minneapolis
city of lakes

MINNEAPOLIS COMBINED SEWER OVERFLOW PROGRAM
2008 ANNUAL REPORT

APRIL 16, 2008

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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MINNEAPOLIS MINNESOTA CSO PROGRAM

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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 Metropolitan Council Environmental Services (MCES) since 1985.

These permits regulate CSOs by defining certain conditions that should be followed if an overflow from the sanitary system occurs, including:

- Keeping detailed records of the number of CSO events
- Maintaining volume data
- Maintaining operation & maintenance data for overflow events and elimination efforts

Cooperation with both joint permittees is also maintained.

A separate inter-agency agreement between the City of Minneapolis and MCES details each permittee's responsibilities 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 (Permit MN 0046744). The City and MCES applied to renew 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 has developed a 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.

NPDES/CSO Background April 16, 2008

COMBINED SEWER SEPARATION HISTORY IN MINNEAPOLIS

The oldest Minneapolis sewers were built in 1870, and were designed to carry both sewage and stormwater. In 1922, construction started for a separate storm drain system around Minneapolis lakes, as well as newly developing areas. Older areas continued to be served by combined sewers. Sewer separation began in earnest in the 1960s, in conjunction with a citywide paving program.

In 1986, the City began an accelerated sewer separation program called ***Minneapolis Combined Sewer Overflow Program - Phase I***. CSOs were greatly reduced by Phase I efforts. Phase I was supported in part by 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.

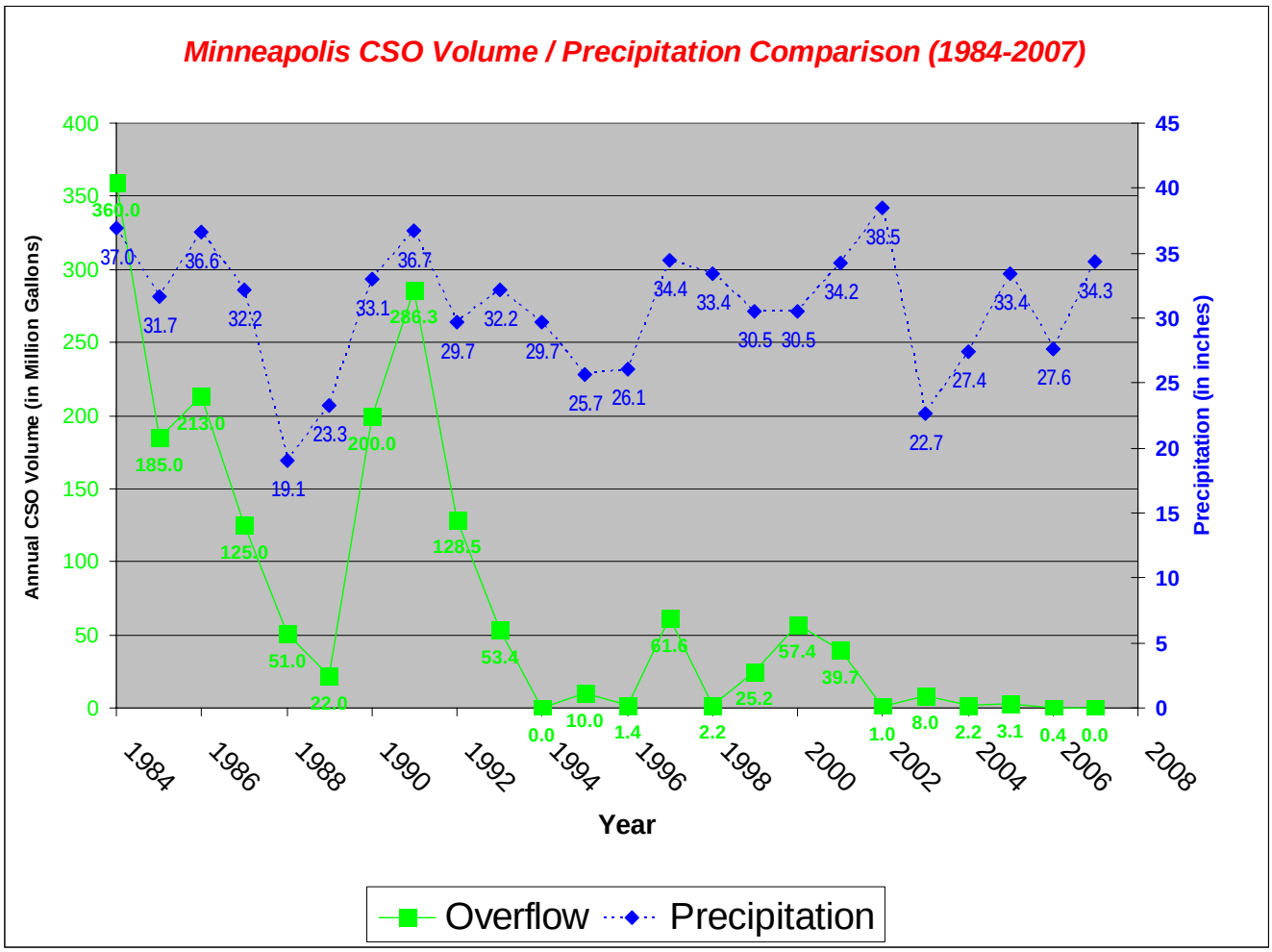
The ***Minneapolis Combined Sewer Overflow Program – Phase II*** was developed in 2002, based on a 1999/2000 comprehensive planning process and an April 2002 study entitled, ***Combined Sewer Separation Elimination*** that identified inflow, rather than infiltration, as the major contributor to CSOs. The 2002 study recommended that Minneapolis:

- 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 implement storage and conveyance improvements

The City's Tier II Comprehensive Sewer Plan, that documented the City's implementation plan for Phase II CSO improvements, was approved by MCES in January 2003. Refer to the MCES portion of this report for the current status of these initiatives.

Progress has been dramatic throughout Phase I and Phase II as upgrades to the sewer system have been carried out (see Table 1). Both the frequency and the volume of untreated sewage overflowing into the stormwater system during intense rainstorms and discharging into the Mississippi River have steadily diminished. In 2007, not a single CSO event occurred in the City of Minneapolis. That was the first year since the City of Minneapolis had combined sewers that untreated sewage did not pollute the Mississippi River in Minneapolis. Nevertheless, overflows could still occur and the separations that remain are generally the most difficult and complex to locate and resolve.

Combined Sewer Overflow Program - Phase II April 16, 2008



Combined Sewer Overflow Program - Phase II April 16, 2008

GOALS AND STRATEGIES

The goal of Phase II of the CSO Program is to eliminate CSOs at the eight outfalls/regulators that still have CSOs. The following table shows information about these regulators:

Regulator Site Location	NPDES Permit Number	Responsible Party
39th Av S & Minnehaha Parkway	M001	MCES
38th St E & 26th 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 SE & 5th 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 City's minimum goal is to meet or exceed the EPA's current sewer overflow control policy.

PROGRAM FUNDING

New in 2007 is funding for Inflow & Infiltration (I & I) capital projects. This program augments the current CSO program. The I & I reduction program is being implemented to meet goals established by Metropolitan Council Environmental Services (MCES). Infiltration is the seepage of groundwater into sanitary sewer pipes through cracks and joints. Inflow is typically a structure or device that collects surface water and drains to the sanitary sewer. The stormwater source can be catch basins, roof rainleaders, area drains all connected directly to the sewer system. MCES has measured the amount of I & I, called Excess Flow, from the City of Minneapolis. The Excess Flow from all of the communities, including Minneapolis, creates problems in the regional sanitary sewer system and wastewater treatment plants. The addition of surface water into the City of Minneapolis local sewer system creates problems for MCES and problems for the City of Minneapolis.

For MCES, this Excess Flow uses pipe capacity and treatment plant capacity that was originally planned for growth. In some cases, the Excess Flow exceeds the capacity of the interceptor pipes and is bypassed to public waters. Or, in some cases, the Excess Flow exceeds the capacity of the treatment plants, and the Excess Flow bypasses plant treatment and is discharged to public waters.

For the City, this Excess Flow creates problems because (1) it degrades the City's environment, (2) the City is being charged for treatment of this Excess Flow as though it were

wastewater, and (3), the most costly problem, the Excess Flow makes the City subject to the MCES Surcharge, as described as follows:

MCES has established I & I goals for all communities discharging into their treatment system. All communities that exceed their I & I goals are required to develop and implement a program to reduce I & I, no later than 2012, to the established goal. In 2007 MCES initiated a surcharge program to compel communities to solve their I & I problems. In the program, MCES penalizes a community that has Excess Flow and plans to hold the penalty in escrow until the community performs work that results in an actual reduction of the Excess Flow. However, if the community develops and implements a successful I & I program, MCES will waive all or part of the surcharge for the subject year, with the amount waived proportionate to the Excess Flow successfully removed.

For the City of Minneapolis, MCES calculated the 2007 surcharge amount to be $ 7.9 million. The City established its I & I reduction program to proactively plan and implement an I & I reduction program to meet its goal for 2007 within the specified timeframe and did not have to pay an MCES's 2007 surcharge. As pertains to the City of Minneapolis, the most significant part of I & I for MCES is the Inflow, and as a result of effective efforts to reduce Inflow sources of Excess Flow in 2007, the City achieved reduction goals set by MCES.

I & I Program Funding (amounts in $1,000 increments)

	2007	2008	2009	2010	2011
Approved Budget for Capital Projects	$5,000	$5,000			
Future Budget for Capital Projects			$5,000	$5,000	$5,000
Total Program Funding	$5,000	$$5,000	$5,000	$5,000	$5,000

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

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Actual Operating Expenses	$278	$931	$1,158	$1,210	$1,207	$1,172				
Budget for Operating Expenses							Not yet determined			
Approved Budget for Capital Projects	$0	$2,000	$2,000	$2,000	$0	$1,000	$1,375			
Future Budget for Capital Projects (not yet approved)								$1,500	$1,500	$1,500
Total Program Funding	$ 278	$2,931	$3,158	$3,210	$1,207	$2,172	$1,375	Not yet determined		

RAINLEADER DISCONNECTION PROGRAM

The 2007 Rainleader Disconnect Program (RDP) staff included the Program Manager, RDP field inspectors and administrative positions.

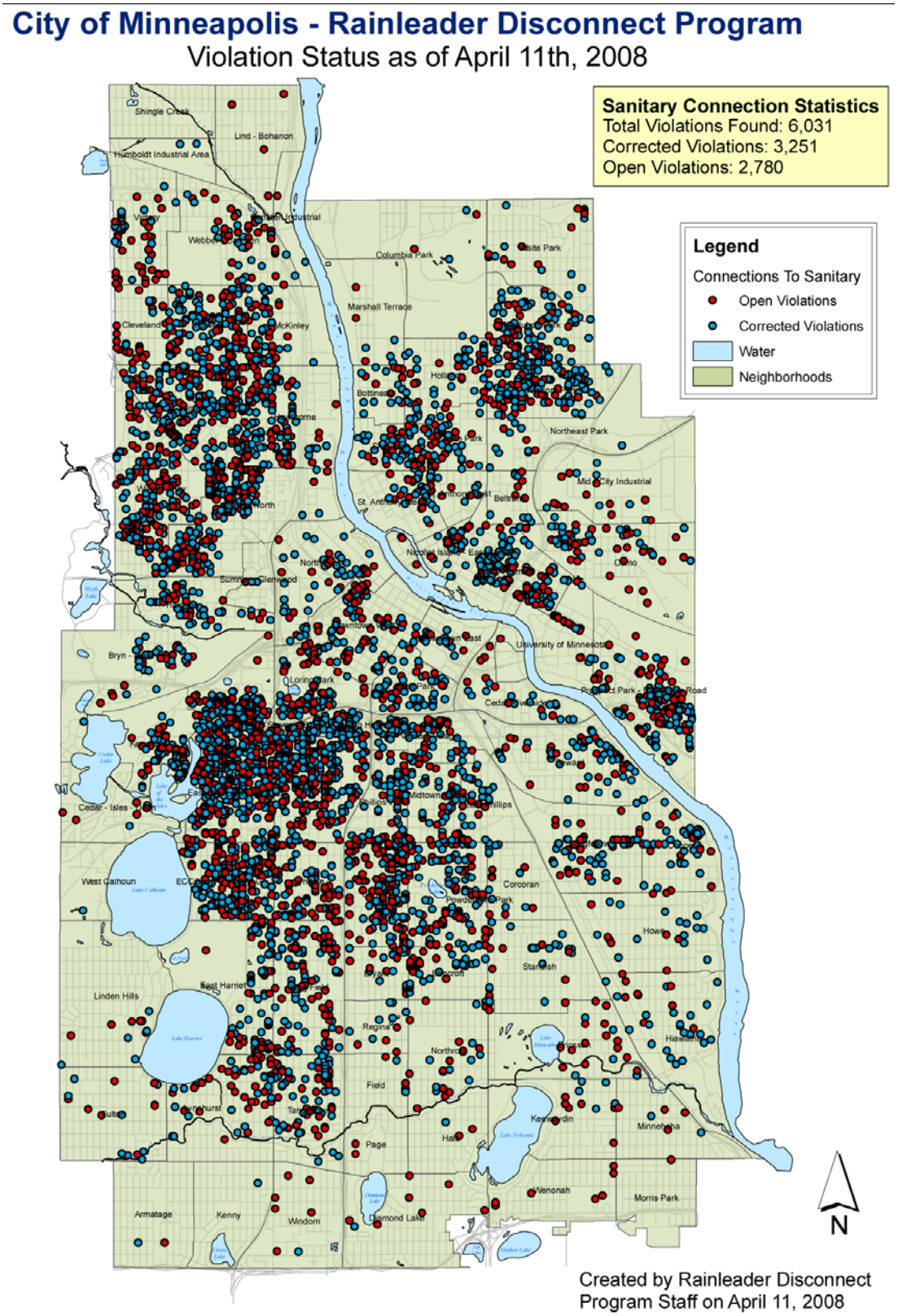
The objective of the RDP is to identify and disconnect all private sources of clear water inflow to the sanitary sewer system in Minneapolis. Minneapolis Regulatory Services, Environmental Management & Safety Division, in coordination with Minneapolis Public Works (MPW), is responsible for managing the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

An ordinance called ***Chapter 56: Prohibited Discharges to Sanitary Sewer System*** went into effect in August 2003. Under the 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. Previous City ordinances and state plumbing codes affected only new construction, not existing connections. Revisions to Chapter 56 were approved in 2006 that were designed to accelerate compliance. These included adding Chapter 2 Administrative Citation enforcement, adding the ability to order connection to the City storm drain as the disconnection method, and utilizing assessments to cover disconnection costs.

Under the RDP, property inspections for private stormwater connections to sanitary sewers began in February 2003 and were completed in 2007. The inspections are summarized as follows: Over the five years of inspections, 103,711 parcels were inspected (28,966 in 2007). A total of 5,997 violations were found (285 in 2007). Of the 5,997 violations, 3,789 (63%) were Downspouts or Open Standpipes, 1,763 (29%) were Roof Drains, and 439 (7%) were Area Drains. (See Figure 1.)

Some properties that are in violation and are required to disconnect stormwater from the sanitary sewer do not have green space for redirecting the stormwater, such as in commercial areas or downtown, and also lack a public storm drain in close proximity to which a connection can be made. For these properties, municipal storm drain infrastructure needs to be built to accomplish the disconnection. No new or upgraded public storm drains were constructed in 2007 for private separation of storm and sanitary. Several public storm drains are planned in 2008.

Combined Sewer Overflow Program - Phase II April 16, 2008



Institutional Inspections → The RDP continued a joint inspection program with the University of Minnesota Environmental Health and Safety department.

Public Works Street Projects → 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 MPW operations. This saved property owners money on street restoration costs and minimized the damage to newly constructed road surfaces.

Minneapolis Development Review (MDR) Inspections → Property inspections are conducted for the weekly MDR meetings. Many properties reviewed by MDR have already been inspected during previous RDP inspections. If not already inspected, an inspection is performed, and results for all non-compliant properties are forwarded to Minneapolis Public Works (MPW). If improper connections to the sanitary sewer are discovered, the RDP initiates the standard *'Notice to Disconnect'* process.

Cross - Connection Inspections → RDP staff assists MPW with the investigation and resolution of instances of sanitary flow into the City's storm system. Corrective action is aggressively pursued to remove these illegal connections.

CAPITAL IMPROVEMENT PROJECTS AND MAINTENANCE PROGRAMS

Since Phase II started, Minneapolis Public Works (MPW) personnel in the Surface Water & Sewers Division (SW&S) have identified, categorized, and prioritized 127 CSO areas. The CSO Program coordinates with the Minneapolis Capital Improvement Project schedule to ensure that any CSO areas within construction limits of a pending capital project are addressed in conjunction with that project's schedule. Occasionally, new CSO areas are discovered by SW&S maintenance or other 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 identifying and disconnecting CSOs

Following is a list of public separation work completed in 2007:

CSO Area ID	Location Description	Acres
116	Temporary connection @ E 47th St & 35W	183.2
50	Marshall St NE, 29th Av NE to 30th Av NE	0.36
111	10th Av N, 3rd to 4th St N	0.14
118	2nd St N & 31st Av N	0.5
80	9th Av N, Washington Av N to 3rd St N	0.78
84	7th Av N, Washington Av N to 4th St N	0.55
85	8th Av N, Washington Av N to 3rd St N	0.2
60	12th St S & Nicollet Mall	1.1
58	2nd St N & 29th Av N	0.67
26	W 45th St, Lyndale to Garfield Av S	11.1
103	Upton Av S & W 52nd St	1
13	19th to 22nd Av S, E 38th to 39th St	4.59
65	Vincent Av S & Brookwood Terrace	0.42
30	Queen Av S & William Berry Pkwy	0.77
106	Humboldt Av N & 45th Av N	0.47
102	5th Av N, Newton to Morgan Av N	1.62
4	Elwood Av & James Av N	1.2
		208.67

ADDITIONAL CSO EFFORTS

These activities directly or indirectly benefit the elimination of CSOs:

Sanitary System Maintenance

- Inspections of infrastructure to determine needed repairs
- The annual pipe rehabilitation program
- Repairs and bulkheading of sanitary pipes where an overflow previously existed
- Replacement of sanitary manhole covers (with more than one hole) in ponding areas. Approximately 700-800 manholes have been replaced thus far.

Sanitary System Smoke Testing

Determining the location of structures or devices that permit surface water to enter the sanitary sewer requires numerous tools. Smoke testing is one of those tools. In 2007, smoke testing was used in the Bryn Mawr neighborhood after metering did not locate the source of inflow in the area. The Bryn Mawr area and an industrial area along Interstate 94 in North Minneapolis were tested by forcing a smoke-like oil vapor into the sanitary sewer and then observing where the smoke surfaced. As a result of this testing, foundation drains, leaking castings and other defects were identified. This technique will be used in the future if metering does not identify the sources of I & I.

Future Sanitary System Flow Metering

In 2008, flow meters will be placed in sewer mains that earlier I & I studies identified as contributing major amounts of Inflow. The meters are intended to converge on the major sources of Inflow so that those sources can be identified and removed.

Regulatory CSO Efforts

Minneapolis Regulatory staff assists the CSO Program in locating, investigating and resolving areas through the review of record drawings, or through the preliminary development review process. Regulatory initiatives include:

Minneapolis Development Review (MDR)

In 2007 MPW staff continued to require complete separation of all sites that are reviewed by the MDR 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.)

New Combined Sewer Overflow Area Identification and Separation

Storm and sanitary record drawings 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 investigated and field-verified.

The amount of acreage still connected to the sanitary system continues to decline, as does the number of cross-connections. The 2007 estimate of 130.67 acres of remaining CSO area is minimal and a good indicator that the City is nearing completion for this activity.

Temporary Connections or Overflow Inspections

MPW SW&S staff has identified all currently known temporary connections or overflows that should have been eliminated with the program. These connections are verified and our sewer database is updated.

Additional Regulatory 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 as part of their current work duties.
- The City will continue education of City staff from MPW, the City's Planning and Zoning sections, and the Regulatory Services Department on the importance of eliminating combined sewer connections.

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. The Pig's Eye Sewage Treatment Plant began operating in 1938. Flows from the combined sewers were diverted from the Mississippi River to the treatment plant by a system of interceptor sewer tunnels located on either side of the Mississippi River. As part of this system, 34 overflow regulators were constructed to divert normal dry weather flows to the interceptor sewer. They also allowed relief overflows into the Mississippi during heavy rainstorms.

The result of this modification was a significant improvement in the water quality of the River, except for brief periods during heavy rainfall. During these peak flow periods, the regulators prevented overloading of the treatment plant, sanitary backups into homes, and pressure surges that could cause structural damage to the pipe system.

Of the original 34 overflow regulators, there are eight remaining. Of the eight, one is owned by the City and the remainder by MCES. The City's remaining regulator is located at Oak Street SE Outfall M012 (R20). CSO Area 56 drains to Outfall M012 and is responsible for more than 13 acres draining to the sanitary system. Monitoring at Outfall M012 will continue until this CSO area is resolved. The financing and schedule for redevelopment of the University Research Park area (also known as the South East Minneapolis Industrial (SEMI) project) are still being worked out and affect the successful resolution of CSO Area 56.

Once this CSO area is resolved, short-term monitoring should confirm that Outfall M012 could be closed. The elimination of overflow regulator 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.

Minneapolis Flood Mitigation Program April 16, 2008

MINNEAPOLIS FLOOD MITIGATION PROGRAM

Construction of projects from the Flood Mitigation Program has the benefit of reducing I & I to the sanitary system. The following flood control projects were partially constructed or completed in 2007:

Flood Mitigation Area 1

- Pipe work and pond excavation was completed in 2006. Final grading and landscaping was completed in 2007. The flood control system is now in service.

Flood Mitigation for CSO Area 13

- This project is located on E 38th St, from 19th Av S to 22nd Av S, and also in a nearby alley. This project removed 1.90 acres of clearwater discharging to the sanitary system and redirected it to Sibley Holding Pond.

Flood Mitigation Area 26/CSO Area 26

- Work on Flood Area 26 was started in 2006, was completed in the spring of 2007.

Flood Mitigation for CSO Area 102

- This project disconnected an alley drain from the sanitary sewer and connected to a nearby storm sewer, and also included construction of box culverts. These box culverts were needed for rate reduction and control, to mitigate the impact of the additional runoff until there is capacity in the existing storm sewer at 5th and Morgan Avenues N. This project removed 1.62 acres of clearwater discharging to the sanitary system and redirected it to the stormwater system.

SANITARY SEWER COLLECTION SYSTEM

The Sewer Maintenance section of MPW – SW&S routinely inspects sanitary infrastructure, and performs needed maintenance to ensure proper operation. The City maintains over 832 miles of sanitary sewers. Minneapolis Sewer Maintenance staff has divided the City into 100 areas for their sewer main cleaning program. This program is significant to the CSO program because it uncovers and reveals I & I. Sewer mains are cleaned by different methods including 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 also utilizes GIS to create maps to better track progress.

Each year, sanitary 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 2007 also included:

- 8 major sanitary sewer repairs
  - A total of 17,314 feet (3.3 miles) of sanitary sewer lined with a cured-in-place liner.
- 298 (requested by residents) possible sanitary backups were inspected
  - of those 298 backups, 16 were found to be plugged & were repaired, and 154 were private property issues
- 4,564 problematic sanitary locations were inspected
- 3 sanitary cave-ins were addressed
- 164 minor sanitary repairs were addressed
- 357 miles of sanitary sewer were jetted with high pressure forced water
- 1.77 miles were jetted and vacuumed
- 11.51 miles of sanitary sewer were rodded (cleaned)
- 0 miles of sanitary sewer were flushed and examined
- 35.50 miles of sanitary sewer were televised

STORM DRAIN COLLECTION SYSTEM

The Sewer Maintenance section also routinely inspects storm drain infrastructure, and performs needed maintenance to ensure proper operation. Inspection and maintenance frequency are event-driven, based on experience and inspection results history.

There are currently 149 grit chambers in Minneapolis, which help in sediment, debris, and oil collection. This number has increased each year. These grit chambers are inspected each spring and fall, and cleaned if necessary. Sediment is removed, the presence of floatables is noted, and the grit chamber cleaning dates are logged. This information is then compiled into a database, which is maintained by the Sewer Maintenance section of the Surface Water & Sewers Division.

Storm drain outfalls are inspected on a five-year schedule, generating information on:

- Condition of structures
- Significant erosion
- Any necessary repairs

Grit chamber maintenance and repairs are planned within the constraints of resources and 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, removing accumulated sediment, trash and debris. This prevents pollution of receiving waters and minimizes flooding problems. Street Maintenance performs annual inspections, during which they clean catch basin grates on summer street sweeping routes, removing debris and sediment from blocked structures.

Statistics from the 2007 Sewer Maintenance program:

- Completed 4 major storm drain repairs
- 365 feet (.069 miles) of storm drain sewer was lined with a cured-in-place liner
- Inspected 180 and cleaned 151 grit chambers. A total of 635 cubic yards was removed and properly disposed of.
- Maintained 10 stormwater holding ponds
- Inspected 113 of 387 storm drain outfalls. Of those 113 inspected,
  - 12 needed maintenance or repair
- Monitored and maintained 25 pump stations