



## MINNEAPOLIS COMBINED SEWER OVERFLOW PROGRAM 2005 ANNUAL REPORT

APRIL 21<sup>ST</sup>, 2006

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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.

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Greg Schroeder, PE  
Capital Improvement Coordinator  
Minneapolis Public Works, Engineering Services  
Registration No. 18831

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 (also 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 defining certain conditions that should be followed if an overflow from the sanitary sewer system occurs. These conditions include: keeping detailed records of the number of CSO events, volume data, operation & maintenance data for overflow events and elimination efforts. Cooperation with both joint permittees is also maintained.

A separate interagency agreement between the City of Minneapolis 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<sup>th</sup>, 1997 and expired on June 30<sup>th</sup>, 2001. The City and the Met Council applied for renewal of this permit in December of 2000, and began negotiating with the MPCA regarding 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 is implementing a developed plan to control CSOs.

including an aggressive approach to eliminating CSO areas based on prioritizing the remaining CSO areas and coordinating with scheduled capital improvement projects in Minneapolis.

### **COMBINED SEWER SEPARATION HISTORY IN MINNEAPOLIS**

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 lakes in Minneapolis, as well as 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 called "Minneapolis Combined Sewer Overflow Program - Phase I". Phase I was supplemented with federal and state funds and was responsible for disconnecting storm infrastructure that contributed more than 4,600 acres of surface area to Minneapolis sanitary sewers. Less than 5% of the surface area within the City limits still requires separation of the sanitary and storm drain systems. This 5% represent the most difficult & complex areas to resolve.

Even though CSOs were greatly reduced by Phase I efforts, overflow events occasionally still occur. As part of the 2000 Minneapolis Comprehensive Plan (approved by the Met

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Council) Minneapolis 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. Refer to the MCES portion of this report for the current status of these initiatives.

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 and implementation of storage or conveyance improvements

In 2002, Phase II of the City's CSO program was developed. Phase II was based on the recommendations of the I/I study, and was slated for implementation in 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<sup>th</sup>, 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:

<b>Regulator Site Location</b>	<b>NPDES Permit Number</b>	<b>Responsible Party</b>
39 <sup>th</sup> Av S & Minnehaha Pkwy	M001	MCES
38 <sup>th</sup> St E & 26 <sup>th</sup> Av S	M002	MCES
Southwest Meters	M004	MCES
Northwest Meters	M005	MCES
East Meters	M006	MCES
26 <sup>th</sup> St E & Seabury Av	M007	MCES
Oak St & 5 <sup>th</sup> St SE	M012	City
Portland Av & 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 **C**ombined **S**ewer **O**verflow (CSO) program has 5 dedicated employees working on CSO related issues.

The **R**ainleader **D**isconnect **P**rogram (RDP) staff now totals 11 employees, including the Program Manager, 7 RDP inspectors, 1 administrative analyst, 1 unclassified position and 1 administrative/clerical person.

Operating budget increases also accompanied staff additions to provide equipment and supplies, and fund modeling and monitoring studies. The total

investigative & enforcement budget for 2005 was \$2.1 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
Investigative & Enforcement Budget	\$567	\$1,454	\$2,368	\$2,066	\$2,285**	\$2,354**	\$11,094
Capital Budget		\$2,000	\$2,000	\$2,000	\$0	\$4,000	\$10,000
<b>Total Program Funding</b>	<b>\$567</b>	<b>\$3,454</b>	<b>\$4,368</b>	<b>\$4,066</b>	<b>\$2,285</b>	<b>\$6,354</b>	<b>\$21,094</b>

\* 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.

\*\* Estimated

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### **RAINLEADER DISCONNECTION PROGRAM (RDP)**

The RDP's objective is to identify and disconnect all private sources of clear water inflow to the sanitary sewer system throughout the City. Minneapolis Regulatory Services, Environmental Management & Safety Division, in coordination with Minneapolis Public Works, is responsible for managing the RDP.

A new ordinance was drafted and approved, effective August 1, 2003, which is called ***Chapter 56: Prohibited Discharges to Sanitary Sewer System***. Previous City ordinances and state plumbing codes only affected only new construction, not existing connections.

Under this new ordinance, prohibited connections include both new and pre-existing roof drains, area drains, and other clear water connections, such as sump pump and foundation drains. Property inspections for private stormwater connections to sanitary sewers began in February 2003. A summary of the inspections follows here:

- **Priority Area Inspections** → In 2005, sixteen priority neighborhoods (based upon the 2002 Brown and Caldwell Sewer Separation Study) were inspected, totaling 20,337 separate inspections, with 1,194 (5.8%) violations found.
- **Institutional Inspections** → The RDP began a joint inspection program with the University of Minnesota Environmental Health and Safety department. The Como area was inspected. Inspections have continued in 2006.
- **Public Works Street Projects** → Four street projects were inspected in 2005. Inspections were undertaken in advance of planned street reconstruction and renovation projects. 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.
- **Preliminary Development Review (PDR) Inspections** → Property inspections are conducted for the weekly Preliminary Development Review meetings. Many properties that are reviewed by the PDR 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 2005, RDP staff assisted Public Works with the investigation and resolution of two instances of sanitary flow into the City's storm system. Corrective action was aggressively pursued to remove these illegal connections.

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There were 20,337 parcels inspected in 2005, which included street projects. Of these 20,337 parcels, 891 (4.4%) were inflow violations (prohibited connections to the sanitary sewer), and 303 (1.5%) were non-inflow violations (disconnections that had been completed in such a way that they could be easily reconnected).

### **CAPITAL IMPROVEMENTS AND MAINTENANCE PROGRAMS**

Public Works Engineering Services staff have identified, categorized, and prioritized 118 CSO areas. Of those 118 CSO areas, 57 have been completed or resolved after Phase II of the CSO Program started. The CSO Program coordinates with the Minneapolis Capital Improvement Project schedule to ensure that any CSO areas that fall within the construction limits of a pending capital project are resolved in conjunction with that project. Occasionally, CSO areas are discovered by Engineering Services and Sewer Maintenance staff. 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 inspector's identification of CSOs as part of their current activities
- Continued education of City staff on the importance of disconnecting CSOs

Following is a list of public separation work completed in 2005:

<b>CSO ID number</b>	<b>CSO Area Location</b>	<b>Acres Separated</b>
CSO Area 020	E Lake St & Oakland Av	1.80 acres
CSO Area 041	42 <sup>nd</sup> Av N, Queen to Russell Av N	2.80 acres
CSO Area 059	E Lake St & 15 <sup>th</sup> Av S	0.51 acres
CSO Area 062	42 <sup>nd</sup> Av N, Queen to Penn Av N	1.22 acres
CSO Area 078	E Lake St & 14 <sup>th</sup> Av S	0.71 acres
CSO Area 105	Cedar Lake Road & Penn Av N	0.56 acres
CSO Area 113	3 <sup>rd</sup> St S & Marquette Av	0.45 acres
	<b>Total Acreage</b>	<b>8.05 acres</b>

No new or upgraded public storm drains were constructed in 2005 for private separation of storm and sanitary. Some properties that are required to disconnect stormwater from the sanitary sewer have no storm drain in close proximity. When there is no green space to redirect the stormwater, such as in commercial areas or downtown, storm drain infrastructure needs to be built to accomplish the disconnection. In 2006, one storm drain project is being constructed to facilitate downtown property roof drain separation.

### **ADDITIONAL CSO EFFORTS**

These activities directly or indirectly benefit the elimination of CSOs:

#### Sanitary System Maintenance:

- Inspections of infrastructure to determine needed repairs

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- The annual pipe rehabilitation program
- Repairs and bulkheading of sanitary pipes where an overflow existed
- Replacement of sanitary manhole covers (w/more than one hole) in ponding areas. Approximately 700-800 manholes have been replaced to date.

### Sanitary System Modeling:

Understanding the City's sanitary system performance during wet weather conditions is necessary to controlling CSOs. A pilot project modeled the Bryn Mawr area interceptor, as well as the contributing sanitary pipe network. This pilot project will help to determine parameters to be used in a citywide sanitary modeling effort, as well as to estimate reduction of inflow after CSO separation in those areas. Development of a citywide sanitary model would help to evaluate:

- Inline storage, including analyzing the capacity of the large, older combined sewers is not being utilized (Partially due to CSO Program efforts and CSO areas already separated)
- Unknown sources of I/I
- Peak flow factors due to industrial sources

### **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 preliminary development reviews. The final resolution and the recording of acreage is compiled and tracked by the CSO team. Non-Capital initiatives include:

#### **Preliminary Development Review (PDR)**

Public Works Staff continued to require complete separation of all sites that are reviewed by the PDR committee. This included the following combined connections:

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

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### **New Combined Area Identification and Separation**

Storm and sanitary as-builts are reviewed to identify instances of connections between sanitary sewers and storm drains, that might have been missed during Phase I of the CSO Program. Questionable areas are then field verified.

As the amount of acreage still connected to the sanitary system continues to decline, so does the number of cross-connections. 2005 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. These connections are verified and our sewer database is updated.

### **Additional Non-Capital Initiatives**

- The City will continue to review sewer and water connections for possible combined connections, before issuing any new or repair permits for those properties.
- City utility and plumbing inspectors continue to identify and report combined systems, which is 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 partially constructed or completed in 2005:

<b>PROJECT AREA</b>	<b>MITIGATION MEASURE</b>	<b>STORMWATER RUNOFF BENEFITS</b>
Flood Area 1, 42 <sup>nd</sup> Av N & 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, W 44 <sup>th</sup> St & 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 flow from FA24/CSO Area 26.
Flood Area 27, Phase II, 28 <sup>th</sup> Av S, E 38 <sup>th</sup> to 40 <sup>th</sup> St	Increased storm system capacity due to box culvert installation	Reduce I/I to the sanitary system

\* TSS – Total Suspended Solids

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The following flood control projects are slated for construction in 2006:

<b>PROJECT AREA</b>	<b>MITIGATION MEASURE</b>	<b>STORMWATER RUNOFF BENEFITS</b>
Flood Area 24 (CSO Area 26), W 45 <sup>th</sup> St & Lyndale Av S	Increased pipe capacity, reconstruction of outfall & addition of grit chamber	Downstream construction of storm drain infrastructure to receive flow from FA24/CSO Area 26.
Flood Area 27, Phase III, 28 <sup>th</sup> Av S, E 38 <sup>th</sup> to 40 <sup>th</sup> St	Increased storm system capacity due to box culvert installation	Reduce I/I to the sanitary system

**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 2005, no regulators were closed.

Oak Street SE Outfall M012 (R20) is the one remaining regulator owned by the City of Minneapolis. Monitoring for overflows was implemented in 2002. Additionally, CSO Area 56 drains to the Oak St outfall. Monitoring at the Oak St outfall will continue until this CSO area is resolved, which will happen in conjunction with the **SouthEast Minneapolis Industrial Area (SEMI)** project. The schedule for the CSO related portion of SEMI is yet to be determined, due to some property acquisition issues. Once this CSO area is resolved, short term monitoring should confirm that this outfall could be closed.

The remaining regulators in Minneapolis are controlled by MCES, and will require monitoring before they can be eliminated. In some cases, 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 and reveals I/I. Sewer mains are cleaned by different 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 uses GIS maps 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 might be needed.

The 10 sanitary pump stations in the City are cleaned each spring, and then checked weekly to determine if additional cleaning is needed. In addition to cleaning, maintenance in 2005 also included:

- 27 major repairs of sanitary sewers
- A total of 13,804 feet (2.61 miles) of sanitary sewer lined with a cured-in-place liner. Of that total,
  - 7,749 feet (1.46 miles) were cement oval sewers
  - 6,055 feet (1.14 miles) were clay sewers
  - 0 feet (0 miles) were galvanized sewers
- 308 (requested by residents) possible sanitary backups were inspected
  - of those 308 backups, 21 were found to be plugged & were repaired, and 287 were private property issues
- 4,688 problematic sanitary locations were inspected
- 16 sanitary cave-ins were addressed
- 171 minor sanitary repairs were addressed
- 430.22 miles of sanitary sewer were jetted with high pressure forced water
- 6.24 miles were jetted and vacuumed
- 4.27 miles of sanitary sewer were rodded (cleaned)
- 21.74 miles of sanitary sewer were disced (sand/debris related)
- 30.69 miles of sanitary sewer were flushed and examined
- 39.78 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, removing debris and sediment from blocked structures.

Statistics for the Sewer Maintenance program in 2005 are as follows:

- Completed 9 major storm drain repairs
- 0 feet (0 miles) of storm drain sewer was lined with a cured-in-place liner
- Inspected 121 and cleaned 90 grit chambers. A total of 626 cubic yards was removed and properly disposed of.
- Maintained 10 stormwater holding ponds (up from 9 in 2004)
- Inspected 90 of 387 storm drain outfalls
  - Of the 90 outfalls inspected, 14 needed maintenance or repair
- Monitored and maintained 25 pump stations