003 the RDP began Site Plan inspections to assist Public Works in conjunction with site plan approvals. 17 such inspections were completed in 2003. If improper connections to the sanitary sewer are discovered, the RDP initiates the standard Notice to Disconnect process.
- Cross-Connection Inspections → Two cases of private sanitary flow connected to City storm drains were discovered and fully investigated. Corrective action was aggressively pursued to remove both illegal connections.

16,742 parcels were inspected in 2003 and 1,299 parcels (7.8%) were found to have non-compliant connections to the sanitary sewer system. 586 (3.5%) of the 1,299 violations were illegal connections to the sanitary sewer system, and the remaining 713 violations were disconnections that had been completed in such a manner that they could be easily reconnected.

CAPITAL IMPROVEMENTS AND MAINTENANCE PROGRAM

Minneapolis Public Works, Engineering Services staff completed the review of as-built records for City's entire storm and sanitary infrastructure. The purpose of this review was to update records and locate any combined connections that may have been overlooked during the initial program. These consist mainly of isolated catch basins,

COMBINED SEWER OVERFLOW PROGRAM - PHASE 2

April 29, 2003

alley and other storm drains, or overflow cross-connections to the sanitary system. Questionable areas were field checked to determine status. Over 100 CSO areas have been identified, categorized, and prioritized. Several areas found were separated as Sewer Maintenance staff discovered them.

Vigilance of field and office staff continues to bring in some additional small separation areas. This information comes in as a result of:

- Private sewer and water connection review of possible combined connections before issuing any new or repair permits
- Utility and plumbing inspectors' identification of combined systems as part of their current activities
- Continued education of City engineering, planning, regulatory and zoning staff on the importance of combined sewer connections

City CSO separation project planning and construction is accelerating in numbers now that the bulk of investigation work has been completed. The size and scope of the projects however, are in general small. The following is a list of public separation work completed in 2003 totaling 16.8 acres:

ID number	Location	Acres separated
CSO Area 002	3 rd Ave S & 4 th St S	0.65 acres
CSO Area 011	Flood Area 12	2.43 acres
CSO Area 012	Flood Area 12	1.60 acres
CSO Area 015	Aldrich Ave N & 42 nd Ave N	0.60 acres
CSO Area 027	Mt. View Alley Drain	1.03 acres
CSO Area 072	10 th St S Paving	0.45 acres
CSO Area 076	37 th Ave S & Minnehaha Ave	0.21 acres
CSO Area 082	12 th Ave SE & 6 th St SE	2.30 acres
CSO Area 083	Knox Ave S & W 31 st St (overflow pipe)	1.38 acres
CSO Area 096	Oakland Ave & 43 rd St E	0.75 acres
CSO Area 098	Drew Ave S & 42 nd St W	0.50 acres
CSO Area 107	Nicollet Ave & W 38 th St (overflow pipe)	4.90 acres

While documentation efforts are improving, some work found and completed in the process of ongoing sewer maintenance or other capital projects may not be included in the above. Next year's report will also include new or upgraded public storm drains that are constructed, as needed to facilitate private property drain disconnection. At least 2 such projects are currently planned for 2004 construction.

A City sanitary hydraulic model is being developed to study and implement storage or other system improvements. In-line storage projects are feasible in Minneapolis because much of the capacity of the large old combined sewers is not being used, post-separation. The modeling study will be implemented to identify system improvements utilizing storage, maximizing system capacity, and conveyance. A thorough understanding of the performance of the City's sanitary sewer system during wet weather is essential to controlling CSOs. Recommended projects identified by this study and through the post-study use of the completed model by Engineering Services staff will

COMBINED SEWER OVERFLOW PROGRAM - PHASE 2

April 29, 2003

be added to the separation project list for inclusion in the CSO capital improvement projects schedule.

Currently, the first phase of this project has been completed: the conversion of the MCES interceptor model from SewerCAT to XP-SWMM. The City sanitary system GIS that will be used for pipe geometry and attribute data is expected to be completed later this year. In the meantime, a pilot project has been started to determine parameters and methodologies for building and calibrating the citywide model.

ADDITIONAL ONGOING CSO EFFORTS

There are several other activities that complement the CSO - Phase 2 program. These activities directly or indirectly benefit the goal of elimination of CSOs:

Sanitary System Maintenance:

- Inspections of infrastructure to determine needed repairs, annual pipe rehabilitation program to minimize infiltration, and repairs and bulkheading overflows to remove inflows.
- Replacement of sanitary manhole covers w/more than one hole in ponding areas (approximately 700-800 manholes have been replaced to date).
- Study and implementation of collection system management software to predict sewer deterioration and recommend inspection frequencies. This will improve sanitary sewer infrastructure condition, as well as preventing emergency overflow events related to structural failures.

Other Public/Private Projects and Developments:

In the past, Public Works Site Plan Review dealt with rainleader/private drain disconnection issues in new development site plans. Late in 2003 the RDP staff took over Site Plan inspections and compliance for illegal connections to the sanitary sewer system to assure compliance with the new rainleader ordinance. Acres separated by Site Plan Review prior to this transfer of responsibilities is reported at 13.32 acres.

All future reports of disconnections initiated by the Site Plan Review process will be tracking and reported through the RDP. This is also true of previous Public Works coordination of rainleader/private drain disconnections for capital projects and developments by other governmental or public entities. The responsibility for all private disconnection work within the City of Minneapolis is now the Rainleader Disconnect Program.

COMBINED SEWER OVERFLOW PROGRAM - PHASE 2

April 29, 2003

Minneapolis Flood Mitigation Program:

Construction of Flood Mitigation Program projects have the benefit of reduced I/I to sanitary system. The following flood control projects were either begun or completed in 2003:

PROJECT AREA	MITIGATION MEASURE	STORMWATER RUNOFF BENEFITS
Chain of Lakes Grit Chambers, W 22 nd St & Lake of the Isles	Construction of stormwater treatment devices for Lake of the Isles and Lake Harriet	Reduction of litter, TSS* and related pollutants to receiving waters
29 th Av N and Logan Av N	Wet pond and associated infrastructure	Removal of TSS, nutrients, and other pollutants as well as rate control to Bassett Creek watershed
Flood Area 27, E of Lake Hiawatha	Installation of underground storage chambers, new and upgraded storm drains, grit chambers	Reduction of litter, TSS and related pollutants to receiving water. Reduction in peak flows to Minnehaha Creek
Flood Area 12, 37 th St E & Columbus Av S	Wet ponds and associated infrastructure	Removal of TSS, nutrients and other pollutants to receiving waters

* TSS – Total Suspended Solids

The following flood control projects are slated for construction in 2004:

PROJECT AREA	MITIGATION MEASURE	STORMWATER RUNOFF BENEFITS
Flood Area 26, 43 rd St E & Park Av	Wet ponds and associated infrastructure.	Removal of TSS, nutrients, and other pollutants as well as rate control to Minnehaha Creek watershed.
29 th Av N and Logan Av N	Wet pond and associated infrastructure.	Removal of TSS, nutrients, and other pollutants as well as rate control to Bassett Creek watershed.
Flood Area 27, E of Lake Hiawatha	Installation of underground storage chambers, new and upgraded storm drains, grit chambers	Reduction of litter, TSS and related pollutants to receiving water. Reduction in peak flows to Minnehaha Creek.
Flood Area 12, 37 th St E & Columbus Av S	Wet ponds and associated infrastructure	Removal of TSS, nutrients and other pollutants to receiving waters
Flood Area 1, 42 nd & Russell Av N		
Flood Area 19, 44 th St W & Aldrich Av S	Increased pipe capacity, reconstruction of outfall and addition of a grit chamber	Prevention of further erosion to the outfall area and reduction of sediment and floatables at outfall
Flood Area 24, 45 th St W & Lyndale Av S	New and upgraded storm drains connected to downstream Flood Area 19 improvements.	CSO separation, prevention of possible SSOs, and removal of sediment and floatables from new stormwater flows.

COMBINED SEWER OVERFLOW PROGRAM - PHASE 2

April 29, 2003

REGULATOR ELIMINATION AND MAINTENANCE

No regulators were closed in 2003. The one remaining City-owned regulator is the Oak Street SE Outfall, M012. Monitoring for the occurrence of overflows at this regulator was implemented in 2002. Monitoring will continue until CSO Area 316 Southeast Minneapolis Industrial Area (SEMI) is completed. This project is programmed for construction in 2005, pending the resolution of a current property acquisition issue. The remaining regulators are controlled by MCES and will require monitoring before they can be eliminated, and they may need to remain as emergency bypasses.

STREET AND COLLECTION SYSTEM CLEANING PROGRAM

April 29, 2003

STREET SWEEPING

Citywide sweeping operations occur every spring and fall. All City streets and alleys are swept systematically. Special methods address seasonal conditions and optimize cleaning procedures. Flusher trucks apply pressurized water to push sediment and debris to the gutters. Street sweepers follow behind, cleaning debris from the gutters. Leaves are collected in the fall before flushing and street sweeping takes place. In the summer, sweepers are assigned to maintenance districts for daily area sweeping. Downtown and high traffic commercial areas are swept weekly at night.

Since 1995, the Clean Water Partnership project includes summer sweeping in the Chain of Lakes watershed. This effort utilizes three sweepers that clean drainage areas around the Chain of Lakes, as well as the Minneapolis Parkway System.

Street sweeping techniques utilize both air regenerative and mechanical sweepers. Mechanical sweepers are best for bulk sweeping, when the debris is heavy. Air regenerative street sweepers vacuum up what mechanical sweepers cannot pick up. Every Minneapolis street is swept a minimum of 4 to 5 times each year. Sweeper piles are hauled to Monticello, Minnesota to be used as daily cover. Leaves are sent to a composting facility for disposal.

Street sweepings and leaves picked up are counted by volume (truckload). These counts are converted to weight by taking an average of a random weighing of trucks and multiplying by number of truckloads hauled. Statistics for last year's program are as follows:

- 20,750 tons material reclaimed with street sweeping operations during spring and summer
- 7,500 tons of leaves collected for composting during fall City-wide sweep

SANITARY SEWER COLLECTION SYSTEM

The City has 830 miles of sanitary sewers to maintain. Minneapolis Sewer Maintenance has divided the City up into 100 areas for their sewer main cleaning program. Mains are cleaned by the methods of jetting, discing, or rodding. Records are kept of the condition and cleaning required each year. City staff have created maps using the GIS system to visually track program progress.

Each year, sewers are selected for cleaning on the basis of past experience, pipe size, location in relation to flood-prone areas, and soil conditions. Some mains are cleaned yearly, sometimes more often as needed. There are 10 sanitary pump stations in the City, which are also cleaned each spring and then checked every week and cleaned again, if needed.

In addition to cleaning, last year's maintenance also included:

- 7 major repairs of sanitary sewers.

STREET AND COLLECTION SYSTEM CLEANING PROGRAM

April 29, 2003

- A total of 18,185 feet or 3.44 miles of sewer lined with a cured-in-place liner - 2,955 (0.56 miles) of clay sewers, and 15,230 (2.88 miles) of cement oval sewers.

STORM DRAIN COLLECTION SYSTEM

Generally, the Sewer Maintenance department inspects their structural control facilities routinely and performs maintenance to ensure proper operation. Frequency of inspections and maintenance are typically event-driven, based on maintenance experience and inspection results history.

The number of grit chambers in Minneapolis, which help in sediment, debris, and oil collection, are steadily increasing. These facilities are inspected each spring and fall, and cleaned if necessary. Sediment is removed, presence of floatables, and dates cleaned are recorded on log sheets. This data is then compiled into a database.

Storm drain outfalls are inspected on a five-year schedule. Site visits of outfall locations generate information on the condition of structures, any significant erosion observed, and if repairs are needed. Any identified maintenance or repairs are prioritized and scheduled as soon as practicable within the constraints of resources, budget, and the schedules of other essential operations and high-priority jobs.

Ponds and pump stations are routinely inspected after significant rainfall or other events that might cause concern or entail a maintenance response. Catch basins are cleaned to remove accumulated sediments, trash and debris to prevent pollution of receiving waters and minimize flooding problems. Street Maintenance workers annually inspect and clean catch basin grates on street sweeping routes during the summer. Sewer Maintenance crews remove debris and sediments from blocked structures discovered in the course of their operations, or reported by Public Works personnel or residents. Other controls are serviced on an as-needed basis.

Statistics for last year's program are as follows:

- Inspected 94 and cleaned 82 grit chambers (up from 87 in 2002). A total of 743 cubic yards (about 1032 tons) of grit were removed.
- Monitored and maintained 25 pump stations.
- Maintained 8 stormwater holding ponds (up from 5 in 2002).
- Inspected 85 of 384 storm drain outfalls in 2003 inspection program. Of the 84 outfalls inspected, 4 were judged to be in need of maintenance.
- Completed 7 major repairs, including abandoning over 200 feet of 60" diameter storm drain not in service anymore.
- Repaired 21 feet of storm drain with a cured-in-place liner.