



MINNEAPOLIS COMBINED SEWER OVERFLOW PROGRAM ANNUAL REPORT

APRIL 28TH, 2005

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.

A handwritten signature in black ink, appearing to read "J. Carlson", is written over a horizontal line.

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PREPARED BY THE PUBLIC WORKS DEPARTMENT, ENGINEERING SERVICES DIVISION

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BACKGROUND

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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. The NPDES program is 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 a CSO from the sanitary sewer 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 a CSO from the sanitary sewer 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, the City has continued to operate under the expired permit requirements, and has developed a new plan to control CSOs. This new plan includes an aggressive approach to eliminating CSO areas based on prioritization of remaining CSO areas, as well as working with scheduled capital improvement projects in Minneapolis.

COMBINED SEWER SEPARATION HISTORY

The oldest sewers in Minneapolis were built in 1870. These sewer pipes were designed to carry both sewage and stormwater. In 1922, construction started for a separate storm drain system 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 that was identified as "Phase I" of the Minneapolis Combined Sewer Overflow program. This program was supplemented with federal and state funds, and disconnected storm drains that drained more than 4,600 acres of surface area into Minneapolis sanitary sewers. Less than 5% of the surface area within the City limits still requires sewer separation of the sanitary and storm drain systems. This 5% represent the most difficult & complex areas to resolve, which is why they remain to be separated.

Even though CSOs have been greatly reduced by Phase I separation efforts, some overflow events continue to occur. As part of the 2000 Minneapolis Comprehensive Plan, that was approved by the Met Council, the City entered into a Memorandum Of Understanding (MOU) that included both parties funding a joint infiltration and inflow (I/I) study. The joint study yielded a report, ***Combined Sewer Overflow Separation Elimination***, which was published in April of 2002. Inflow, rather than infiltration, was identified as the main contributor to overflows. For current status of these initiatives, refer to the MCES portion of this report.

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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 connections, area drains, or other clean water discharges
- Study/implementation of storage or conveyance improvements

In 2002, Phase II of the City's CSO program was developed. This phase of the program was based on the recommendations of the I/I study, and was slated for implementation in the years 2003 - 2007. The City then submitted a Tier II comprehensive sewer plan to the Met Council for review and approval. The Tier II Sewer Plan documents the City's implementation plan for Phase II CSO improvements. On January 29, 2003, the Met Council approved the City's Tier II Comprehensive Sewer Plan.

COMBINED SEWER OVERFLOW PROGRAM - PHASE II

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GOALS AND STRATEGIES

The goal of the Minneapolis Combined Sewer Overflow Program - Phase II is to eliminate CSOs at the eight outfalls/regulators that still have CSOs:

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

The Rainleader Disconnect Program (RDP) staff now totals 11 employees, including the Program Manager, 7 RDP inspectors, 1 engineering technician, one unclassified position, and one administrative/clerical person.

Operating budget increases also accompanied staff additions to provide equipment and supplies, and fund modeling and monitoring studies. The total operating budget for 2004 was \$2.4 million, and the capital improvements budget was \$2 million.

*CSO Program - Phase II Funding (amounts in \$1,000 increments) **

	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 2002-2005 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.

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RAINLEADER DISCONNECTION PROGRAM (RDP)

The RDP's objective is to identify and disconnect all (citywide) private sources of clear water inflow to the sanitary sewer system. The Minneapolis Department of Regulatory Services, Environmental Management division, in coordination with the Department of Public Works, 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, not existing connections. Prohibited connections (under the new ordinance) include both new and pre-existing roof drains, area drains, and other clear water connections. Property inspections for private stormwater connections to sanitary sewers began in February of 2003. As summary of the inspections is as follows:

- Priority Area Inspections → In 2004, Seventeen priority neighborhoods (based upon the 2002 Brown and Caldwell Sewer Separation Study) were inspected, totaling 16,708 separate inspections, with 1577 (9.4%) violations found.
- Institutional Inspections → The RDP began a joint inspection program with the University of Minnesota Environmental Health and Safety department. The Knoll Area, Steam Plant, West Bank, and the Mall Area of the Minneapolis Campus were inspected. Inspections will continue in 2005.
- Public Works Street Projects → Three street projects were inspected in 2004. Inspections were undertaken in advance of planned street reconstruction and renovation. These inspections provided property owners with sufficient notice to plan disconnection work in conjunction with Public Works operations. This saved property owners money (on street restoration costs) and minimized the damage to newly constructed road surfaces.
- Site Plan Inspections → Property inspections are conducted at the weekly Site Plan Review meetings. Many properties that are reviewed by the site plan review committee have already been inspected during previous RDP neighborhood inspections. If not already inspected, an inspection is performed, and results for all non-compliant properties are forwarded to Public Works. If improper connections to the sanitary sewer are discovered, the RDP initiates the standard 'Notice to Disconnect' process.
- Cross - Connection Inspections → In 2004, RDP staff assisted Public Works with the investigation and resolution of one instance of sanitary flow into the City's storm drain infrastructure. Corrective action was aggressively pursued to remove this illegal connection.

16,826 parcels were inspected in 2004, which included street projects. Of these 16,826 parcels, 984 (5.8%) were inflow violations (prohibited connections to the sanitary sewer), and 593 (3.5%) were non-inflow violations (disconnections that had been completed in such a way that they could be easily reconnected). In 2004, RDP staff inspections identified 100.4 roof acres that were connected to the sanitary sewer system.

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CAPITAL IMPROVEMENTS AND MAINTENANCE PROGRAMS

Public Works Engineering Services staff have identified, categorized, and prioritized 114 CSO areas. Occasionally, CSO areas are discovered in the field by Sewer Maintenance staff, and are resolved at that time. Field and office staff continue to bring in additional small CSO separation areas. This information is a result of:

- Private sewer and water connection reviews (for possible combined connections) are done prior to issuing any new/repair permits
- Utility and plumbing inspectors' identification of CSOs as part of their current activities
- Continued education of City engineering, planning, regulatory and zoning staff on the importance of disconnecting CSOs

The following is a list of public separation work completed in 2004 (totaling 31.76 acres):

ID number	Location	Acres separated
CSO Area 008	E Lake St, west of 13 th Av S	1.50 acres
CSO Area 022	Elliot Av S, Lake St to W 29 th St	9.00 acres
CSO Area 023	Nicollet to Blaisdell Av; W 47 th -48 th St	1.95 acres
CSO Area 028	Portland to Oakland Av; E 36 th – 37 th St	1.36 acres
CSO Area 035	Chicago Av S, E 43 rd – 44 th St	1.93 acres
CSO Area 073	35 th /36 th St Renovation Project	14.13 acres
CSO Area 112	Pleasant Av S & W 55 th St	2.20 acres

Note: Some CSO separation work that was found and completed by the Sewer Maintenance department, or in conjunction with capital projects, may not be included in the above chart. In such cases, Sewer Maintenance would contact Engineering Services staff, and the acreage is recorded. In 2004, CSO efforts included three new or upgraded public storm drain construction projects. These projects were specifically constructed to facilitate private property drain disconnections.

In an attempt to identify potential sewer system improvements, the City has developed a hydraulic model of the City's sanitary sewer system. Since the inception of the CSO program, and as a result of those CSO separations, much of the capacity of the large, old combined sewers is not being used. This modeling study will identify potential improvements which may include utilizing storage, maximizing system capacity, and improving conveyance. An understanding of the City's sanitary system performance during wet weather is necessary to controlling CSOs.

Projects that are generated as a result of this study will be added to the separation project list to be included in the CSO capital improvement program schedule. A pilot project is nearing completion that will help to determine parameters and methodologies for building and calibrating the overall citywide model.

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ADDITIONAL CSO EFFORTS

There are several other activities which directly or indirectly benefit the elimination of CSOs:

Sanitary System Maintenance:

- Inspections of infrastructure to determine needed repairs
- The annual pipe rehabilitation program
- Repairs to, and bulkheading of, overflows
- Replacement of sanitary manhole covers (w/more than one hole) in ponding areas (approximately 700-800 manholes have been replaced to date).
- A study (and future implementation) of a collection system management software that would assist the City in predicting sewer deterioration, and subsequently recommend inspection frequencies. This will improve sanitary sewer infrastructure condition, as well as minimize emergency overflow events that were related to structural failures.

NON-CAPITAL CSO DEVELOPMENTS

Most CSO related initiatives, operations, documentation and duties are the responsibility of the CSO Team. However, Non-Capitol staff continues to assist the CSO Team in the areas of locating, investigating and resolving areas through the review of as-built records, or through site plan reviews. The final resolution and the recording of acreage is compiled and tracked by the CSO team. Some Non-Capital initiatives include:

Site Plan Review

Public Works Staff continued to require complete separation of all sites under review. This included the following combined connections:

- Roof drains¹
- Surface parking lots²
- Uncovered rooftop parking ramps
- Loading docks and area drains
- Internal drains
- Sump pumps
- Permitted non-stormwater clean water connections (cooling, heating etc.)

1 During 2004, over 60 properties with combined roof drains were identified by the site plan review process. Enforcement and responsibilities for compliance associated with these separations was under the oversight of Minneapolis Regulatory Services.

2 Nearly 20 acres were separated by the removal of parking lot drains from the sanitary sewer.

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New Combined Area Identification and Separation

Ongoing review of storm and sanitary as-built records provided an opportunity to identify an instance of a connection between a sanitary sewer and a storm drain that might have been missed during Phase I of the CSO Program. Questionable areas are field verified. As the amount of acreage that remains connected to the sanitary sewer continues to decline, so do the number of cross connections that are uncovered during these reviews. 2004 estimates were minimal, which is a good indicator that the City is nearing completion for this activity.

Temporary Connection or Overflow Inspections

Engineering Services staff has identified all currently known temporary connections or overflows, which should have been eliminated with the program. All of these connections have been verified and as-built plats updated.

Other Separation Initiatives

- The City will continue to review sewer and water connections for possible combined connections, before issuing any new or repair permits for that property.
- City utility and plumbing inspectors will continue to identify and report combined systems, as part of their current work duties.
- Continued education of City staff from Engineering Services, Planning, Regulatory Services and Zoning departments on the importance of eliminating combined sewer connections.

MINNEAPOLIS FLOOD MITIGATION PROGRAM

Construction of projects from the Flood Mitigation Program have the benefit of reducing I/I to sanitary system. The following flood control projects were either begun or completed in 2004:

PROJECT AREA	MITIGATION MEASURE	STORMWATER RUNOFF BENEFITS
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. Elimination of CSO areas.
Flood Area 1, 42nd & Russell Av N		
Flood Area 19, 44 th St W & Aldrich Av S	Increased pipe capacity, reconstruction of outfall and addition of grit chamber	To prevent further erosion to the outfall area and reduction of sediment and floatables at outfall. Downstream construction of storm drain infrastructure to receive future CSO flow.

* TSS – Total Suspended Solids

The following flood control projects are slated for construction in 2005:

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PROJECT AREA	MITIGATION MEASURE	STORMWATER RUNOFF BENEFITS
Flood Area 1, 42nd & Russell Av N	Wet ponds and associated infrastructure	Removal of TSS, nutrients and other pollutants to receiving waters. Elimination of two CSO areas.
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. Downstream construction of storm drain infrastructure to receive future CSO flow.
Flood Area 24, 45 th St W & Lyndale Av S	New and upgraded storm drains connected to Flood Area 19 improvements.	CSO separation, prevention of possible SSOs, and removal of sediment and floatables from new stormwater flows.

REGULATOR ELIMINATION AND MAINTENANCE

A regulator is a device installed in combined systems to control the amount of flow into the sewer system during periods of wet weather. Excess flows are routed to an outfall. In 2004, no regulators were closed. Oak Street SE Outfall, M012 is the one remaining City-owned regulator. Monitoring for the occurrence of overflows at this regulator was implemented in 2002. Monitoring will continue until the Southeast Minneapolis Industrial Area (SEMI) project, which contains CSO Area 56, is completed. This project was slated for construction in 2005; however, a property acquisition issue problem arose and the SEMI project is on hold until 2006 or later.

The remaining regulators are controlled by MCES, and will require monitoring before they can be eliminated. In some cases these regulators may need to remain as emergency bypasses.

SEWER SYSTEM CLEANING PROGRAM

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SANITARY SEWER COLLECTION SYSTEM

The Sewer Maintenance department routinely inspects sanitary infrastructure, and performs maintenance as needed to ensure proper operation. The City has over 830 miles of sanitary sewers that it maintains. Minneapolis Sewer Maintenance staff has divided the City into 100 areas for their sewer main cleaning program. This sewer main cleaning program is significant to the CSO program because it uncovers/reveals I/I. Sewer mains are cleaned by methods called jetting, discing, or rodding. Annual records are kept that describe the condition, as well as the cleaning that was done for that year. City staff has created maps using GIS to help track progress.

Each year, sewers are selected for cleaning on the basis of past experience, pipe size, and location (in relation to flood-prone areas and poor soil conditions). Some mains are cleaned annually, but occasionally additional cleanings are needed. There are 10 sanitary pump stations in the City. These pump stations are cleaned each spring, and then checked weekly to determine if they will need additional cleaning.

In addition to cleaning, maintenance in 2004 also included:

- 15 major repairs of sanitary sewers
- A total of 17,893 feet (3.39 miles) of sanitary sewer lined with a cured-in-place liner. Of that total,
 - 9,990 feet (1.89 miles) were cement oval sewers
 - 8,697 feet (1.65 miles) were clay sewers
 - 31 feet (.01 miles) were galvanized sewers
- 245 (resident driven requested) possible sanitary backups were inspected
 - of those 245 backups, 20 were found to be plugged & were repaired, and 225 were private property issues
- 5,200 problematic sanitary locations were inspected
- 36 sanitary cave-ins were addressed
- 214 minor sanitary repairs were addressed
- 399 miles of sanitary sewer were jetted with high pressure forced water
- 4.48 miles were jetted and vacuumed
- 2.81 miles of sanitary sewer were rodded (cleaned)
- 32.25 miles of sanitary sewer were disced (sand/debris related)
- 40.77 miles of sanitary sewer were flushed and examined
- 40.1 miles of sanitary sewer were televised

SEWER SYSTEM CLEANING PROGRAM

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STORM DRAIN COLLECTION SYSTEM

The Sewer Maintenance department routinely inspects storm infrastructure, and performs maintenance as needed to ensure proper operation. Inspection and maintenance frequency are usually 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) is increasing. These chambers are inspected each spring and fall, and cleaned if necessary. Sediment is removed, the presence of floatables is noted, and grit chamber cleaning dates are logged. 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:

- Condition of structures
- Significant erosion
- Any necessary repairs

Grit chamber maintenance and repairs are planned within the constraints of resources, budget, as well as the schedules of other operations. Ponds and pump stations are inspected after a significant rainfall event; however, other events might require a maintenance response.

Catch basins are cleaned to remove accumulated sediments, trash and debris. This prevents pollution of receiving waters and minimizes flooding problems. Street Maintenance workers perform annual inspections during which they clean catch basin grates on summer street sweeping routes, thereby removing debris and sediment from blocked structures.

Statistics for the program in 2004 are as follows:

- Completed 5 major storm drain repairs
- 825 feet (0.16 miles) of storm drain sewer was lined with a cured-in-place liner
- Inspected 112 and cleaned 96 grit chambers. A total of 488.5 cubic yards was removed and properly disposed of.
- Maintained 9 stormwater holding ponds (up from 8 in 2003)
- Inspected 239 of 387 storm drain outfalls
 - Of the 239 outfalls inspected, 11 needed maintenance or repair
- Monitored and maintained 25 pump stations