City of Minneapolis

Minneapolis Planning Department

The Minneapolis Plan

Volume 3 - Technical Appendix

Adopted by City Council and Mayor: March 2000

A Publication of
The Minneapolis Plan

Choosing our future
Celebrating our present
Honoring our past

The Minneapolis Plan

In order to serve the needs of the City of Minneapolis and to meet the conditions of the Metropolitan Land Planning Act, the City of Minneapolis has developed a new comprehensive plan entitled *The Minneapolis Plan*. The plan consists of four volumes, a Policy Document and three Technical Appendices. Two additional documents—*Downtown Minneapolis 2010* and *Minneapolis Mississippi River Corridor Critical Area Plan*—are also components of the comprehensive plan but are limited in their geographic scope. These documents may be obtained from the Minneapolis Planning Department.

This version of *The Minneapolis Plan* has been adopted by the City Council and the Mayor.

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March 2000

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The Minneapolis Plan
Volume 3 - Technical Appendix

Table of Contents

- Aviation
- Parks and Open Space
- Water Supply Plan
- Sewer Plan
- Storm Water Management (Draft)
- Libraries
- Energy Plan

Contents of other Volumes

Volume 1 - Policy Document

- Introduction
- Community Building
- The Market in the City
- Marketplaces: Growth Centers
- Marketplaces: Neighborhoods
- Learning
- Leisure and Culture
- Natural Ecology
- Movement
- City Form
- Afterword

Volume 2 - Technical Appendix

- Land Use
- Transportation
- Housing
- Historic Preservation

Volume 4 - Technical Appendix

- Implementation
- Location and Design Review Standards
- Capital Program and Authorization
- 1998 Community Development Block Grant Capital Report
- Capital Neighborhood Revitalization Program Plans (Revised)
- School Master Facilities Plan

Chapter 1

Technical Appendix for Aviation

Adopted by City Council and Mayor: March 2000

Heliports

The current City of Minneapolis Zoning Code does not make provisions for Heliports as a use (conditional or otherwise) within the city. The Code does provide for Medical helistops as a conditional use as follows:

> Title 20 ZONING CODE
>
> 522.40. Definitions. As used in the zoning code, the following words and phrases shall mean:
>
> Medical helistop. An identifiable landing area for discharging and picking up passengers and goods, by helicopter or similar vertical lift aircraft, located on the property of a hospital. No refueling or servicing of aircraft, or permanent facilities, including terminals, hangars, radar antennas, warehousing, or storage, are permitted. In addition, said medical helistop shall conform to all applicable state and federal regulations.
>
> 538.910. Conditional uses. Any use allowed as a conditional use in the R3 District shall be allowed in the R4 District, and in addition, the following uses shall be permitted, subject to the provisions of Chapter 525, unless already permitted in section 538.890 above:
>
> (3) Health and medical institutions, qualifying as nonprofit institutions under the laws of the State of Minnesota, as follows:
>
> (a) Hospitals, sanitariums and health resorts.
>
> (b) Medical helistop.
>
> 540.450. Conditional uses. The following conditional uses may be allowed in the B1-1 District subject to the provisions of Chapter 525:
>
> (19) Medical helistop.

There are currently three medical institutions known to be operating medical helistops (see attached map):

The Hennepin County Medical Center
Abbot Northwestern Hospital
Fairview Riverside Medical Center

Protection of Regional Airspace

The current City of Minneapolis Zoning Code contains provisions for the protection of regional airspace, referred to as the airport zoning ordinance, through the placement of height restrictions on development in proximity to the airport. The regulations are as follows:

> Title 20 ZONING CODE
>
> 522.260. Airport areas; height regulations. The following special height limitations shall apply to areas within two (2) miles of the boundary lines of Minneapolis-St. Paul International Airport:
>
> (1) Within seven thousand five hundred (7,500) feet to the nearest airport runway boundary, no building, structure, object of natural growth or portion thereof shall exceed a height above curb level of twenty-five (25) feet or one foot for each fifty (50) feet that such building, structure or object is distant from such nearest boundary or boundaries, whichever height is greater.
>
> (2) Between seven thousand five hundred (7,500) feet and two (2) miles from the nearest airport runway boundary, no building, structure, object of natural growth or portion thereof shall exceed a height above curb level of one hundred fifty (150) feet. (Code 1960, As Amend., § 251.240)

The City of Minneapolis also recognizes requirements regarding the protection of the regions general airspace. The relevant notification criteria for airspace obstruction as defined under the Minnesota Aeronautic Rules and Regulations is as follows:

> Notification: Any sponsor who proposes any construction or alteration that would exceed a height of 200 feet above ground level at the site, or any construction or alteration of greater height than an imaginary surface extending upward and outward at a slope of 100:1 from the nearest point of the nearest runway of a public airport shall notify the Commissioner [note: Minnesota Department of Transportation] at least 30 days in advance.

This local reporting requirement is in addition the Federal permitting/review process involving proposal where FAA Form 7460-8 is required.

The Metropolitan Council has outlined in the Aviation Policy Plan portion of the Metropolitan Development Guide the following Land-Use Compatibility Guidelines for communities surrounding the Minneapolis/St. Paul International Airport:

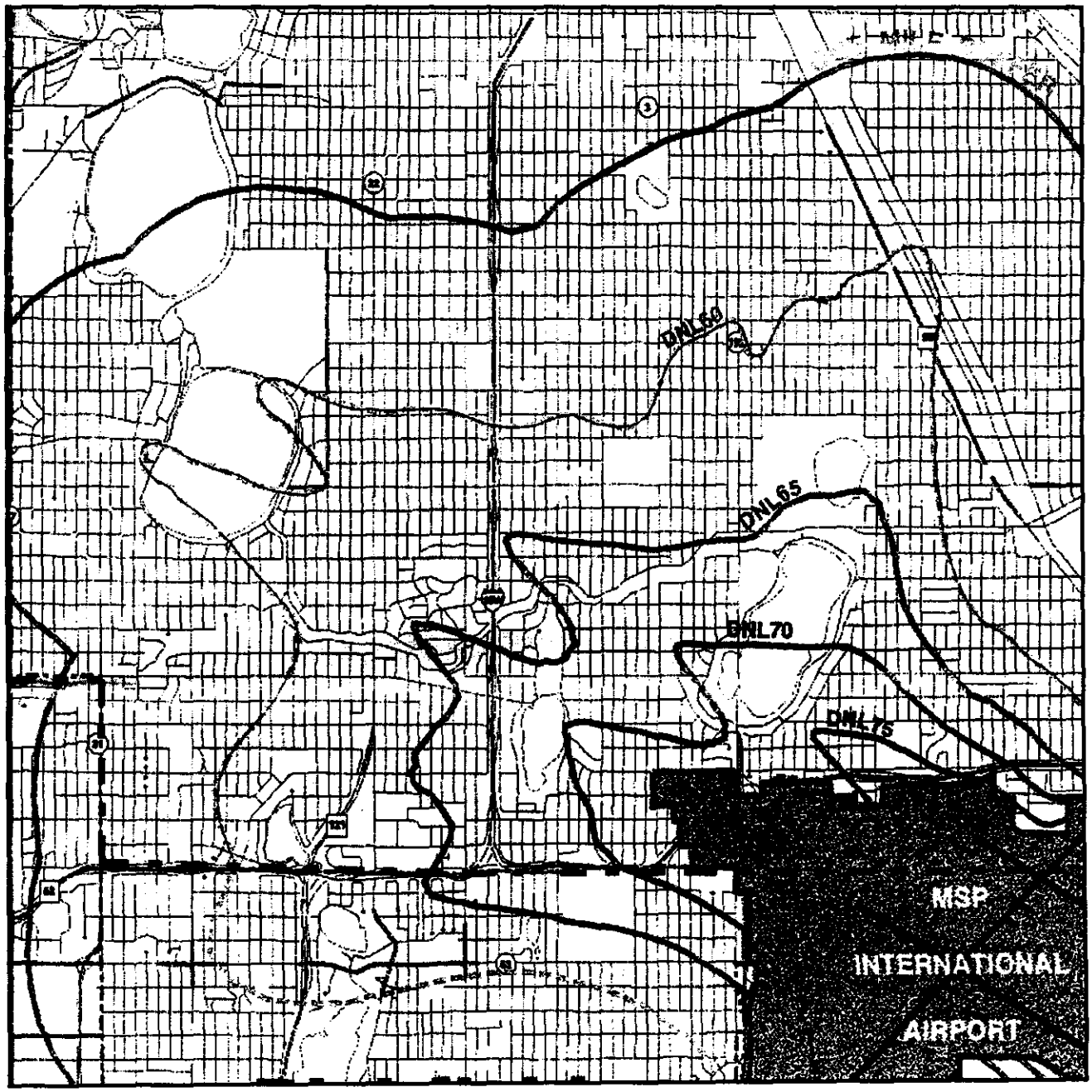
Major and Intermediate Airports Land-Use Compatibility Guidelines

Land-Use Compatibility Guidelines	Land-Use Types / Noise Exposure Zones							
	New Development Major Redevelopment				Infill – Reconstruction or Additions to Existing Structures			
	1	2	3	4	1	2	3	4
Residential								
Single/Multiplex with Individual Entrance	INCO	INCO	INCO	COND	COND	COND	COND	COND
Multiplex/Apartment with Shared Entrance	INCO	PROV	PROV	PROV	COND	PROV	PROV	PROV
Mobile Home	INCO	INCO	INCO	COND	COND	COND	COND	COND
Educational and Medical Schools, Churches, Hospitals, Nursing Homes	INCO	INCO	INCO	PROV	COND	COND	COND	PROV
Cultural, Entertainment, Recreational								
Indoor	COND	PROV	PROV	PROV	COND	PROV	PROV	PROV
Outdoor	COND	COND	COND	CNST	COND	COND	COND	CNST
Office, Commercial, Retail	COND	PROV	PROV	CNST	PROV	PROV	PROV	CNST
Services								
Transportation-Passenger Facilities	COND	PROV	PROV	CNST	COND	PROV	PROV	CNST
Transient Lodging	INCO	PROV	PROV	PROV	COND	PROV	PROV	PROV
Other Medical, Health and Educational Services	COND	PROV	PROV	CNST	COND	PROV	PROV	CNST
Other Services	COND	PROV	PROV	CNST	COND	PROV	PROV	CNST
Industrial, Communication, Utility	PROV	CNST	CNST	CNST	PROV	CNST	CNST	CNST
Agricultural Land, Water Areas, Resource Extraction	CNST	CNST	CNST	CNST	CNST	CNST	CNST	CNST

INCO means Inconsistent COND means Conditional
PROV means Provisional CNST means Consistent

(M:\...\Batzel_Geoffrey\Major and Intermediate Airports Land.doc)

Minneapolis-St.Paul International Airport
Noise Policy Area

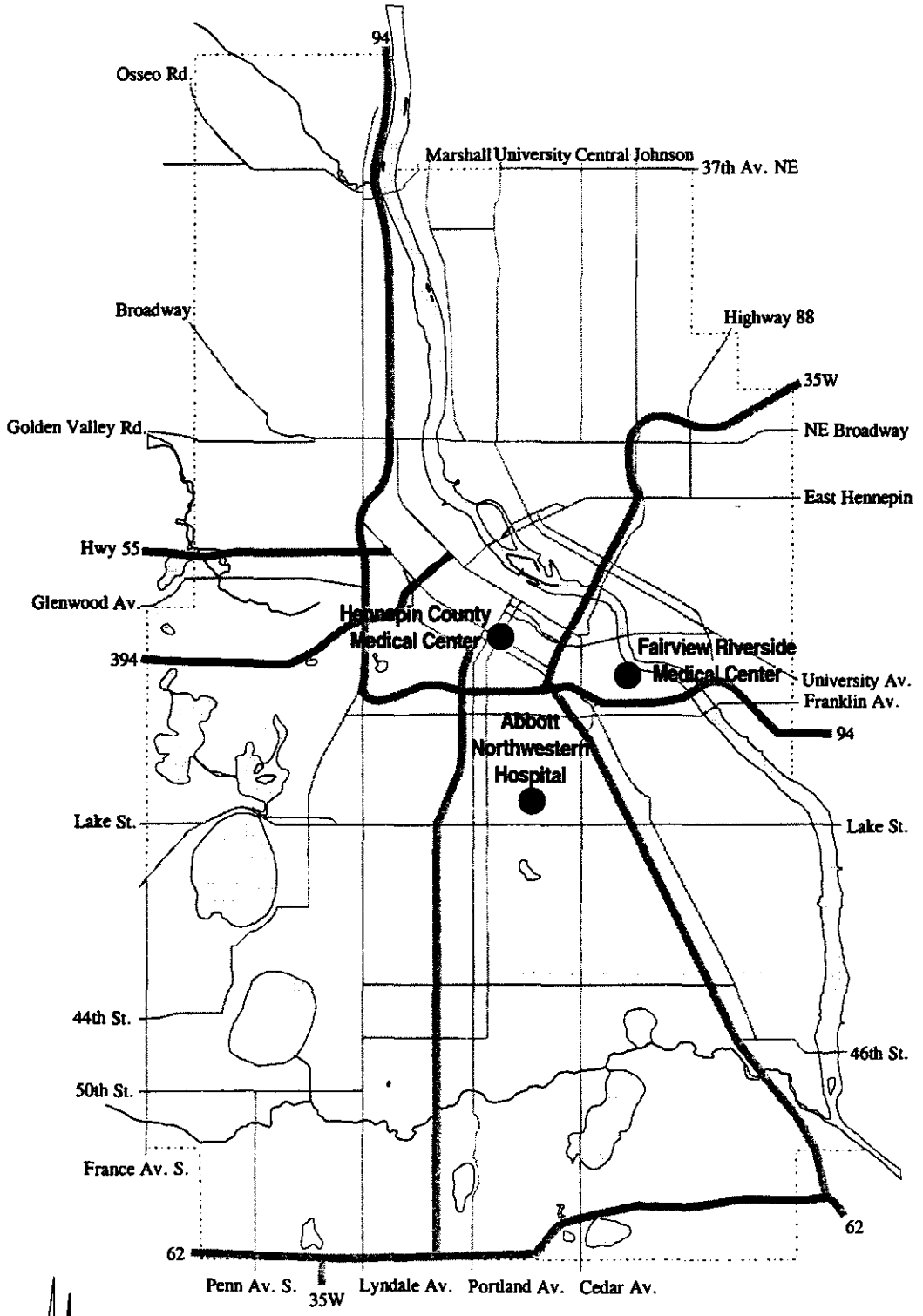


Source: Metropolitan Council

Chapter 2

Technical Appendix for Parks and Open Space

Adopted by City Council and Mayor: March 2000



minneapolis
city of lakes

1 mile

1 kilometer

Medicial Helistops

map 3.1.1

source: Minneapolis Planning Department

Parks and Open Space

Content guidelines for Parks and Open Space elements in all local comprehensive plans:

1. *An inventory (usually a map) of all existing and proposed open space facilities in the community – for example, parks, recreation/play areas, designated trails, greenways, open space preservation areas, habitat preserves and any other "preserved" open land.*

   It is also helpful to note whether it is a public or private facility.

See maps which follow. We were not able to determine where private facilities are.

2. *A narrative description of community recreation open space needs to accommodate the community's 2020 population/household forecast. Include any community goals, policies, priorities staging, standards and/or programs to meet forecast recreated needs.*

The Metropolitan Council's 2020 population forecast indicates a population growth of 24,118 beyond the 1996 estimate. The Minneapolis Park and Recreation Board has not developed a policy to meet forecast recreation needs but assumes the threshold of the National Park Standards.

3. *A five-year capital improvement program identifying proposed local park, open space and trail project, and funding sources to meet those needs.*

See attached sheets.

Content requirements for communities with regional recreational open space inside or adjacent to their boundaries.

1. *A description of local parks, open space, and on-and off-road trails that connect with or otherwise affect regional recreational open space, including the location and timetable for development of proposed links.*

During the period 2000-2005, improvements will be made to a number of local parks that are adjacent to regional parks or trails. These include:

- Riverside Park (adjacent to Mississippi Lower Gorge Regional Park – rehabilitation in 2000);
- Lynnhurst Park (adjacent to Minnehaha Regional Trail, rehab in 2001);
- Webber Park (adjacent to Victory Memorial Parkway and North Mississippi Regional Park – neighborhood center rehab in 2005, site and tot lot rehab in 2003);
- Lyndale Farmstead Park (adjacent to Chain of Lakes Regional Park – rehab in 2002).

The following trails, linking to regional parks or trails, are under development:

- Cedar Lake Trail – Phase 3 (connecting to Mississippi River, to be constructed 2000);
- Bassett's Creek Trail (connecting to Cedar Lake Trail and Theodore Wirth Regional Park);

- Luce Line trail extension through Wirth Park (connecting with Luce Line in St. Louis Park ; to be constructed 1999 – 2001);
- The Dinkytown Bike Link/Bypass (connecting with the Central Riverfront Regional Park; to be constructed 1999 – 2000);
- The Midtown Greenway – Phases 2-3 (connecting with multiple regional trails, the Chain of Lakes Regional Park, and the Mississippi River, to be constructed 2001–2003.)

Already existing are the Midtown Greenway – Phase 1, Kenilworth and Cedar Lake Trail – Phases 1 and 2 (connecting to Chain of Lakes Regional Park and other trails).

In the planning stages are greenspace/trail systems within the Southeast Minneapolis Industrial Area, the Near North redevelopment area, the Minneapolis Upper River Corridor, and the Humboldt Avenue Greenway, all of which will connect with existing regional trails.

2. *A description of any use of regional recreation open space as part of or complementary to the local park or trail system, and the function they will serve in the local system.*

Regional parks serve not only regional users but also the neighborhoods and communities within which they are allocated.

3. *A description of policies, programs and ordinances to protect regional recreation open space from adverse impacts of inappropriate development activity on adjacent lands.*

See attached Minneapolis Park and Recreation Board's Land Policy (August 1997).

4. *Land use policies to minimize conflicts between existing or proposed programs, and ordinances to protect existing regional recreation open space located in the community or adjacent to it.*

See attached Minneapolis Park and Recreation Board's Land Policy (August 1997).

5. *Local control to protect future regional recreation open space from incompatible development prior to park and trail acquisition.*

Minneapolis has several tools available to work towards protecting future regional recreation open space from incompatible development prior to park and trail development.

A. Through the comprehensive planning process the City develops land use policies. A land use policy map illustrates desired land uses throughout the City and acts as a goal toward which the City works. The City undertakes "small area plans" to study particular areas of the City in order to establish new land use policies or reemphasize current policy. The small area planning process is a way for the City to review particular areas of the City when questions of land use, both existing and future, exist.

B. The Park Board has a Land Policy that works to mitigate adverse developmental impact on park land and water resources. The policy addresses acquisition of parkland by other

public agencies, encroachments on and appropriate interim uses for parklands, policies on land divestiture and leasing, and prohibitions against inappropriate disposal of wastes on parklands.

C. The City gives a zoning designation to all land in the City. The performance standards for each zoning district prescribe appropriate activity for that land. The existence of zoning districts establishes complimentary and compatible land use patterns in the City. It is the expectation and the ultimate goal that zoning districts support City land use policy. Therefore, zoning districts adjacent to potential parkland should be compatible with that parkland; if they are not at present, then it would be a goal of the City to achieve that compatibility over time.

D. For an explicit purpose and for a limited time frame, the City can impose a moratorium on development in a particular area to prevent unwanted development from occurring (Chapter 521 Interim Ordinances).

E. Site plan review standards in the zoning code (Chapter 530 Site Plan Review) are established to promote development that is compatible with nearby properties, neighborhood character and natural features.

6. *The following projects are likely to generate additions to the existing regional open space system:*

A. **Humboldt Greenway:** Trails and greenspace are an important component of this plan for housing redevelopment in North Minneapolis. Greenway links will be created along Humboldt Avenue North, linking to Shingle Creek Regional Trail on the north and Victory Memorial Parkway on the south, and along 49th Avenue North, linking to North Mississippi Regional Park.

B. **Minneapolis Upper River Corridor:** A comprehensive master plan for land use changes and park development along the Upper River corridor of Minneapolis is nearing completion. This plan, developed over the past two years under the direction of a team of local agencies, charts a vision which will transform an area of aging, obsolete industries, substandard housing, environmentally questionable riverfront land uses, and minimal public river access. Among the proposed changes is the creation of 90 acres of continuous riverfront park and 15 miles of new trails, riverbank restoration and stabilization, wildlife habitat areas, and the creation of a variety of public amenity and activity areas along the river. Full implementation of the plan is anticipated to require a minimum of twenty-five years. Implementation would complete the missing links in the riverfront trail system through Minneapolis, linking with the Central Riverfront Regional park and Trial to the south and regional trail systems in Anoka County to the north.

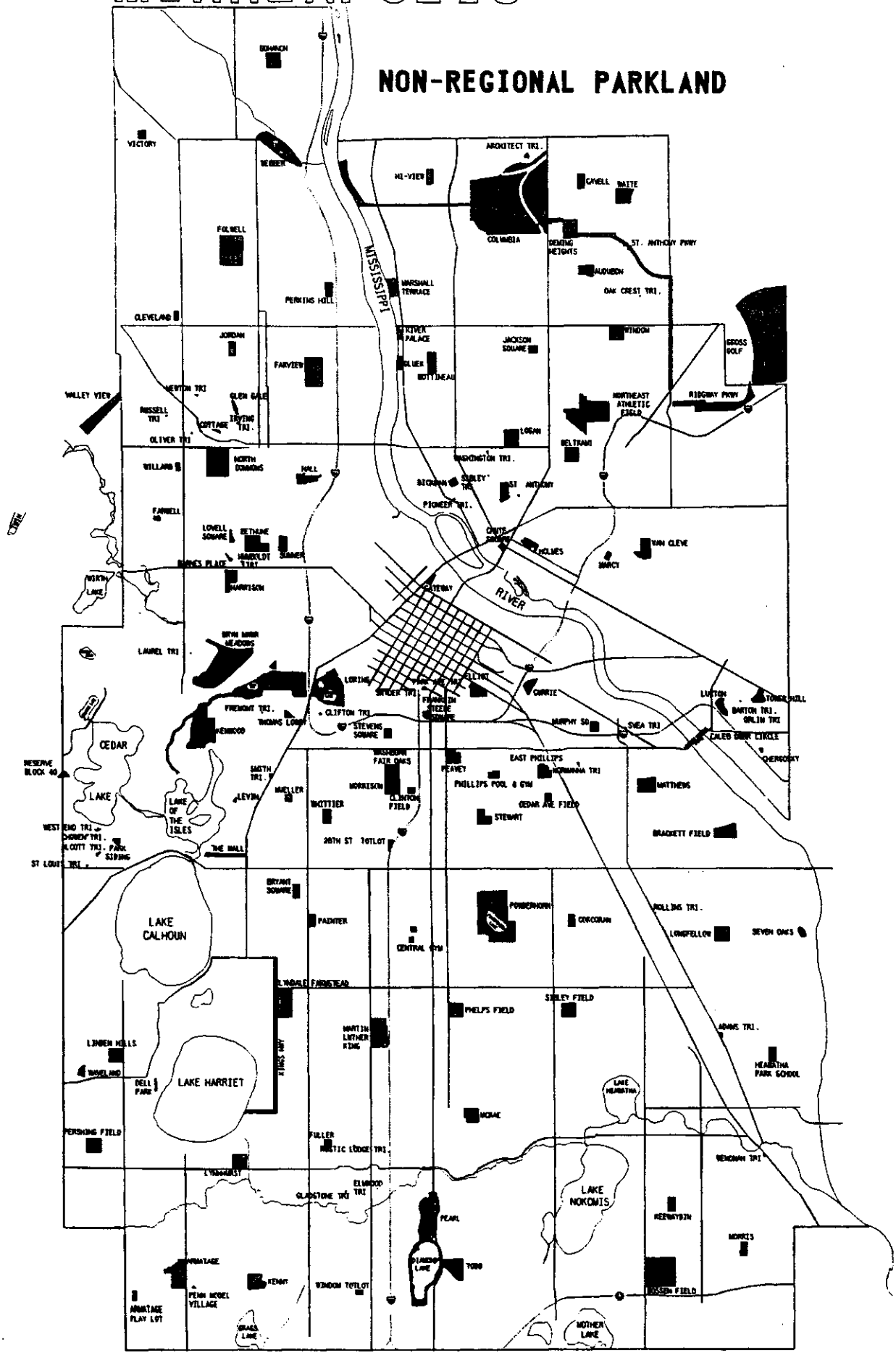
C. **Southeast Industrial Area (SEMI):** SEMI public space is envisioned to be associated with an east/west and a north/south parkway. The parkways will include adjacent

stormwater management ponds and pedestrian and bicycle trails. The plan recommends that parkways have a right of way of 120 feet to allow for these features.

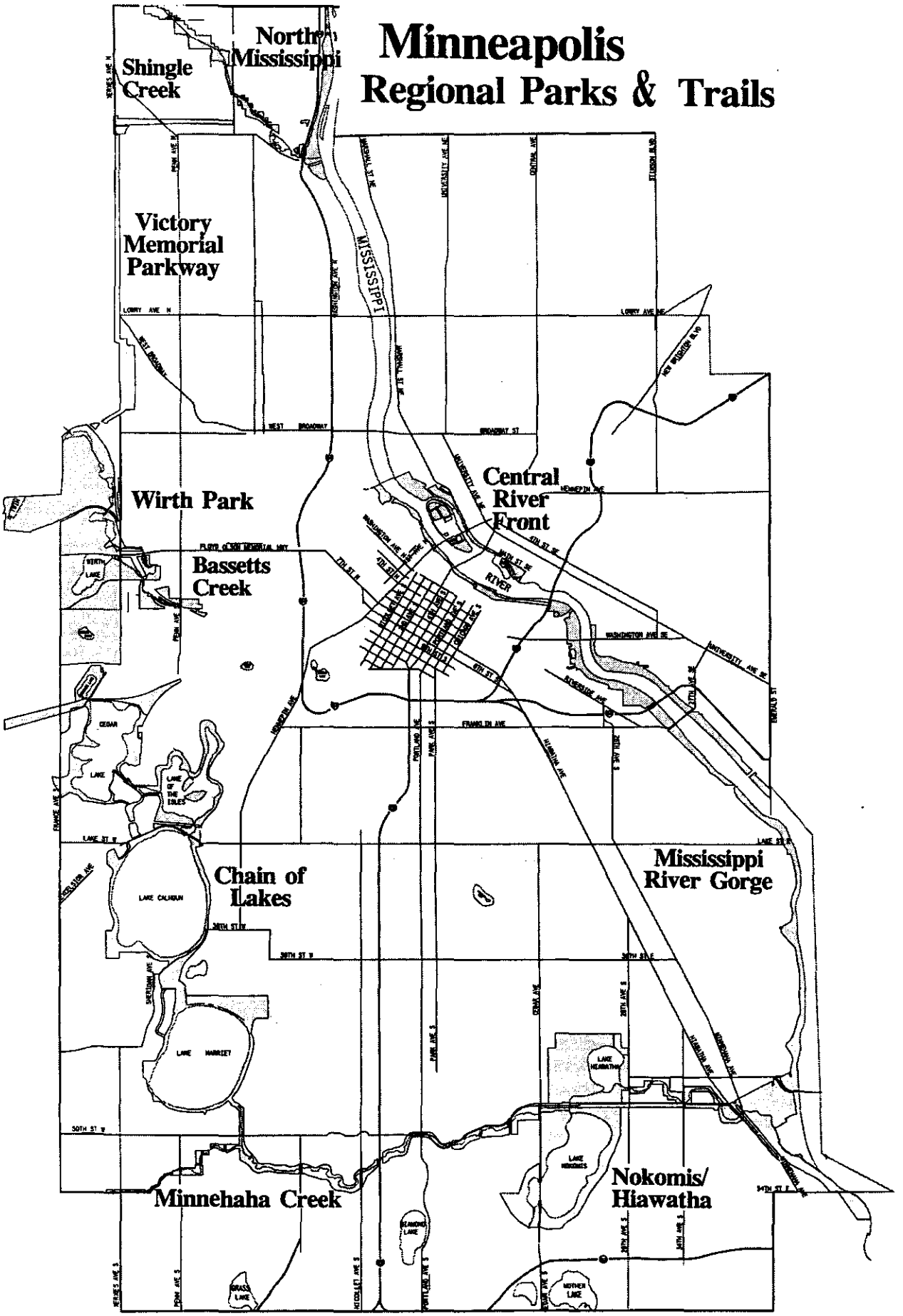
D. **Midtown Greenway:** The Midtown greenway is a four-mile long transit/pedestrian/bikeway corridor that intersects fifteen neighborhoods in south Minneapolis. This will offer an opportunity to implement a unifying vision and strategy building upon existing assets within this central city corridor.

MINNEAPOLIS

NON-REGIONAL PARKLAND



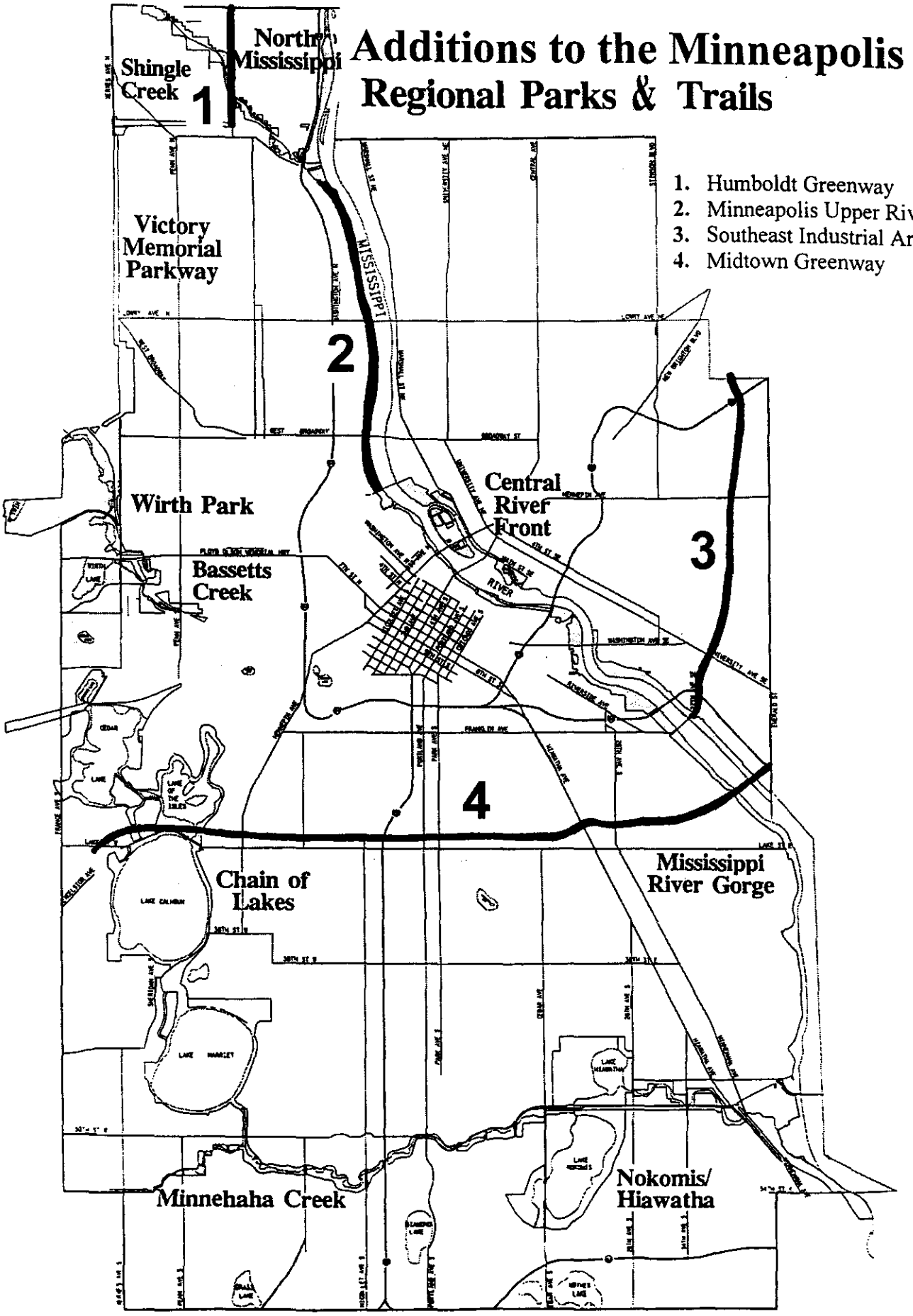
Minneapolis
Regional Parks & Trails



Prepared by the Mpls Park & Recreation Board

Additions to the Minneapolis Regional Parks & Trails

1. Humboldt Greenway
2. Minneapolis Upper River Corridor
3. Southeast Industrial Area (SEMI)
4. Midtown Greenway



Prepared by the Mpls Park & Recreation Board

Minneapolis Park and Recreation Board projects proposed for Metropolitan Parks and Open Space Commission CIP funding (as of July 1999) ($000s)

PARK	PROJECT DESCRIPTION	2000-2001	2002-2003	2004-2005
West River Parkway/ Mississippi Gorge Regional Park	Repair 300 ft. of river wall on West Bank	$180		
Minnehaha Parkway and Regional Trail	Rebuild 4.3 miles of trail; shoreline restoration of Minnehaha Creek	350		
Chain of Lakes Regional Park	Rebuild trails, shoreline rehabilitation at Lake of the Isles	1,000		
E. River Parkway/ Mississippi Gorge Regional Park	.7 mile of paved trail south of Franklin Ave.; boulevard trees	130		
Theodore Wirth Regional Park	Replace beach bathhouse, new paved terrace, landscaping, boardwalk and paths	694		
Minnehaha Regional Park	Relocation of Wabun picnic access drive, trail development	800		
Central Mississippi Riverfront Regional Park	Reconstruct historic plank road within Mill Ruins Park	699.9		
North Mississippi Regional Park	Continued development	1,000		
Chain of Lakes Regional Park	Continued shoreline restoration, trails at Lake of the Isles		1,000	
Minnehaha Parkway and Regional Trail	Shoreline restoration, trails		637	
Minnehaha Regional Park	Rebuild Longfellow Garden/Lagoon, Wabun picnic improvements		1,500	
Theodore Wirth Regional Park	2 playgrounds near beach, parking lot		500	
Central Mississippi Riverfront Regional Park	Excavate and interpret headrace and mill ruins		1,000	
North Mississippi Regional Park	Picnic shelters, signage, parking, street removal		1,000	
Chain of Lakes Regional Park	Continue Lake of the Isles trail, shoreline development			1,000
Minnehaha Regional Park	Lower Glen pathways, bridge/stair repair, complete Wabun picnic improvements)			1,000
Theodore Wirth Regional Park	Renovate picnic shelter and Wirth Lake shoreline			500
Central Mississippi Riverfront Regional Park	Expose and interpret three mill ruins upstream of Portland Avenue			1,000
Upper Mississippi Regional Trail	Acquire and develop two acres of former industrial land			637
Chain of Lakes Regional Park	Trail between Lakes Harriet/Calhoun and totlot			450
North Mississippi Regional Park	Parking, lighting, paths, signage, grading			1,000

MPRB: 2000-2005 Capital Improvement Program

Project	2000	2001	2002	2003	2004	2005
Comm. And Neigh Center Rehabilitation						
Sibley Park	$ 300,000.00					
Painter Neigh. Ctr.			$ 500,000.00			
Site and Toilet Rehabilitation						
St. Anthony Park	$ 300,000.00					
Corcoran Park	$ 250,000.00					
Riverside Park	$ 200,000.00					
North Commons	$ 300,000.00					
Pershing Park		$ 300,000.00				
Bossen		$ 300,000.00				
Clinton Field		$ 300,000.00				
Willard Playground			$ 300,000.00			
Hall Park				$ 300,000.00		
Brackett Park				$ 300,000.00		
Lake Nokomis						$ 600,000.00
Theodore Wirth						$ 350,000.00
Rehabilitation of Shelter Buildings						
Lynnhurst			$ 100,000.00			
Powderhorn				$ 100,000.00		
Waite Park					$ 100,000.00	
Jackson Square					$ 100,000.00	
Marshall Terrace					$ 100,000.00	
Athletic Field Renovation						
Logan	$ 400,000.00					
Riverside	$ 150,000.00					
Lynnhurst		$ 450,000.00				
Nokomis			$ 450,000.00			
Shingle Creek					$ 450,000.00	
Windom Park					$ 450,000.00	
Service Center Rehabilitation						
Northside			$ 500,000.00			$ 150,000.00
Hiawatha				$ 500,000.00		$ 150,000.00
Grant Matches						
ISTEA and TEA21 Grant Match	$ 450,000.00	$ 450,000.00	$ 450,000.00	$ 550,000.00	$ 550,000.00	$ 500,000.00
Scenic Byway Grant Match		$ 75,000.00	$ 100,000.00	$ 100,000.00	$ 150,000.00	$ 100,000.00
NRP Matching	$ 150,000.00					
Other						
Bleacher Safety Compliance	$ 200,000.00					
Brackett Park Sports Lighting		$ 55,000.00				
Infrastructure (roofs)	$ 100,000.00	$ 150,000.00	$ 100,000.00	$ 200,000.00	$ 150,000.00	$ 250,000.00
Gym Floor Replacement		$ 200,000.00		$ 150,000.00	$ 150,000.00	$ 100,000.00
Tennis Courts	$ 100,000.00	$ 120,000.00	$ 120,000.00	$ 170,000.00	$ 120,000.00	$ 120,000.00
Pathways and Hardsurfaces			$ 75,000.00	$ 175,000.00	$ 175,000.00	$ 175,000.00
Parking Lot Rehabilitation				$ 100,000.00	$ 150,000.00	$ 150,000.00
Parkway		$ 500,000.00				
Parkway Lighting			$ 205,000.00	$ 255,000.00	$ 255,000.00	$ 255,000.00
Base CIP Sub-Total	$ 2,900,000.00	$ 2,900,000.00	$ 2,900,000.00	$ 2,900,000.00	$ 2,900,000.00	$ 2,900,000.00
Gap Funded Projects						
Comm. And Neigh Center Rehabilitation						
Bottineau Park Neigh. Ctr.	$ 1,000,000.00					
Waite Neigh. Ctr.	$ 450,000.00					
Folwell Park Bldg. Rehab		$ 450,000.00				
Bethune Neigh. Ctr.		$ 500,000.00				
Creekview Neigh. Ctr.		$ 500,000.00				
Lake Hiawatha Neigh. Ctr. Bldg. Rehab			$ 500,000.00			
Longfellow Community Ctr.			$ 500,000.00			

Hiawatha Neigh. Ctr.			$ 500,000.00			
McRae Neigh. Ctr.			$ 500,000.00			
Sterwart Park Neigh. Ctr.				$ 500,000.00		
Fuller Park Neigh. Ctr.				$ 500,000.00		
Keewaydin Park Neigh. Ctr.				$ 500,000.00		
Pershing Neigh. Ctr.				$ 500,000.00		
Elliot Neigh. Ctr.					$ 500,000.00	
Northeast Neigh. Ctr.					$ 500,000.00	
Armatage Neigh. Ctr. Bldg. Rehab					$ 500,000.00	
Audubon Neigh. Ctr. Bldg. Rehab					$ 500,000.00	
Nokomis Comm. Ctr. Bldg. Rehab						$ 1,000,000.00
Kenwood Park Neigh. Ctr.						$ 500,000.00
Webber Park Neigh. Ctr.						$ 500,000.00
Site and Toilet Rehabilitation						
Painter Park		$ 300,000.00				
Shingle Creek		$ 300,000.00				
Jackson Square Site and Toilet Rehab		$ 300,000.00				
Lyndale Farmstead			$ 300,000.00			
Keewaydin Park			$ 300,000.00			
Harrison Park				$ 300,000.00		
Webber				$ 300,000.00		
Lake Hiawatha				$ 300,000.00		
Currie					$ 300,000.00	
Cedar Field					$ 300,000.00	
Levin Park					$ 300,000.00	
Folwell Park					$ 300,000.00	
Jordan Park					$ 300,000.00	
Farwell						$ 300,000.00
Rehabilitation of Shelter Buildings						
Bossen			$ 100,000.00			
Folwell			$ 100,000.00			
Windom				$ 100,000.00		
N.E. Athletic Field					$ 100,000.00	
Farview						$ 100,000.00
Bryn Mawr						$ 100,000.00
Athletic Field Renovation						
North Commons	$ 450,000.00					
Longfellow		$ 450,000.00				
Folwell Park Field Renovation			$ 450,000.00			
Van Cleve			$ 450,000.00			
Powderhorn Field Renovation				$ 500,000.00		
Armatage				$ 500,000.00		
Waite Park					$ 450,000.00	
Keewaydin					$ 450,000.00	
Pershing Field						$ 300,000.00
Other						
East Phillips Park			$ 300,000.00			
Community Parks					$ 500,000.00	$ 850,000.00
Off Leash Rec. Areas	$ 100,000.00	$ 100,000.00				
Bridge Repair						
St. Anthony Parkway		$ 100,000.00				
Swimming/Wading Pool Replacement						
Cleveland Park						$ 175,000.00
Jackson Square						$ 175,000.00
Webber Pool						$ 2,000,000.00
GAP Funding Sub-Total	$ 2,000,000.00	$ 3,000,000.00	$ 4,000,000.00	$ 4,000,000.00	$ 5,000,000.00	$ 6,000,000.00
Grand Total	$ 4,900,000.00	$ 5,900,000.00	$ 6,900,000.00	$ 6,900,000.00	$ 7,900,000.00	$ 8,900,000.00

	PARK NAME	PARK CLASSIFICATION	ARCHERY	BASEBALL/SOFTBALL	BASKETBALL	BOATING	HOCKEY	HORSESHOE	SKATING	VOLLEYBALL	BIKEWAY	TOILET FACILITIES	SWIMMING-BEACH	SWIMMING-POOL	JOGGING/WALKING	TENNIS COURTS	DRINKING WATER	ATHLETIC FIELD	PLAYGROUND	GYMNASIUM	PICNIC SHELTER -	PICNIC TABLES	RECREATION BUILDING	NATURE/WILDLIFE	SPECIAL FACILITIES	ACRES
1.	ADAMS TRIANGLE	CS/T																								.3
2.	ARCHITECT TRIANGLE	CS/T																								.6
3.	ARMATAGE PARK	JAD/NP		●	●		●	●	●	●		●		WP*		●	●	●	●	●		●	●			18.6
4.	AUDUBON PARK	JAD/NP		●	●				●	●		●		WP		●	●	●	●			●	●			5.4
5.	BARNES PLACE	CS/T																								.6
6.	BARTON TRIANGLE	CS/T																								.02
7.	BASSETT CREEK	CIP		●								●			●		●	●	●			●				60.0
8.	BEDFORD TRIANGLE	CS/T																								.01
9.	BELTRAMI PARK	JAD/NP		●	●			●				●		WP		●	●	●	●			●	●			8.1
10.	BERRY, WILLIAM PARK	RP	●								●	●			●		●		●			●		●	●	25.5
11.	BETHUNE PARK	JAD		●	●				●			●		WP		●	●	●	●			●	●			12.2
12.	BONAVON PARK	NP		●	●			●	●	●		●		WP		●	●	●	●			●	●			8.8
13.	BOSSEN FIELD	DP		●	●			●		●		●				●	●	●	●			●				39.1
14.	BOTTINEAU FIELD	NP		●	●		●	●	●	●		●		WP		●	●	●	●			●	●			6.2
15.	BRACKETT FIELD	NP		●	●		●	●	●	●		●		WP		●	●	●	●			●	●			12.1
16.	BRYANT SQUARE	NP		●	●		●		●	●		●		WP		●	●		●			●	●			3.7
17.	BRYN MAWR MEADOWS	DP		●	●		●		●	●		●		WP	●	●	●	●	●			●				50.8
18.	CALEB DORR CIRCLE	CS/T																								.7
19.	CALHOUN LAKE	RP				●			●		●	●	●		●		●									525.2
20.	CAVELL PLAYGROUND	NPL										●				●	●	●	●			●				3.6
21.	CEDAR AVENUE PLAYGROUND	PL		●	●												●		●							1.7
22.	CEDAR LAKE	RP				●					●	●	●		●		●					●		●	●	252.6
23.	CHOWEN TRIANGLE	CS/T																								.1
24.	CHUTE SQUARE, RICHARD	CS/T										●													●	1.1
25.	CLARENCE TRIANGLE	CS/T																								.02
26.	CLEVELAND PARK	PL							●			●		WP			●	●	●			●				1.4
27.	CLIFTON TRIANGLE	CS/T																								.03
28.	CLINTON FIELD	NPL		●	●												●		●			●				1.5
29.	COLUMBIA GOLF COURSE	SUP																								116.0
30.	COLUMBIA PARK	CP	●	●				●				●			●	●	●	●	●			●		●		67.0
31.	COTTAGE PARK	CS/T			●																					.5
32.	CORCORAN PARK	NP						●	●					WP					●			●				3.1
33.	CREEKVIEW	JAD/NP		●	●					●		●			●		●		●			●	●			---
34.	CURRIE	NPL		●	●				●	●		●		WP		●	●		●			●				3.2
35.	DELL PARK																									.4
36.	DEMING HEIGHTS	CS/T																				●				12.85

Key

CS/T	City Square/Triangle	NP	Neighborhood park
JAD	Joint use facility	NPL	Neighborhood playlot
PL	Playlot	CIP	Citywide park
DP	District park	RP	Regional park
PKWY	Parkway	SUP	Special facilities
WP	Wading pool		

	PARK NAME	PARK CLASSIFICATN	ARCHERY	BASEBALL/SOFTBALL	BASKETBALL	BOATING	HOCKEY	HORSESHOE	SKATING	VOLLEYBALL	BIKEWAY	TOILET FACILITIES	SWIMMING-BEACH	SWIMMING-POOL	BIKING/WALKING	TENNIS COURTS	DRINKING WATER	ATHLETIC FIELD	PLAYGROUND	GYMNASIUM	PICNIC SHELTER	PICNIC TABLES	RECREATION BUILDI	NATURE/WILDLIFE	SPECIAL FACILITIES	ACRES
37.	DIAMOND LAKE	CIP																						●		68.8
38.	DICKMAN PARK	NPL		●	●					●		●		WP			●		●			●				2.0
39.	EAST PHILLIPS	NPL		●	●		●		●	●		●		WP			●		●			●				6.5
40.	ELIOT PARK	NP		●	●			●	●	●		●		WP												6.9
41.	ELMWOOD TRIANGLE	CS/T																								.02
42.	EUCLID TRIANGLE) LEVIN PARK	PL																								.3
43.	FAIRVIEW PARK	NP		●	●		●	●	●	●		●		WP		●	●	●	●			●	●			20.8
44.	FARWELL PARK	NPL															●		●	●		●				1.2
45.	FOLWELL PARK	CP		●	●		●		●	●		●		WP		●	●	●	●	●		●	●			26.8
46.	FREMONT TRIANGLE	CS/T																								.05
47.	FULLER PARK	NP		●	●				●	●		●		WP		●	●		●			●	●			2.1
48.	GATEWAY PARK	CS/T																								1.5
49.	GLADSTONE TRIANGLE	CS/T																								.1
50.	GLEN GALE PARK	PL																	●			●				1.7
51.	GLENN	CIP																						●		3.8
52.	GROSS GOLF COURSE	SUP																							●	152.8
53.	HALL PLAYGROUND	JAD/NPL		●	●			●	●	●		●		WP					●			●				6.0
54.	HARRIET LAKE	RP				●					●	●	●		●	●	●		●		●	●		●	●	405.1
55.	HARRISON PARK	JAD/NP		●	●		●	●	●	●		●		WP		●	●	●	●	●		●	●			7.0
56.	HENNEPIN ISLAND	RP													●		●				●	●		●		20.0
57.	HIAWATHA GOLF COURSE	SUP																							●	140.0
58.	HIAWATHA LAKE	RP					●		●				●	WP												83.7
59.	HIAWATHA PLAYGROUND	NP		●	●		●	●	●	●		●		WP												4.1
60.	HI-VIEW PARK	PL												WP												3.9
61.	HOLMES PARK	NPL		●					●			●		WP			●		●			●				2.7
62.	HUMBOLDT TRIANGLE	CS/T																								.3
63.	IRVING TRIANGLE	CS/T																								.1
64.	ISLES LAKE	RP				●	●		●		●				●									●	●	199.7
65.	JACKSON SQUARE	PL			●					●		●		WP			●	●	●			●				2.3
66.	KEEWAYDIN FIELD	JAD/NP					●		●					WP												4.1
67.	KENNY PARK	JAD/NP		●	●		●	●	●	●		●		WP		●	●	●	●			●	●			9.5
68.	KENWOOD PARK	JAD/NP		●							●	●			●	●	●	●	●	●		●	●	●		32.7
69.	KENWOOD TRIANGLE	CS/T																								.02
70.	KING FIELD	SUP/NP		●	●		●		●	●		●		WP		●	●	●	●	●		●	●		●	18.7
71.	LASALLE TRIANGLE	CS/T																								.05
72.	LAUREL TRIANGLE	CS/T																								.01

	PARK NAME	PARK CLASSIFICATION	ARCHERY	BASEBALL/SOFTBALL	BASKETBALL	BOATING	HOCKEY	HORSESHOE	SKATING	VOLLEYBALL	BIKEWAY	TOILET FACILITIES	SWIMMING-BEACH	SWIMMING-POOL	BIKING/WALKING	TENNIS COURTS	DRINKING WATER	ATHLETIC FIELD	PLAYGROUND	GYMNASIUM	PICNIC SHELTER	PICNIC TABLES	RECREATION BUILDING	NATURE/WILDLIFE	SPECIAL FACILITIES	ACRES
73.	LINDEN HILLS FIELD	NP		●	●		●		●	●		●		WP		●	●	●	●			●	●			8.0
74.	LOGAN PARK	CP		●	●		●		●	●		●		WP		●	●		●	●		●	●			10.1
75.	LONGFELLOW FIELD	CP		●	●		●		●	●		●		WP		●	●	●	●	●		●	●			12.5
76.	LONGFELLOW GARDENS	RP																							●	4.6
77.	LORING PARK	CIP/NP							●			●		WP	●		●					●	●			36.2
78.	LOVELL SQUARE	PL																	●							1.4
79.	LUXTON PARK	JAD/NP		●	●		●		●	●		●		WP			●	●	●			●	●			4.0
80.	LYNDALE FARMSTEAD	SUP/NPL							●			●				●	●		●			●	●			16.1
81.	LYNDALE PARK	SUP/RP													●									●	●	61.3
82.	LYNNHURST FIELD	JAD/CP		●	●		●		●	●		●		WP		●	●	●	●	●		●	●			8.2
83.	THE MALL	PKWY																								4.8
84.	MAIN STREET	RP																								---
85.	MARCY	NPL															●		●		●	●				1.25
86.	MARSHALL TERRACE	NPL		●	●			●		●		●		WP		●	●		●			●				7.8
87.	MATTHEWS	JAD/NP		●	●				●	●				WP		●	●	●	●	●		●	●			10.1
88.	MCRAE PARK	NP			●		●	●	●	●		●		WP		●	●		●			●	●			8.1
89.	MEADOWBROOK GOLF COURSE	SUP																							●	209.9
90.	MINNEHAHA PARK	RP						●			●	●			●	●	●		●		●	●		●	●	171.2
91.	MISS. RIVER LOWER GORGE	RP/RT				●									●		●					●		●		407.7
92.	MONROE PLACE	CS/T																								.1
93.	MORRIS PARK	NPL		●					●			●		WP			●		●			●	●			3.9
94.	MORRISON DORILUS PARK	CS/T																								8.5
95.	MOUNT CURVE TRIANGLES	CS/T																							●	2.3
96.	MUELLER PARK	NP			●					●		●		WP			●		●			●				1.3
97.	MURPHY SQUARE	CS/T															●					●				3.3
98.	NEWTON TRIANGLE	CS/T																								.1
99.	NICOLLET ISLAND	RP																							●	NA
100.	NOKOMIS LAKE	DP/CP/RP	●	●		●		●	●		●	●	●		●	●	●	●	●	●		●	●	●	●	407.7
101.	NORMANNA TRIANGLE	CS/T																								.1
102.	NORTH COMMONS	JAD/CP		●	●		●	●	●	●		●		●		●	●	●	●	●		●	●			25.7
103.	NORTH MISSISSIPPI PARK	CIP																							●	~~20.0~~ 64.64
104.	NORTHEAST ATHLETIC FIELD	NP/DP/JAD		●	●			●		●		●		●		●	●	●	●			●	●			30.9
105.	OAK CREST TRIANGLE	CS/T																								.01
106.	OLIVER TRIANGLE	CS/T																								.04
107.	ORLIN TRIANGLE	CS/T																								.01
108.	PAINTER PARK	NP		●	●			●	●	●		●				●	●		●			●	●			3.0

	PARK NAME	PARK CLASSIFICATION	ARCHERY	BASEBALL/SOFTBALL	BASKETBALL	BOATING	SOCKET	HORSESHOE	SKATING	VOLLEYBALL	BIKEWAY	TOILET FACILITIES	SWIMMING-BEACH	SWIMMING-POOL	BIKING/WALKING	TENNIS COURTS	DRINKING WATER	ATHLETIC FIELD	PLAYGROUND	GYMNASIUM	PICNIC SHELTER	PICNIC TABLES	RECREATION BUILDING	NATURE/WILDLIFE	SPECIAL FACILITIES	ACRES
109.	PARADE, THE	SUP		●					●			●				●	●	●								48.8
110.	PARK AVENUE TRIANGLE	CS/T																								.1
111.	PARK SIDING	PL		●													●		●			●				1.6
112.	PEARL PARK	NP		●	●		●	●	●	●		●		WP		●	●	●	●			●	●			29.0
113.	PEAVEY FIELD	NPL		●			●		●	●		●		WP		●	●	●	●			●	●			7.6
114.	PENN MODEL VILLAGE TRI.	CS/T																								.2
115.	PERKINS HILL	PL																	●							3.0
116.	PERSHING FIELD	NP		●	●		●	●	●	●				WP		●	●	●	●							10.0
117.	PHELPS FIELD	NP		●	●					●		●		WP		●	●	●	●			●	●			7.6
118.	PIONEER TRIANGLE	CS/T																								.2
119.	POWDERHORN PARK	CP		●	●		●	●	●	●		●		WP	●	●	●	●	●	●		●	●	●		65.5
120.	RIVERSIDE PARK	NPL		●	●			●	●	●		●		WP	●	●	●		●		●	●				40.7
121.	ROLLINS TRIANGLE	CS/T																								.01
122.	RUSSELL TRIANGLE	CS/T																								.03
123.	RUSTIC LODGE TRIANGLE	CS/T																								.2
124.	SEVEN OAK OVAL	CS/T																								2.1
125.	SHINGLE CREEK	CIP					●	●	●	●				WP		●	●		●			●				59.0
126.	SIBLEY FIELD	NP		●	●		●		●	●		●		WP		●	●	●	●			●	●			8.0
127.	SIBLEY TRIANGLE	CS/T																								.1
128.	SIXTH WARD PLAYGROUND	(See Currie)																								1.3
129.	SMITH TRIANGLE	CS/T																								.3
130.	SNYDER TRIANGLE	CS/T																								.1
131.	ST. ANTHONY PARK	JAD/NPL		●	●			●	●	●		●		WP												4.0
132.	ST. LOUIS TRIANGLE	CS/T																								.3
133.	STEELE SQUARE, FRANKLIN	NPL		●								●		WP			●		●			●				1.4
134.	STEVENS SQUARE	NPL		●	●					●							●					●				2.5
135.	STEWART FIELD	JAD/NP		●				●	●			●		WP		●	●		●	●		●	●			5.8
136.	SUMNER FIELD	CS/T																								4.5
137.	SVEA TRIANGLE	CS/T																								.1
138.	TODD PARK	NPL		●												●	●	●	●			●				13.2
139.	TOWER HILL	CIP													●	●					●	●		●		4.9
140.	28TH STREET T/L	PL																	●			●				1.16
141.	VALLEY VIEW PARK	CIP		●																				●		22.2
142.	VAN CLEVE PARK	JAD/CP		●	●		●	●	●	●				WP		●	●	●	●			●	●			8.9
143.	VINELAND TRIANGLE	CS/T																								.1
144.	WAITE PARK	JAD/NP		●	●		●	●	●	●		●		WP		●	●		●	●		●	●		●	6.3

	PARK NAME	PARK CLASSIFICATIONS	ARCHERY	BASEBALL/SOFTBALL	BASKETBALL	BOATING	HOCKEY	HORSESHOE	BEATING	VOLLEYBALL	BIKEWAY	TOILET FACILITIES	SWIMMING-BEACH	SWIMMING-POOL	HIKING/WALKING	TENNIS COURTS	DRINKING WATER	ATHLETIC FIELD	PLAYGROUND	GYMNASIUM	PICNIC SHELTER	PICNIC TABLES	RECREATION BUILDING	NATURE/WILDLIFE	SPECIAL FACILITIES	ACRES
145.	WASHBURN AVENUE	CS/T																								1.3
146.	WASHBURN FAIR OAKS	CIP															●					●				7.5
147.	WASHINGTON TRIANGLE	CS/T																								.04
148.	WAVELAND TRIANGLE	PL														●	●									1.9
149.	WEBBER PARK	JAD/NP/SUP		●	●		●	●	●	●		●		●		●	●		●			●	●	●		24.9
150.	WENOAH TRIANGLE	CS/T																								.1
151.	WEST END TRIANGLE	CS/T																								.3
152.	WHITTIER PARK	JAD/NP		●	●		●		●	●		●		WP			●	●	●			●	●			3.6
153.	WILLARD PLAYGROUND	JAD/NPL		●								●					●		●		●	●				.9
154.	WINDOM PARK	NP		●	●		●		●			●		WP		●	●	●	●			●	●			8.6
155.	WIRTH GOLF COURSE	SUP																							●	210.0
156.	WIRTH PARK	RP	●			●					●	●	●		●	●	●		●		●	●		●	●	539.6

Additions to main park inventory list

Park/ parkway name	Location	Size	Classification	Facilities (general)
Alcott Triangle	St. Louis Ave. and 29th St. W.	.26 acre	Triangle	
Armatage Play Lot	58th St. W. and Washburn Ave. S.	1.63 acre	Neighborhood playlot	Playground, picnic tables
B. F. Nelson	6th Ave. NE and Main St. NE	10.2 acres	Regional park	Mainly undeveloped; greenspace
Boom Island	700 Sibley St. NE	22.5 acres	Regional park	Boat launch, promenade, picnic shelter, trails, lighthouse, interpretation
Central High Gym	2400 4th Ave. S.	2.06 acres	Gymnasium	
Chergosky Park	Arthur Ave. and Seymour Ave. SE	.38 acre	Neighborhood playlot	Playground, picnic tables
Dean Parkway		13.02 acres	Parkway (regional)	Trails
East River Parkway		84.99 acres	Parkway (regional)	Trails
Jordan Park	30th Ave. N. and Irving Ave. N.	3.63 acres	Neighborhood playlot	Playground, picnic shelter, athletic field
Kenwood Parkway		14.7 acres	Parkway (regional)	Trails
King's Highway		17.88 acres	Parkway	Trails
Linden Hills Boulevard		5.71 acres	Parkway (regional)	Trails
Victory Memorial Parkway		133.55 acres	Parkway (regional)	Trails
Minnehaha Parkway		254.15 acres	Parkway (regional)	Trails
Reserve Block 40	Drew Avenue S. and Cedar Lake Parkway	1.67 acres	Triangle	
Ridgeway Parkway		23.99 acres	Parkway	Trails
River Palace	Lowry Ave. NE and Marshall St. NE	2.13 acres	Neighborhood playlot	Undeveloped
St. Anthony Parkway		36.48 acres	Parkway	Trails
Stinson Parkway		12.15 acres	Parkway	Trails
Thomas Lowry Park	Mt. Curve and Douglas Avenue	1.46 acres	Neighborhood playlot	Pergola
Victory Playground	44th Ave. N. and Upton Ave. N.	2.35 acres	Neighborhood playlot	Tennis court, basketball court, playground, picnic shelter
West River Parkway		131.5 acres	Parkway	Trails, prairie restorations, interpretation
Windom School totlot	Wentworth Ave. S.. and 58th St. W.	1.23 acres	Neighborhood playlot	Playground

BOB

CLIC PRESENTATION JUNE 12, 1997
PROPOSED PROJECTS 1998, 1999, 2000

1998 Project	Net Debt Bond Request	Project Description
Central Park/R. Green	$ 130,000	The project proposes to acquire properties in order to expand Central Park that is adjacent to Richard Green School. The expansion will establish a balance between youth, school and resident activities. The project also includes funds from a State Youth Initiative Grant, and the NRP.
Harrison Park/School	300,000	Currently, park programs are split between the park shelter building and school. This project would add a park center building to the new school at Harrison. This will enable the Park Board to provide more comprehensive recreation programming. The project also includes funds from a State Youth Initiative Grant, the Mpls Public Schools, the NRP, as well as private funds.
Lind/Bohanon	250,000	The project would add a small Recreation Center Building to the new Jenny Lind School. The play areas would also be rebuilt, as well as other related site improvements. The project would enable more

XIV. LAND POLICY

Park land should be held in perpetuity and additional lands acquired for present and future generations when in accordance with Board plans.

DISCUSSION

On occasion, individuals, institutions and organizations, both public and private, have expressed interest in obtaining or divesting MPRB lands for other purposes, including roadways, cellular phone towers, power transmission lines, waste disposal, sewers, signs, billboards and buildings.

The Board anticipates that similar requests for such non-park uses of Minneapolis park lands will increase as competition for land increases in the City. In addition, more intensive development of lands surrounding the MPRB property will increasingly impact park resources including water quality, and general biotic conditions. Finally, the impacts of noise, odor, and other disruptions are likely to increase. To meet these challenges, the MPRB is proactively working with a variety of public agencies and private interests to avoid or mitigate adverse developmental impact on MPRB land and water resources.

When another public body attempts to acquire park lands through the power of eminent domain, the Board shall direct its staff to make an exhaustive and comprehensive study, analysis and recommendation of the resultant effects on the entire Park System. If the Board, as a result thereof, determines the affected area is essential to the Park System, it shall work cooperatively with such agency to suggest alternate courses of action whereby taking of park land can be averted. And if the condemning authority persists in its determination to take park land, the Board shall determine whether statutory authority exists for such taking, and if not, the Board shall take whatever action is necessary to resist the taking of its property.

A. Encroachments on Park Lands.

The Board strongly opposes diversion of park property by any individual, institution or organization, public or private, for any purpose other than that for which the lands were acquired. Where proposed diversions of park property appear to be in the best interest of the Park System or where all other alternatives have been exhausted, and only under these conditions, requests will be taken under consideration by the Board on an individual basis.

In those instances where the Board determines that encroachment on park property may be necessary, easements or permits will be granted which include the following requirements:

A.1. To the greatest extent possible, intrusion will be limited to the periphery of park property, must be unobtrusive in nature, and must minimize the amount of damage to the landscape.

A.2. Restoration of any physical or natural property removed or damaged, or equivalent monetary compensation shall be provided.

A.3. Compensation shall reflect the impact of the intrusion on aesthetic and recreational values of park land.

B. Interim Uses.

The MPRB will only lease its lands or permit their use for purposes consistent with the objectives of the MPRB. Interim uses may be approved by the Board if it is determined that the use contributes substantially toward the system's short-term or long-range goals. The Board will require compensation for land or facilities leased, and for any park services rendered, consistent with other benefits of the use of MPRB system.

C. Divestiture of Land.

In cases where the Board determines that certain lands are no longer appropriate for inclusion in the system, they may, by resolution and with the concurrence of the District Court and other agencies as required, divest such land. The preferred method is by public sale; however, other methods, such as land exchanges or negotiated sale, may be considered if they provide greater benefit to the MPRB.

D. Disposal of Wastes.

The Board will not allow the depositing of landfill or burying of any waste material, which, in the opinion of the Board, results in harm to the public health and safety, natural resources, or in any way be deemed deleterious to the Park System. The Board shall adopt a Waste Disposal Position Statement which will define waste materials and identify acceptable uses of organic materials in park property.

XV. BOARD OPERATIONS

DISCUSSION

The formal business of the MPRB is transacted at meetings of the Board or its committees. Minnesota Statutes establish certain procedural requirements for meetings of the Board. The following policies comply with these statutes and are designed to promote and protect the public interest and to facilitate public input.

A. Transacting the Business of the MPRB.

A.1. Notice.

Meetings may be convened only after proper notice. The type of notice required depends on the type of meeting.

Chapter 3

Technical Appendix for the Water Supply Plan

Adopted by City Council and Mayor: March 2000

Minneapolis Water Works

Water Supply, Emergency and Conservation Plan

December 1995

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

Yasser M. AbouAish

20955 1-3-1996

Registration Number *Date*

City of Minneapolis
Department of Public Works
Minneapolis Water Works, Engineering Section

INTRODUCTION

This Water Supply, Emergency and Conservation Plan has been prepared to comply with Minnesota Statutes 473.859, which requires a water supply plan as a component of the Public Facilities Plan. The Laws of Minnesota mandated by Chapter 186 of the 1993 Legislative Session requires Public Water Suppliers serving more than 1,000 persons to submit a Water Supply Plan to the Department of Natural Resources (DNR) for approval by January 1, 1996 (Minn. Statutes 103G.291).

This plan is also submitted to the Metropolitan Council as an amendment to the local comprehensive plan (Minn. Statutes 473.859) for communities with municipal water supplies in the seven-county Twin Cities Metropolitan Area.

The Water Supply Plan for the Minneapolis Water Works / City of Minneapolis is prepared pursuant to Minnesota Statutes 103G.291, subdivision 3 and is organized in accordance with the guidelines established by the DNR - Division of Waters and the Metropolitan Council.

ACKNOWLEDGEMENT

The following Minneapolis Water Works Staff had a major contribution in the preparation of this Report

Mr. Jim Bussa	*Ms. Barbara Schommer*
Mr. Jimmie Hayek	*Mr. Jay Whitaker*
Mr. Adam Kramer	*Engineering Section*
Ms. Val Olson	*Administration*
Mr. Harold Pulju	*Operation Supervisors*

SUMMARY

This Plan is divided into four (4) parts:

PART I - WATER SUPPLY SYSTEM DESCRIPTION AND EVALUATION
This chapter addresses the adequacy of the existing water sources and supply systems to provide current and projected demands.

PART II - WATER EMERGENCY PLANNING
This chapter lists emergency response procedures and develops actions necessary to improve emergency preparedness.

PART III - WATER CONSERVATION PLANNING
This chapter identifies programs intended to reduce unnecessary water demand, improve the efficiency in usage and minimize water losses and waste.

PART IV - METROPOLITAN COUNCIL ITEMS
This chapter relates to comprehensive plan requirements that apply to communities in the seven county Twin Cities Metropolitan Area.

CONTACT PERSON

For any questions or concerns regarding this plan, please contact Yasser AbouAish, P.E. at the Minneapolis Water Works, Engineering Section - 4300 Marshall Street NE Minneapolis, MN 55421; or phone at (612) 661-4904, FAX (612) 661-4914.

TABLE OF CONTENTS

PART I - SUPPLY SYSTEM DESCRIPTION AND EVALUATION 1

A. ANALYSIS OF WATER DEMANDS 2
B. TREATMENT AND STORAGE CAPACITY 9
C. SOURCE OF WATER SUPPLY 12
D. ADEQUACY OF SYSTEM TO SUPPLY DEMAND 15
E. SUMMARY OF DATA 20

PART II - WATER EMERGENCY PLANNING 21

A. EMERGENCY TELEPHONE LIST 21
B. CURRENT WATER SOURCES AND SERVICE AREA 25
C. PROCEDURE FOR AUGMENTING WATER SUPPLIES 25
D. DEMAND REDUCTION PROCEDURES 30
E. PROCEDURE FOR WATER ALLOCATION 33
F. TRIGGERS FOR IMPLEMENTING PLAN COMPONENTS 33
G. ENFORCEMENT 34
H. WATER SUPPLY PROTECTION 35

PART III - WATER CONSERVATION PLANS 39

A. ROLE OF CONSERVATION 39
B. WATER CONSERVATION POTENTIAL 40
C. WATER CONSERVATION PROGRAMS 41
D. ADOPTION OF PLAN 46

PART IV - METROPOLITAN COUNCIL ITEMS 47

A. DESCRIPTION OF THE MUNICIPAL SYSTEM 47
B. WATER UTILITY OPERATIONS 47
C. CONSERVATION PROGRAM 47
D. EMERGENCY PREPAREDNESS / CONTINGENCY PLAN 47
E. COORDINATION OF PLANNING EFFORTS WITH OTHERS 48
F. PROBLEMS AND POTENTIAL SOLUTIONS 48
G. WELLHEAD PROTECTION PROGRAM 48
H. IMPLEMENTATION PROGRAM 48

LIST OF TABLES AND CHARTS

Item	Title	Follows Page
1	Total Service Population	2
2	Suburban - Population	2
3	City of Minneapolis - Population	2
4	Minneapolis Total Number of Service Connections	3
5	Annual Water Withdrawn	3
6	Percent of Suburban To Total Water Demands	3
7	Residential vs. Total Minneapolis Water Usage	3
8	Minneapolis Total Water Usage per Capita	4
9	Residential Water Usage per Capita	4
10	Minneapolis Work Force	4
11	1994 Total Water Usage by Category	4
12	Annual Water Use by Category	5
13	1994 Total Minneapolis Water Usage by Category	5
14	Annual un-Metered Water	6
15	1992 Minneapolis Water Works Monthly Demands	6
16	1992 Monthly Demands for Large Volume Customers	7
17	Seasonal and Peak Water Demands	8
18	River Flow Characteristics Data at Anoka	16
19	Population Forecast	17

LIST OF APPENDICES

Appendix A: Water Source and Service Area Information Maps and Attachments

A-1 Water Source Information
A-2 Service Area Information

Appendix B: Augmenting Water Supplies Reports' Conclusions

B-1 Water Resources Investigation
B-2 Alternate Water Supplies Study

Appendix C: Water Defense Network for Supply Protection Measures

Appendix D: Emergency Assessment for Major Water Supply Components

D-1 Raw Water Source
D-2 Collection System, Main Intakes - Pump Station #5
D-3 Collection System, Alternate Intakes - Pump Station #4
D-4 Treatment System, Softening Plant
D-5 Treatment System, Dewatering Plant
D-6 Treatment System, Fridley Filtration Plant
D-7 Treatment System, Columbia Heights Filtration Plant
D-8 Finished Water Storage
D-9 Transmission and Distribution System

Appendix E: Emergency Response Plan for Hazardous Material Incidents

Appendix F: Minneapolis Municipal Water Conservation Program

PART I - WATER SUPPLY SYSTEM DESCRIPTION AND EVALUATION

This chapter examines the current status of water demand and supply in order to assess the adequacy of the existing system to sustain current and projected demands .

The DNR's Water Appropriation Permit Number is 786216-Mississippi River.

Name of Water Supplier:	Minneapolis Water Works City of Minneapolis
Address:	4300 Marshall Street NE Minneapolis, MN 55421
Contact:	Adam J. Kramer, Superintendent Water Plant Operations (612) 661-4915
Population of Service Area:	367,924 (Minneapolis, 1993) 113,592 (Suburban Customers*) TOTAL 481,516 (estimated)
Total number of service connections:	102,000**

* Minneapolis Water Works supply wholesale water to seven suburbs.

** Number of service connections does not include suburbs. Approximately 41,000 additional connections are served by Minneapolis water supply.

A. ANALYSIS OF WATER DEMANDS

1. Summary of Historic Water Use

The Minneapolis Water Works uses water from the Mississippi River to supply the City of Minneapolis, Golden Valley, Crystal, New Hope, Columbia Heights, and Hilltop, as well as parts of Bloomington and Edina Morningside.

The following Tables and Charts provide a summary of total water use over the last 10 years (1984 to 1993).

a) Population

Population Changes/Service Area	Table 1, Chart 1
Population Changes/Suburban Customer	Table 2, Chart 2
Population Changes/Minneapolis only	Table 3, Chart 3

The total population of the Minneapolis Water Works' Service Area is currently estimated at 480,000 (70% of which is in the City of Minneapolis).

The decade population loss in Minneapolis for the period of 1980 to 1990 (Census years) of about 3,000, stands in contrast to the large population losses experienced in the City between 1950 and 1980. While the City has declined in total population by nearly one-third since the peak year of 1950, the rate of decline has slowed dramatically. The greatest losses in population occurred between 1960 and 1980.

Between 1970 and 1975, the City experienced population losses of around 10,000 persons per year, while the suburban population grew. The rate of population decline slowed during the late 1970's and early 1980's to approximately 7,000 to 3,000 persons per year.

Recent Census figures and estimates indicate that the major components of population change - fertility and mortality rates, and in/out migration - have created a trend toward population stability. Approximately 370,000 live, now, in Minneapolis.

Suburban customers served by Minneapolis Water Works total approximately 110,000. This number includes the population of Golden Valley, Crystal, New Hope, Columbia Heights and Hilltop, as well as Edina Morningside and approximately 30% of Bloomington's population.

Total Service Area Population

YEAR	MPLS. POPULATION	SUBURBAN* POPULATION	TOTAL POPULATION	PERCENT CHANGE
1985	360,000	117,953	477,953	- 2.2
1990	368,383	121,957	490,340	+ 2.6
1995	367,000	113,592	480,592	- 2.0
				Avg. + 0.5

* ACCORDING TO THE LEAGUE OF MINNESOTA CITIES (LMC)

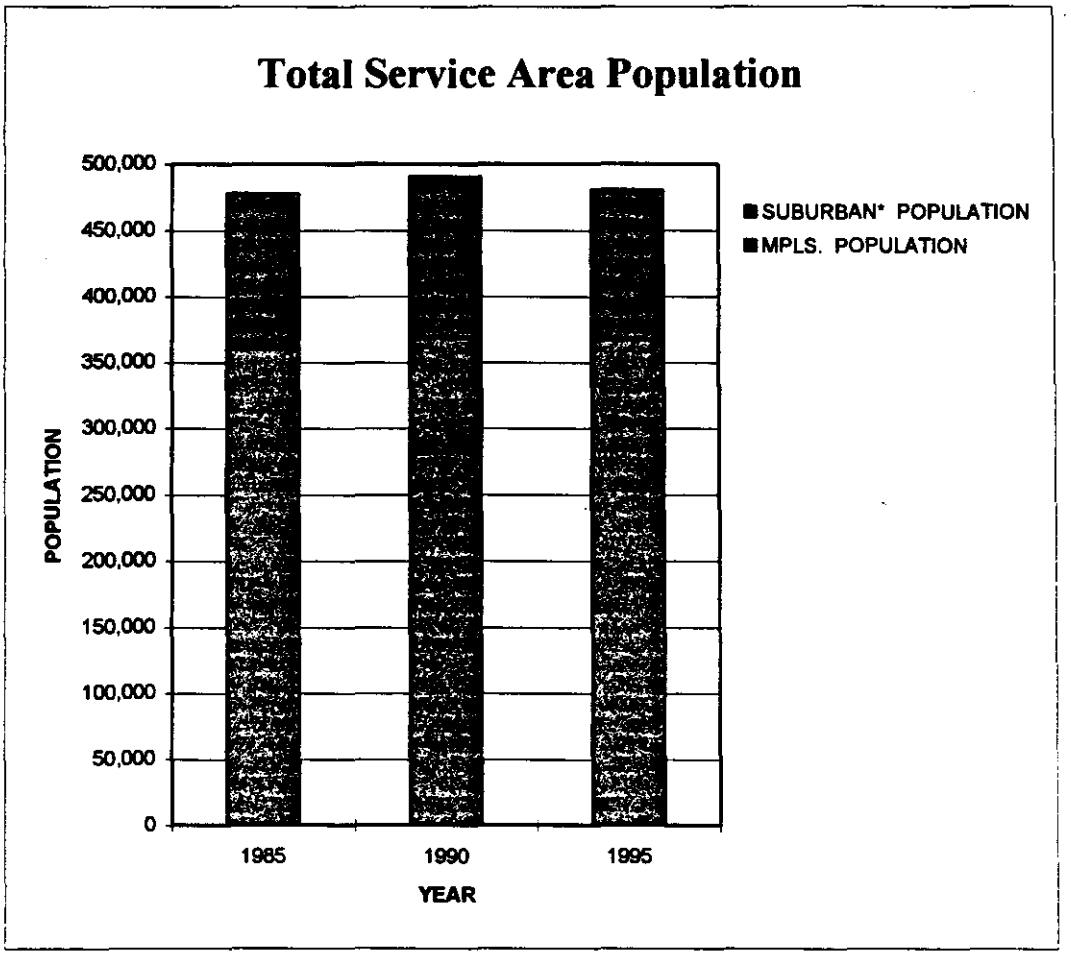
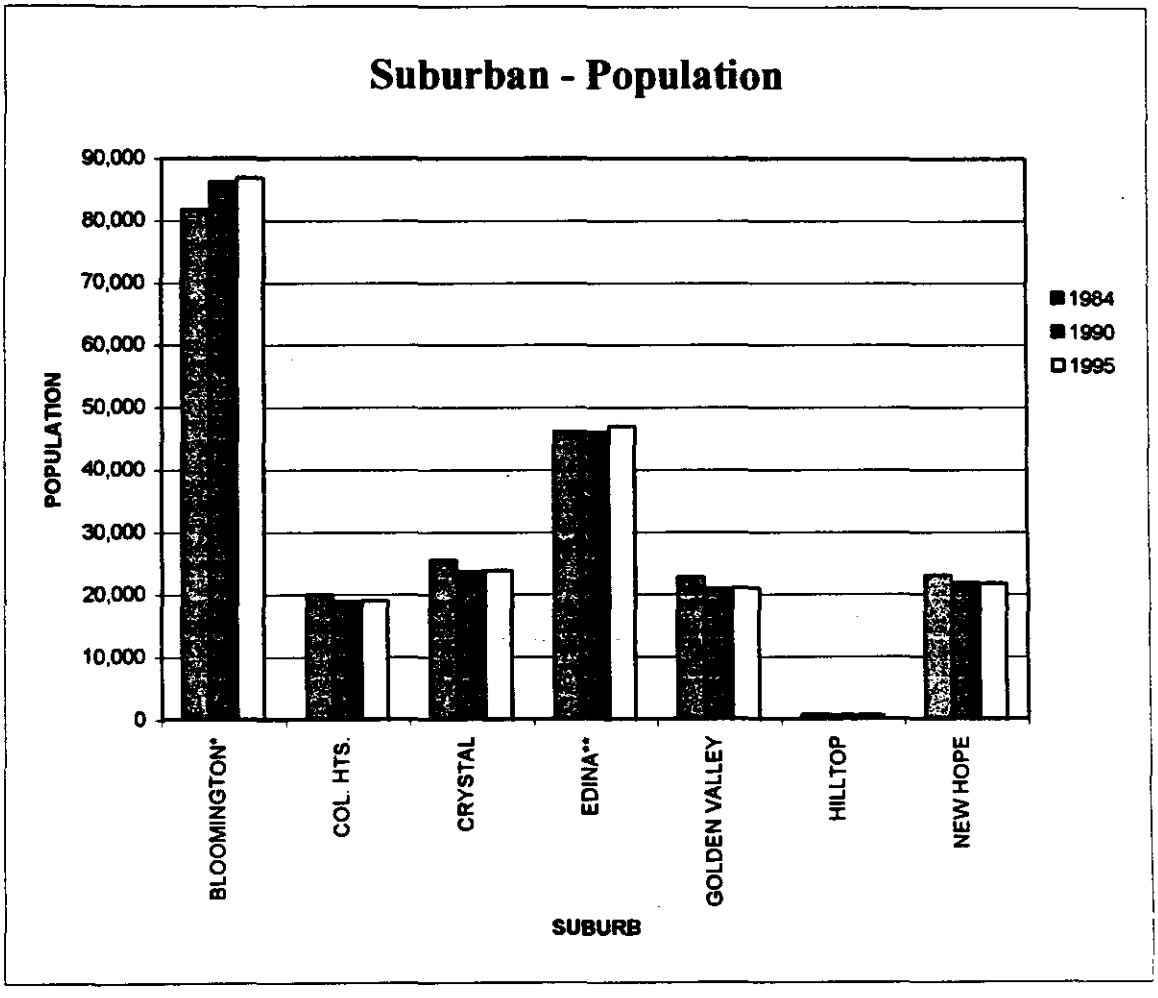


TABLE and CHART No.1

Suburban - Population

YEAR	BLOOMINGTON*	COL. HTS.	CRYSTAL	EDINA**	GOLDEN VALLEY	HILLTOP	NEW HOPE
1984	81,831	20,029	25,543	46,073	22,775	817	23,087
1990	86,335	18,910	23,788	46,070	20,971	749	21,853
1995	86,918	18,999	23,807	46,984	21,029	749	21,758



* MPLS. WATER WORKS PROVIDES ONLY 30% OF BLOOMINGTON'S WATER

** MPLS. WATER WORKS PROVIDES WATER TO EDINA MORNINGSIDE ONLY

TABLE and CHART No.2

City of Minneapolis - Population

YEAR	POUPLATION	PERCENT CHANGE
1984	362,090	- 0.6
1985	360,000	- 0.6
1986	356,677	- 0.9
1987	355,800	- 0.2
1988	358,166	+ 0.7
1989	366,166	+ 2.2
1990	368,383	+ 0.6
1991	368,993	+ 0.2
1992	368,559	- 0.1
1993	367,924	- 0.2
	Average:	+ 0.1

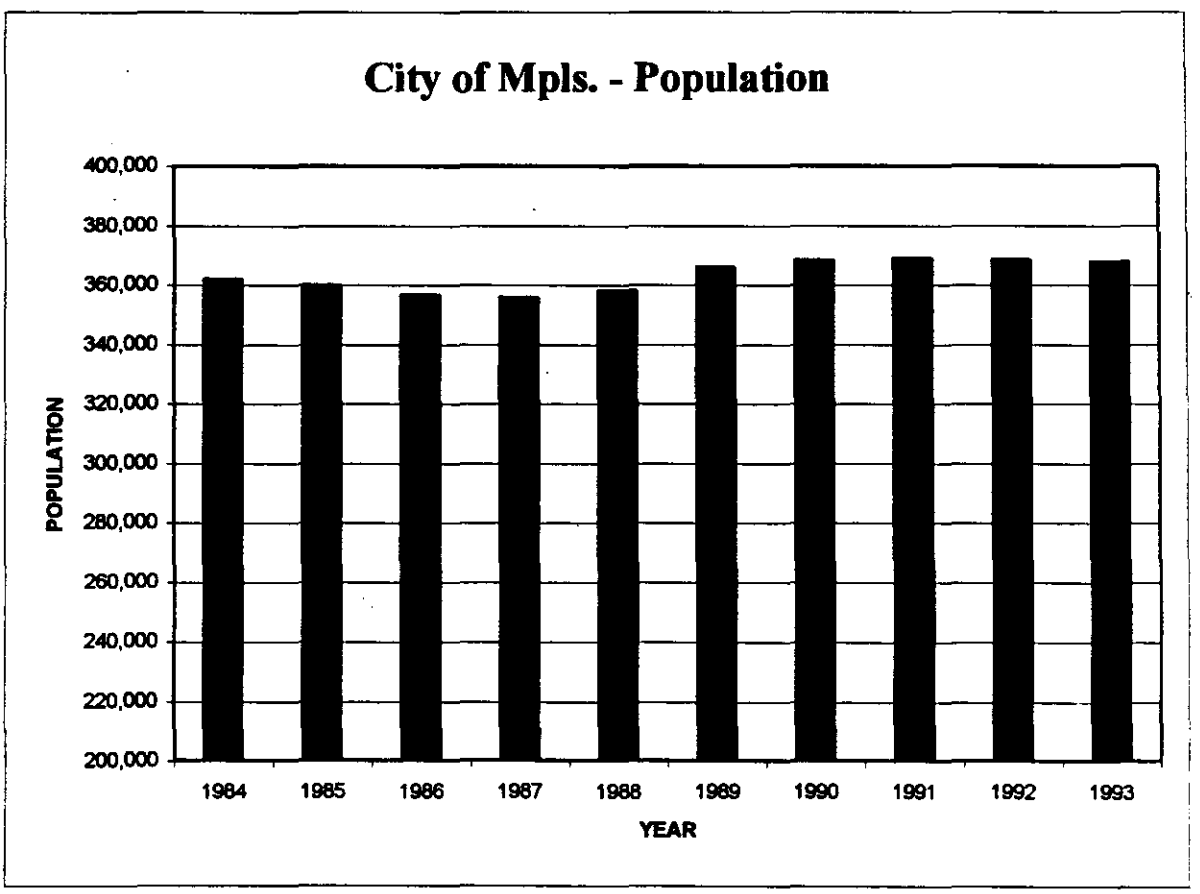


TABLE and CHART No.3

b) Service Connection

Number of service connections — Table 4, Chart 4

The City of Minneapolis' overall number of service connections has been relatively stable. It averages approximately 103,000 in the last 10 years. This number include inside and outside City water customers, not counting any of the suburban customers.

c) Water Consumption

Annual Water Withdrawn — Table 5, Chart 5

Percent of Suburbs to Total Demand — Table 6, Chart 6

Residential vs. Total Mpls. Water Use — Table 7, Chart 7

The average annual water withdrawn from the Mississippi River in the last 10 years is approximately 24 billion gallons. The average annual change of water withdrawn was zero over the entire 10-year period.

Variation in annual water withdrawn is mostly due to weather conditions. Variation is also influenced by increases in single unit attached housing and rental units, decline in the number of residents living in single-family homes and increased conservation consciousness of non-residential customers in order to reduce utility (water/sewer) costs.

The wholesale (suburban customers) water use represents approximately 22% of the water produced by the Minneapolis Water Works. This percentage increased to 26% in 1988 due to extremely dry conditions. Variations in annual water use by the suburbs are primarily due to their residential nature. Outdoor use is greatly affected by weather conditions.

The Minneapolis annual water usage in the last 10 years averages 18.5 billion gallons, with virtually no average annual change. The Minneapolis residential water use represents only 35% of the total Minneapolis use.

Typical suburban systems (comprised primarily of residential customers) ratio of residential-to-total water use ranges from 60-80%. This will be discussed later in the report as it relates to conservation potential.

Mpls. Total Number of Service Connections

YEAR	SERVICE CONNECTIONS
1984	103,803
1985	103,890
1986	105,192
1987	103,831
1988	103,608
1989	103,435
1990*	103,500
1991*	103,500
1992*	103,500
1993*	103,500
Average:	103,776

* DATA FOR THIS YEAR IS ESTIMATED

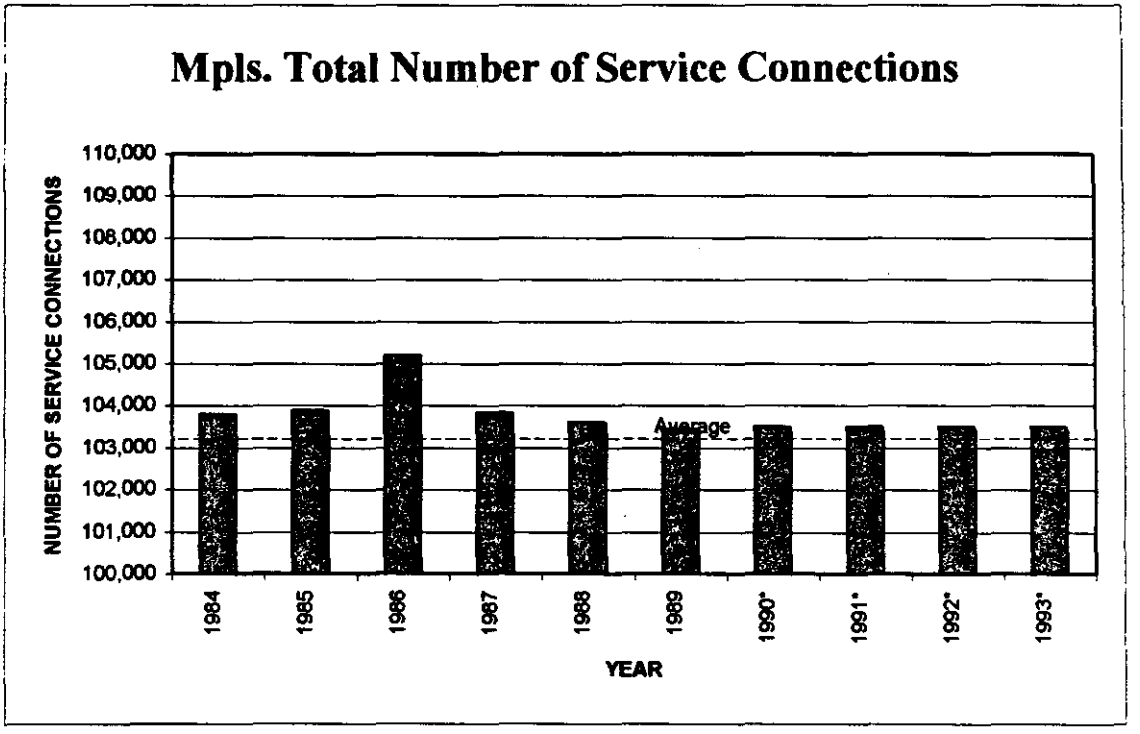


TABLE and CHART No.4

Annual Water Withdrawn

YEAR	MILLIONS OF GALLONS	PERCENT CHANGE
1984	22,384	+ 2.4
1985	23,008	+ 2.8
1986	23,710	+ 3.1
1987	26,963	+ 5.3
1988	29,696	+ 10.1
1989	27,358	- 7.8
1990	24,198	- 11.6
1991	24,259	+ 0.3
1992	24,610	+ 1.4
1993	23,125	- 6.0
	Average:	+ 0.0

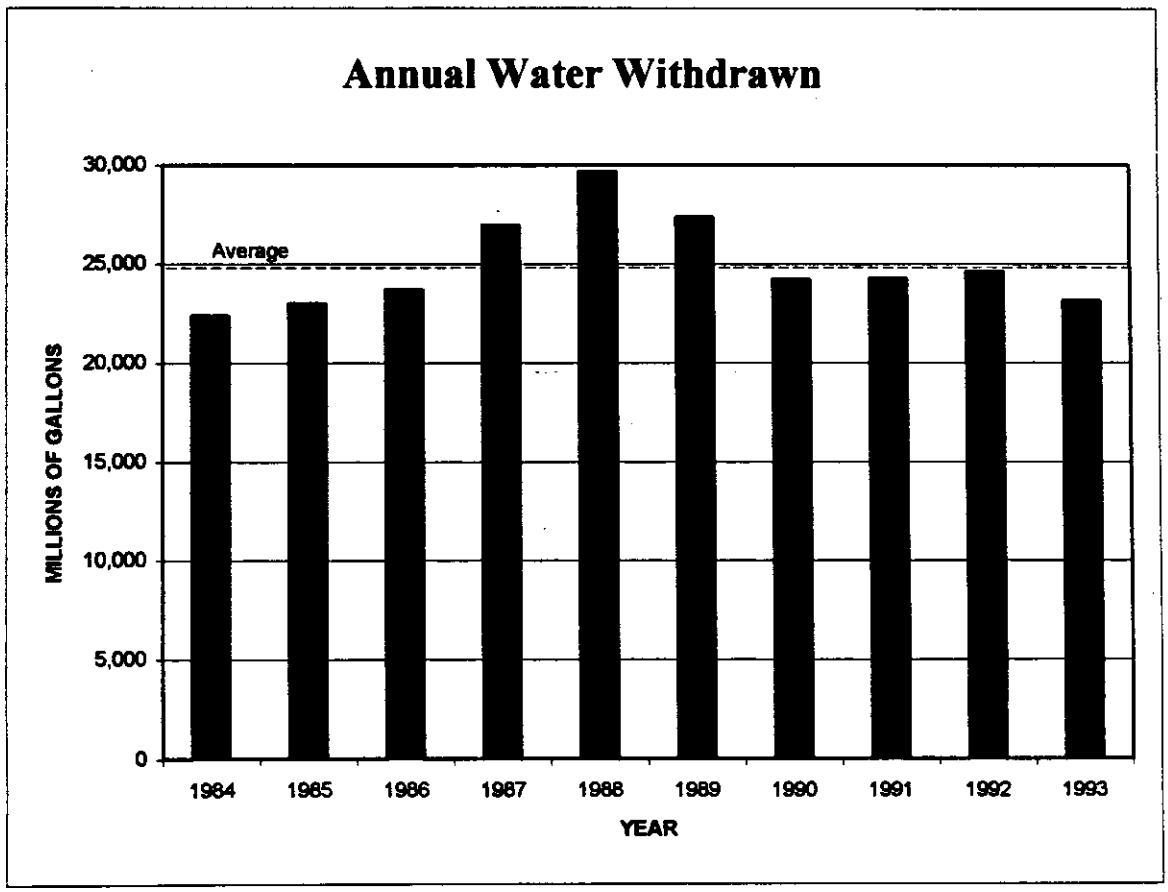


TABLE and CHART No.5

Percent of Suburban to Total Water Demands

YEAR	TOTAL SUBURBAN DEMAND (MG)	TOTAL WATER WITHDRAWN (MG)	PERCENT OF TOTAL PRODUCTION
1984	4,479	22,384	20.0%
1985	4,507	23,008	19.6%
1986	4,729	23,710	19.9%
1987	6,042	26,963	22.4%
1988	7,385	29,696	24.9%
1989	5,752	27,358	21.0%
1990*	5,500	24,198	22.7%
1991*	5,500	24,259	22.7%
1992*	5,500	24,610	22.3%
1993*	5,500	23,125	23.8%
Average:	5,489	24,931	21.9%

* DATA FOR THIS YEAR IS ESTIMATED

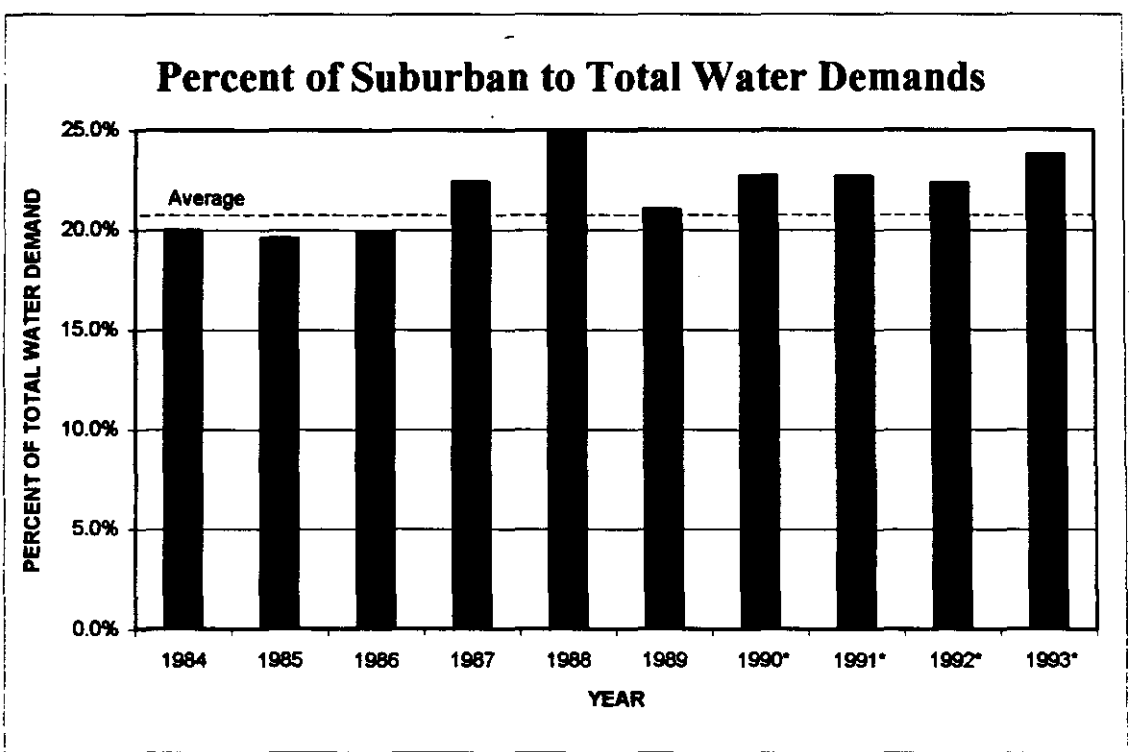


TABLE and CHART No.6

Residential Usage vs. Total Mpls. Usage

YEAR	MINNEAPOLIS TOTAL USEAGE MILLIONS OF GALLONS	MINNEAPOLIS RESIDENTIAL ONLY MILLIONS OF GALLONS	PERCENT
1984	17,905	6,275	35.0%
1985	18,501	6,773	36.6%
1986	18,980	6,133	32.3%
1987	20,921	6,804	32.5%
1988	22,328	8,113	36.3%
1989	21,606	7,048	32.6%
1990*	20,000	7,000	35.0%
1991*	20,000	7,000	35.0%
1992*	20,000	7,000	35.0%
1993*	20,000	7,000	35.0%
Average:	20,024	6,915	34.5%

* DATA FOR THIS YEAR IS ESTIMATED

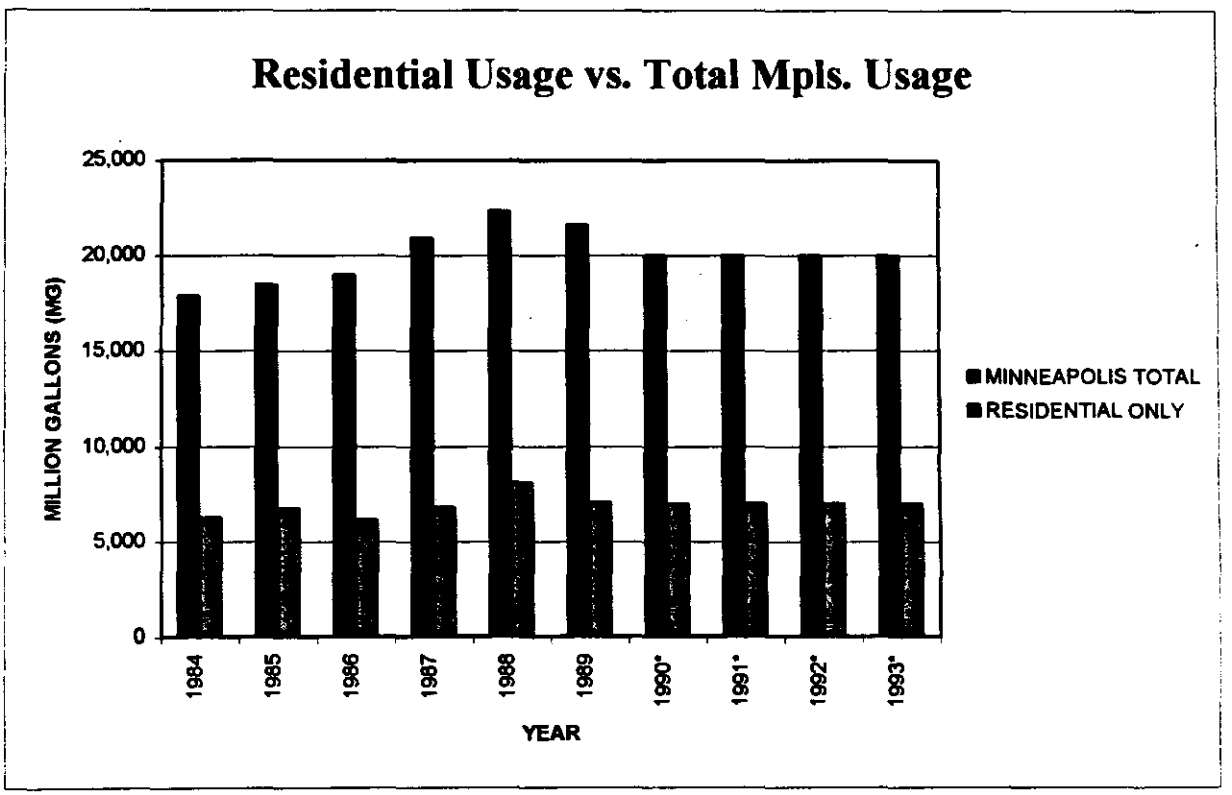


TABLE and CHART No.7

2. Per Capita Water Usage

Table 8 and Table 9 provide a historical summary of both Minneapolis total and Minneapolis residential per capita water use for a 10-year period (1984 to 1993). This data is also plotted on Chart 8 and Chart 9, respectively.

Total per capita use for Minneapolis has averaged 145 gallons per capita daily for the last 10 years.. Total per capita use was higher (170 gallons per capita daily) in 1988 due to the dry conditions. Total per capita use changes are also affected by the changing workforce in Minneapolis (residential and transient work force). Table 10 summarizes the total Minneapolis Work Force for the 10-year period from 1984 to 1993. This information is also plotted on Chart 10.

If the Transient workforce in Downtown Minneapolis and the Seasonal Student population in the University of Minnesota-Minneapolis Campus were included, the total per capita use for Minneapolis would average 100 gcd.

Residential per capita use for Minneapolis has averaged 69.5 gallons per capita daily for the last 10 years. Residential per capita was higher (83 gallons per capita daily) in 1988 due to extremely dry conditions, which resulted in more water being used for landscaping.

An average of 3.0 persons per unit (single family and two-unit housing) were used. If the national average of 3.5 persons per residential unit were used, the Minneapolis residential per capita usage would average only 60 gcd.

3. Water Demand by Customer Category

Table 11 summarizes the 1994 total water use by category and meter size. This information is also plotted on Chart 11. Definitions of use categories are as follows:

Residential: Water used in Minneapolis single-family and two-unit housing, meter size 3/4-inch and smaller

The City of Minneapolis meters its water on a quarterly or monthly basis; quarterly accounts are for residential and small commercial customers, monthly accounts are for larger users. The City's new Automatic Meter Reading (AMR) system will result in switching most residential quarterly accounts to a monthly system. This should help the conservation efforts by identifying excessive use and by detecting water leaks earlier, which will be discussed later in this report.

Mpls. Total Water Usage per Capita

YEAR	MPLS POPULATION	TOTAL MPLS WATER USAGE (MGD)	per CAPITA TOTAL WATER USAGE (gcd)
1984	362,090	17,905	135.5
1985	360,000	18,501	140.8
1986	356,677	18,980	145.8
1987	355,800	20,921	161.1
1988	358,166	22,328	170.8
1989	366,166	21,606	161.7
1990*	368,383	18,500	137.6
1991*	368,993	18,500	137.4
1992*	368,559	18,500	137.5
1993*	367,924	18,500	137.8
	Average:	19,424	146.6

* TOTAL MPLS WATER USAGE DATA FOR THIS YEAR IS ESTIMATED

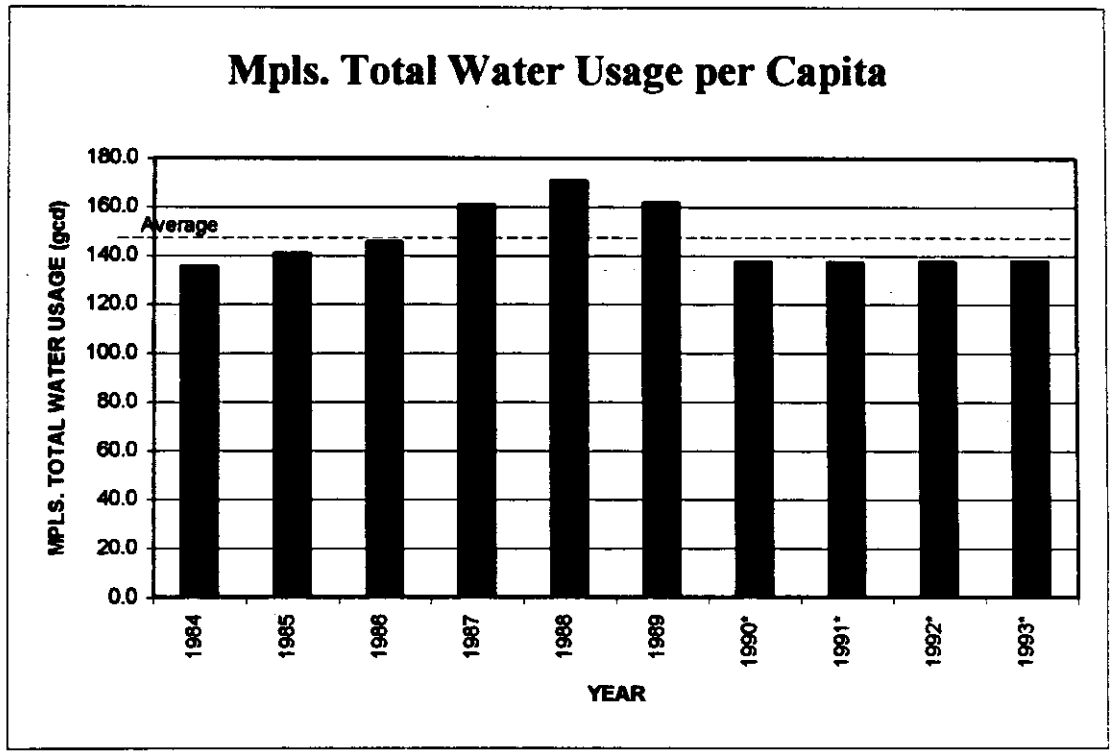


TABLE and CHART No.8

Residential Water Usage per Capita

YEAR	RESIDENTIAL WATER USAGE (MG)	per CAPITA RESIDENTIAL WATER USAGE (gcd)
1984	6,275	63.3
1985	6,773	68.7
1986	6,133	62.8
1987	6,803	69.8
1988	8,113	82.7
1989	7,048	70.3
1990*	7,000	69.4
1991*	7,000	69.3
1992*	7,000	69.4
1993*	7,000	69.5
Average:	6,915	69.5

* DATA FOR THIS YEAR IS ESTIMATED

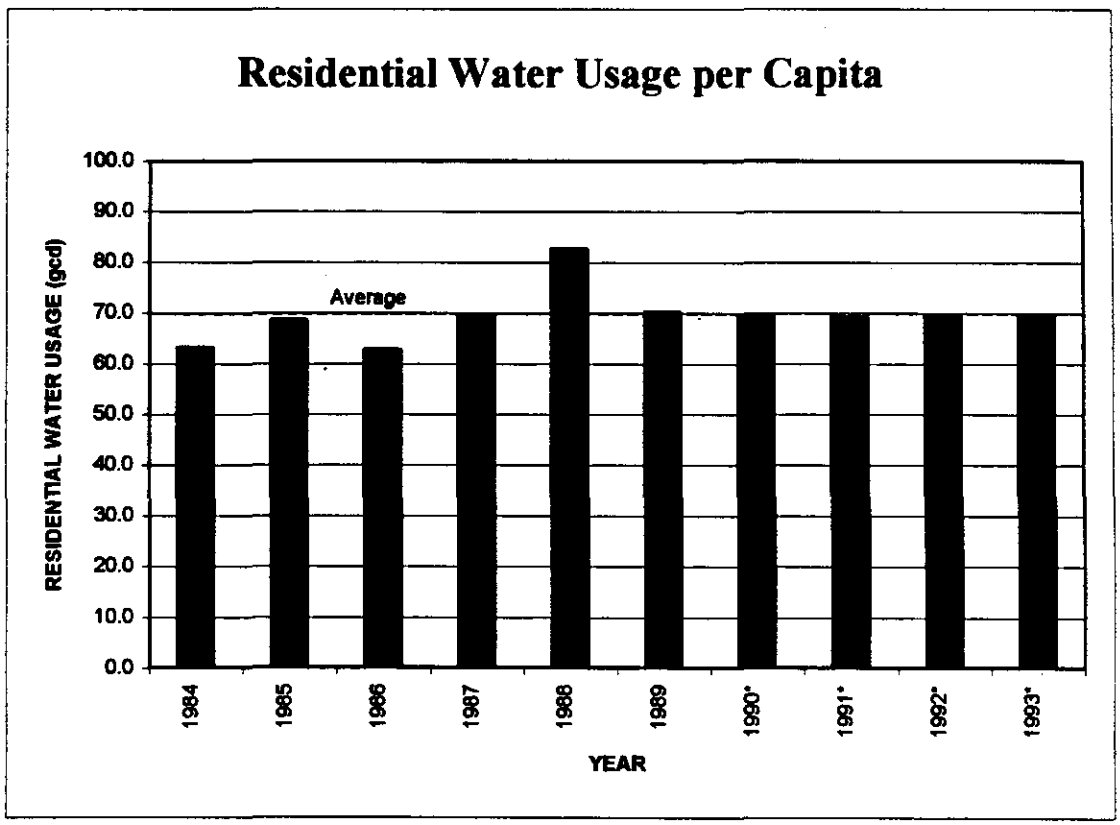
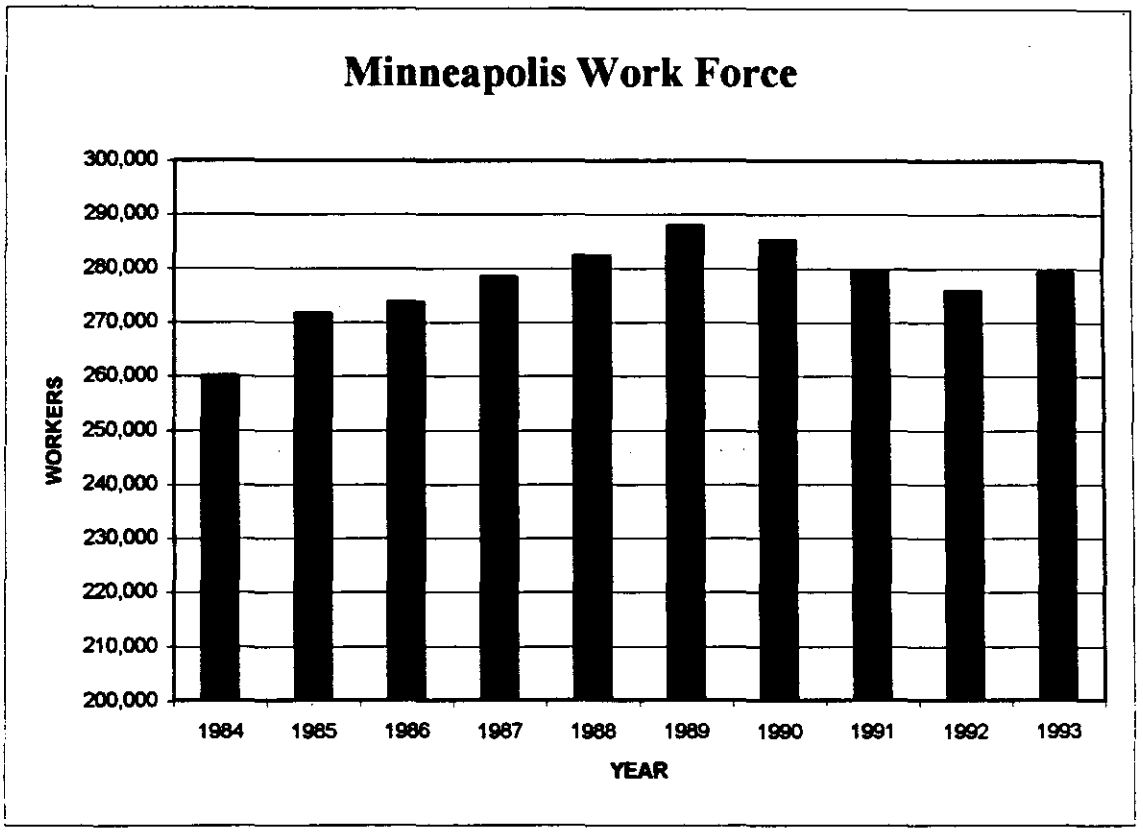


TABLE and CHART No.9

Minneapolis Work Force

YEAR	Work Force
1984	260,100
1985	271,700
1986	273,800
1987	278,400
1988	282,400
1989	287,900
1990	285,300
1991	279,700
1992	275,900
1993	279,400



Minneapolis Work Force: Includes all persons working within the City as estimated by the Minnesota Department of Economic Security. The Work Force includes both Minneapolis residents and non-residents.

TABLE and CHART No.10

1994 Total Water Usage By Category

CATEGORY	METER SIZE	NUMBR OF CONNECTIONS	WATER USE (MG)	% OF TOTAL ANNUAL USE
RESIDENTIAL	3/4" OR SMALLER	88,000	6,950	28%
NON-RESIDENTIAL	1" OR LARGER	14,000	8,686	35%
SUBURBS	VARIES	7	6,204	25%
UN-METERED	N/A	N/A	2,978	12%
TOTALS	N/A	N/A	24,818	100%

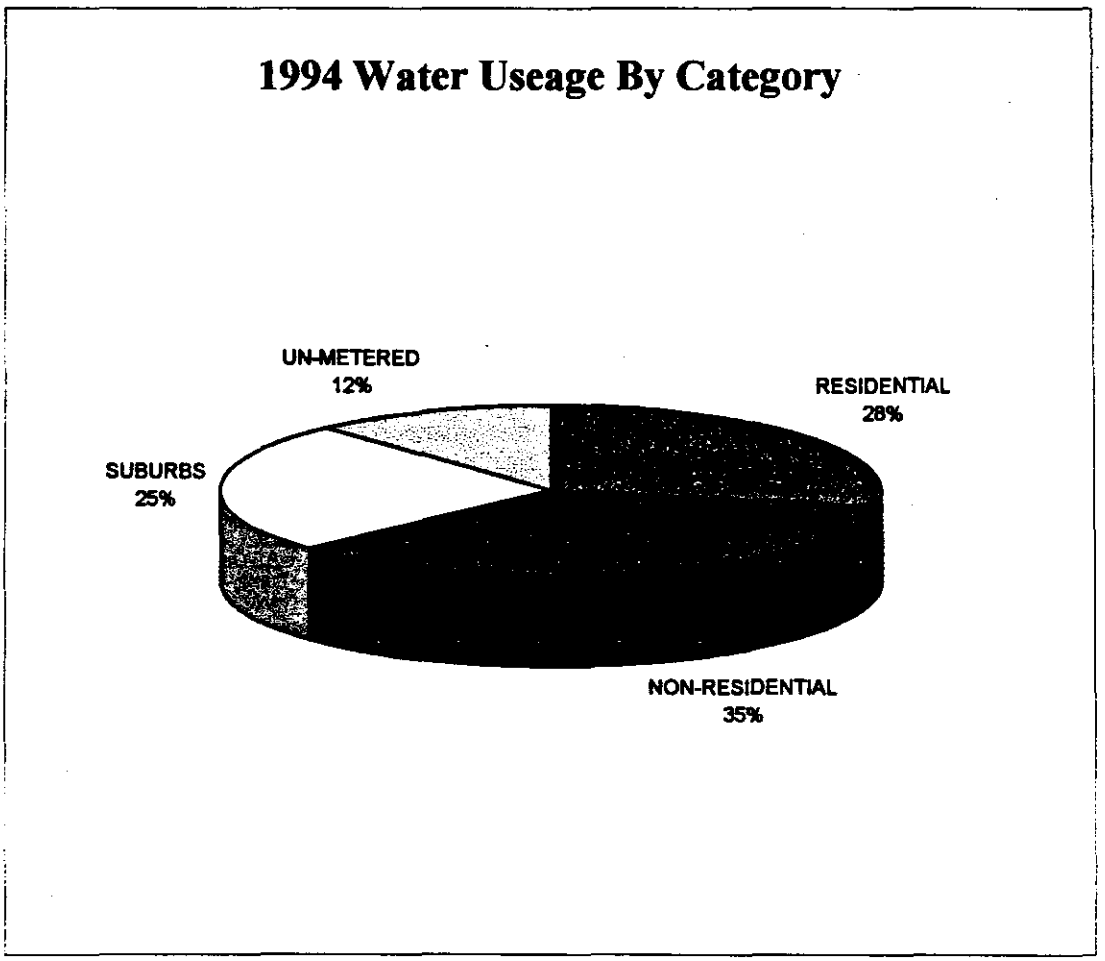


TABLE and CHART No.11

Non-Residential: Water used by non-residential connections, meter size 1-inch and larger.

The City of Minneapolis Utility Billing Division does not currently break down non-residential water use by category, but uses codes which will make it possible, in 1996, to develop reports based on commercial and institutional use to help refining the emergency planning and conservation programs. The non-residential definitions are as follows:

(Commercial): Water used by hotels, restaurants, office and apartment buildings, multiple dwellings, shopping/retail stores and other commercial facilities.
(Institutional): Hospitals, nursing homes, daycare centers and schools, and other facilities that use water for essential domestic requirements.

Suburban: Bulk water sales (wholesale use) to other public water suppliers. Minneapolis has seven (7) suburban customers, connection size varies.

Un-Metered: The difference between the amount of water that is withdrawn from the River and the amount that is sold to non-municipal and suburban customers. The majority of un-metered water is used by the Minneapolis Water Works in producing, storing and distributing water (treatment plants, settling basins, and in-ground reservoirs, hydrant and watermain flushing and leaks) and other municipal users (fires, sewer and street cleaning and authorized uses for Park Board etc.). Some of these uses are billed based on estimated quantities. A smaller portion of the un-metered water is due to meters under-registering and preventable leaks which will be discussed later in this report.

Annual water distribution is provided for 1984 through 1993 for all customers categories (Table 12; data is plotted on Chart 12).

As was shown earlier on Table 6, Suburbs usage averages about 22% of the overall water production. Out of the remaining 78%, residential usage averages 35% of the total Minneapolis water usage (Table 7).

Assuming 70% of the suburban use is residential, total residential usage for Minneapolis and suburbs will average approximately 45% of the overall water production by the Minneapolis Water Works. On average, non-residential usage accounts for 50% of the total City water use and approximately 46% of the overall production. Minneapolis water usage for 1994 is summarized in Table 13 by category and meter size; information is also plotted on Chart 13.

Annual Water Use By Category

YEAR	MILLIONS OF GALLONS			
	NON-RESIDENTIAL	RESIDENTIAL	SUBURBAN	UN-METERED
1984	10,305	6,275	4,479	1,321
1985	10,391	6,773	4,507	1,384
1986	11,218	6,133	4,729	1,578
1987	11,182	6,803	6,042	3,211
1988	10,541	8,113	7,385	3,657
1989	13,991	7,048	5,752	928
1990*	12,000	7,000	5,000	2,785
1991*	12,000	7,000	5,000	1,948
1992*	12,000	7,000	5,000	2,422
1993*	12,000	7,000	5,000	2,222

* DATA FOR THIS YEAR IS ESTIMATED

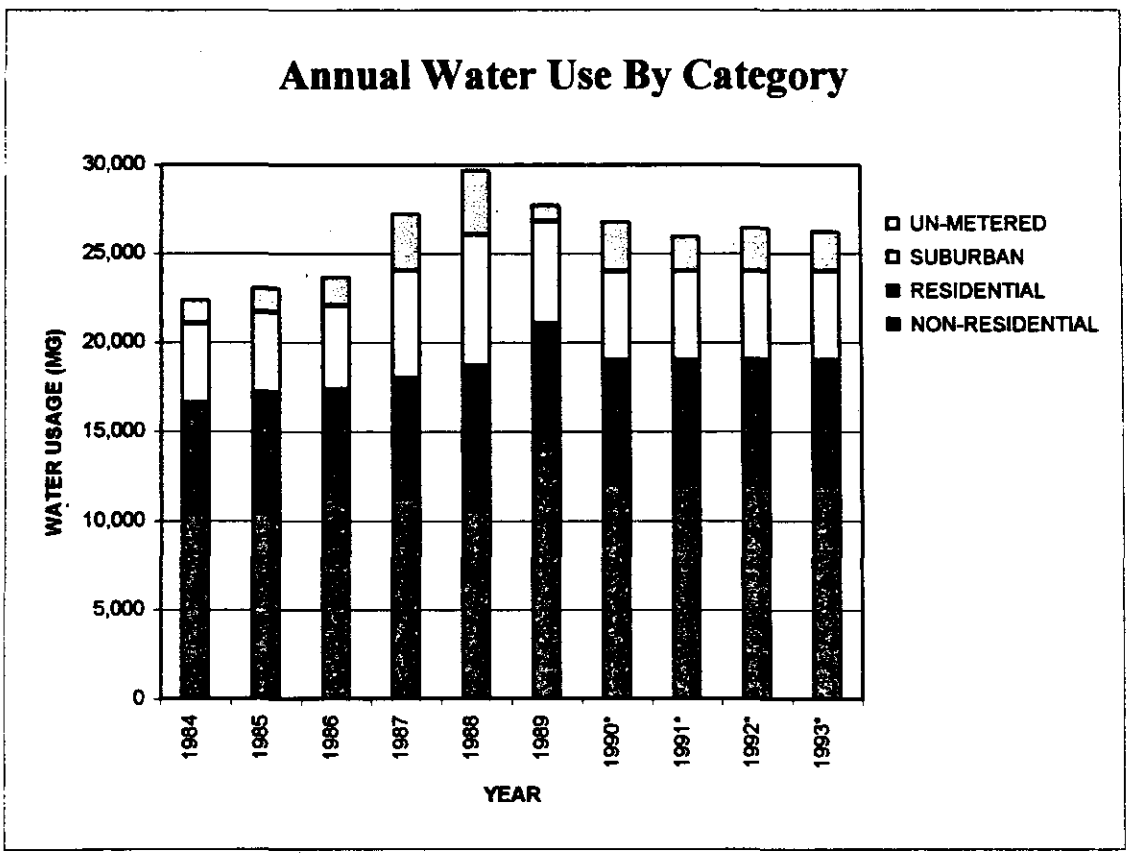


TABLE and CHART No.12

1994 Total Mpls. Water Usage By Category

CATEGORY	METER SIZE	NUMBR OF CONNECTIONS	WATER USE (MG)	% OF TOTAL ANNUAL USE
RESIDENTIAL	3/4" OR SMALLER	88,000	6,950	37.5%
NON-RESIDENTIAL	1" OR LARGER	14,000	8,686	46.5%
UN-METERED	N/A	N/A	2,978	16.0%
TOTALS	N/A	N/A	18,614	100%

1994 Total Mpls. Water Usage By Category

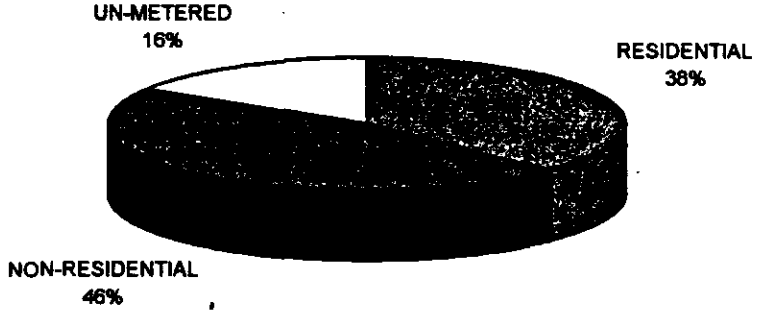


TABLE and CHART No.13

Un-metered water has ranged from 3½% to 12½% (Table 14) from 1984 to 1993. The ten-year average for un-metered water is approximately 8½%, which is below the AWWA's recommended threshold maximum of 10%. Annual un-metered water is also shown on Chart 14.

The monthly water withdrawn data is presented for 1992 (Table 15) which was a "typical" water year in terms of average use and precipitation. Water use jumps noticeably upward for the May through mid-September period. This is primarily due to increased uses for residential landscape watering, playing fields and parks irrigation and use for the City's swimming pools. This monthly data is also plotted in Chart 15.

4. Large Volume Customers

Large volume customer are defined as users which consume more than 5% of total production. The Minneapolis Water Works has two large wholesale customers (suburban public works suppliers), which meet this criteria.

The Joint Water Commission (JWC) - cities of Golden Valley, New Hope and Crystal used 3 billion gallons or 10% of the total production in 1993. The City of Bloomington used 2 billion gallons or 7% in the same year. It is important to note here that the JWC relies on the Minneapolis Water Works for its entire demand, while Minneapolis only supplies Bloomington with approximately 30% of its overall demand.

Limited water use during emergencies declared by Minneapolis (which will be discussed later in this report) shall similarly apply to the suburban customers.

The following table provides an average of water consumed by the two largest volume suburban customers annually over the last 10 years.

Suburban Customer	Volume - (MGY)	Percent of Total
JWC	2,200	12%
Bloomington	1,800	8%
TOTAL	4,000	20%

The total volume of water used by both customers has remained steady or increased slightly from 1984 to 1993. Their annual combined demand has ranged from 3.8 Billion Gallons to 6.6 Billion Gallons in that 10-year period. This accounts for approximately 20% of the Minneapolis Water Works' total productions. Currently both utilities have lawn sprinkling ordinances.

Annual Un-Metered Water

YEAR	WITHDRAWN (MG)	UN-METERED (MG)	PERCENT UNACCOUNTED
1984	22,384	1,321	5.9%
1985	23,008	1,384	6.0%
1986	23,710	1,578	6.7%
1987	26,963	3,211	11.9%
1988*	29,696	3,657	12.3%
1989	27,358	928	3.4%
1990	24,198	2,785	11.5%
1991	24,259	1,948	8.0%
1992	24,610	2,422	9.8%
1993	23,125	2,222	9.6%
		Average:	8.5%

* THE YEAR THAT THE MPLS. UTILITY BILLING SYSTEM CHANGED

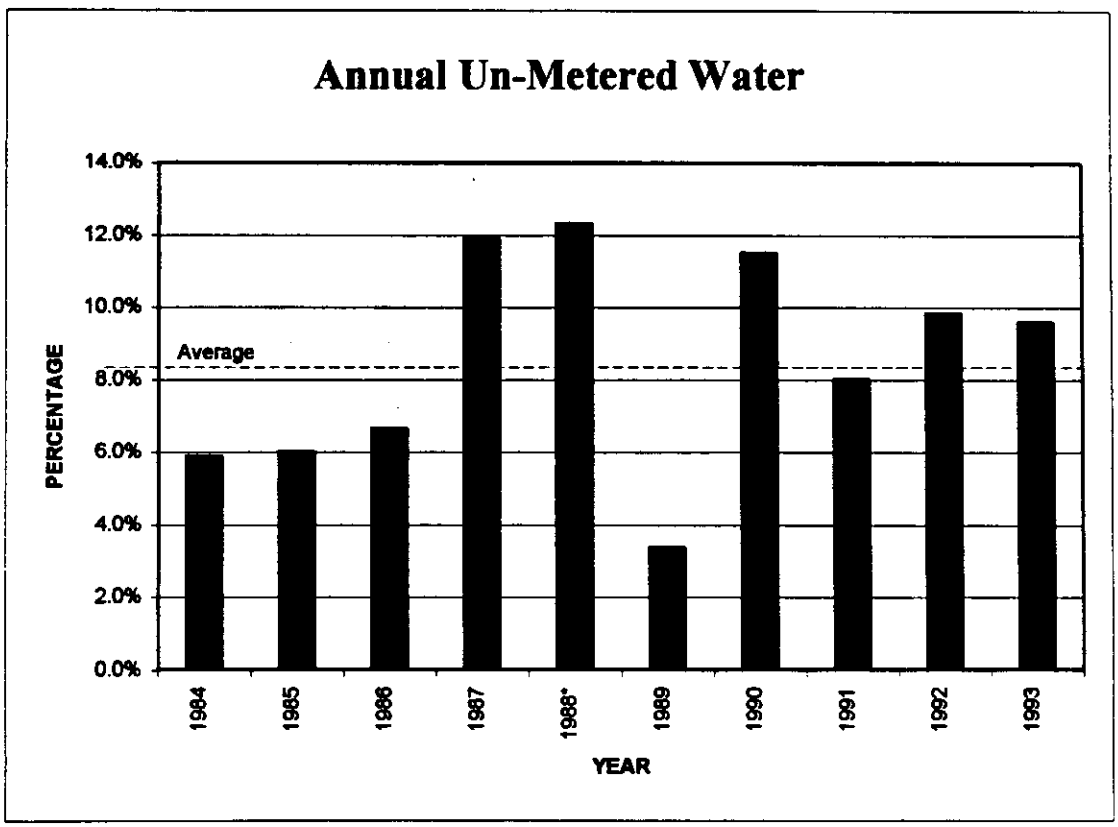


TABLE and CHART No.14

1992 Mpls. Water Works Monthly Demand

MONTH	(MG)
JANUARY	1,903
FEBRUARY	1,783
MARCH	1,844
APRIL	1,799
MAY	2,456
JUNE	2,661
JULY	2,254
AUGUST	2,374
SEPTEMBER	1,973
OCTOBER	1,917
NOVEMBER	1,770
DECEMBER	1,874
TOTAL:	24,608

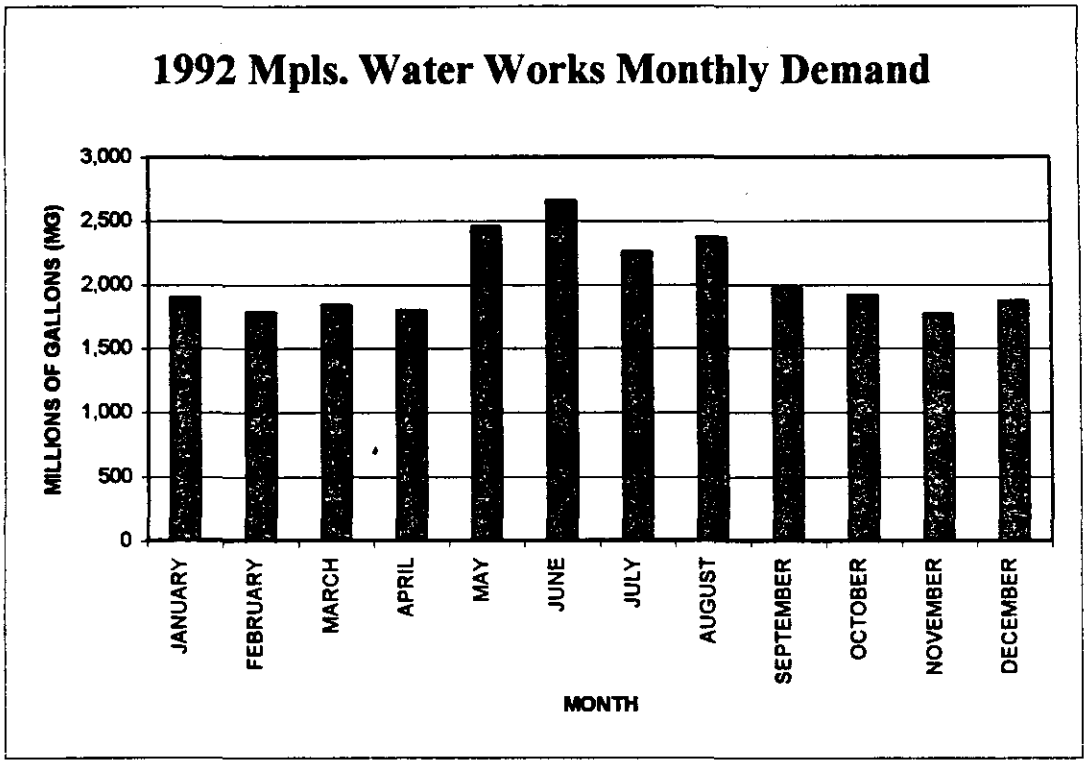


TABLE and CHART No.15

No inside City customers meet the large volume customer definition (of more than 5% of total production), however, the largest non-residential customers are listed in the following table with their total annual consumption for 1994.

Ten Largest Minneapolis Water Customers

Customer		Annual Water Use (MG)
Name	Category	
University of Minnesota (incl. 90 buildings)	Institutional	607
Metropolitan Airports Commission	Commercial	371
Hennepin County Energy Recovery Center (HERC)	Industrial	246
Bureau of Engraving	Industrial	102
Riverside Plaza Apartments	Commercial	97
Veteran's Administration Hospital	Institutional	95
IDS Building	Commercial	58
NRG Thermal Corporation	Industrial	56
Owens Corning Fiberglass Corp.	Industrial	56
Minneapolis Hilton Hotel	Commercial	42

Furthermore, the 600 Minneapolis large non-residential accounts monthly demand is summarized in Table 16 for 1992 as an example for a typical water year usage by large customers. Information is plotted in Chart 16.

These 600 large monthly accounts use over 4 billion gallons annually which represents 15% of total production (20% of Minneapolis use excluding suburbs). These accounts also represent approximately 40% of the Minneapolis non-residential use.

As mentioned earlier, the City is starting to identify large, non-residential accounts by use category in order to enhance the emergency planning and conservation programs.

1992 Monthly Demands for Large Volume Customers

MONTH	LARGE VOLUME CUSTOMER DEMAND (MG)
JANUARY	317
FEBRUARY	281
MARCH	334
APRIL	321
MAY	376
JUNE	444
JULY	447
AUGUST	429
SEPTEMBER	398
OCTOBER	360
NOVEMBER	297
DECEMBER	306
Total:	4,310

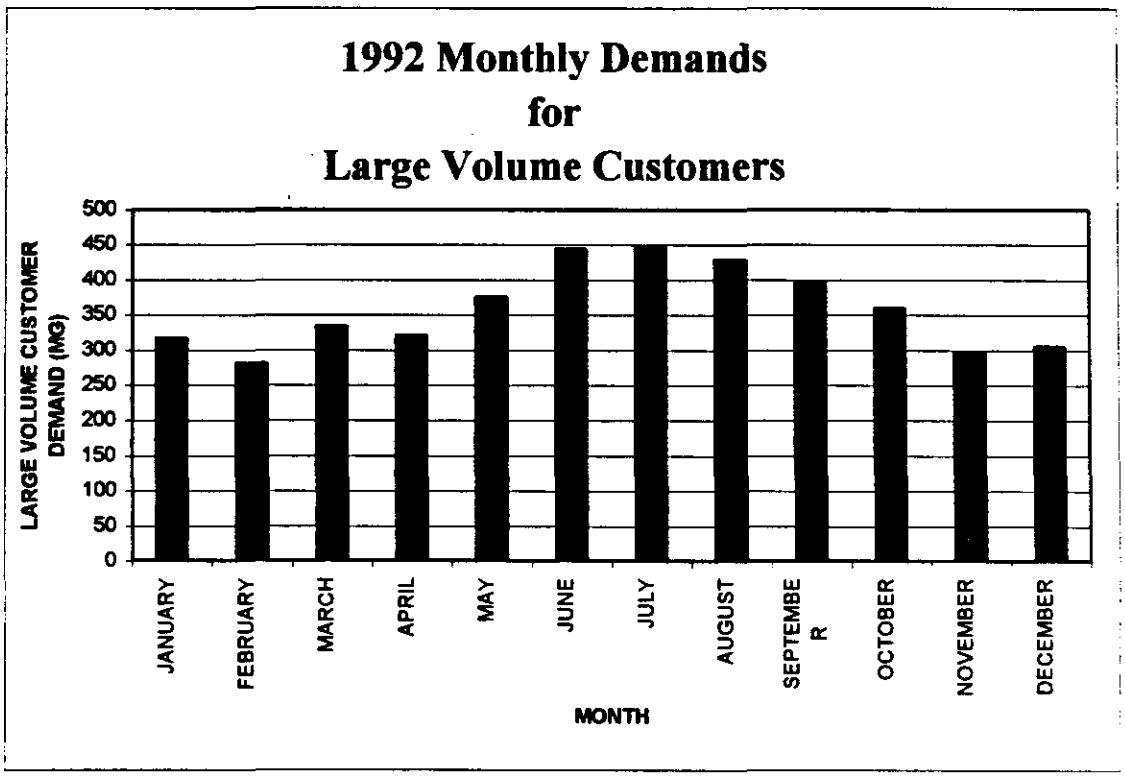


TABLE and CHART No.16

5. Seasonal and Peak Water Demands

The following table shows the average water produced during winter and summer months over the last 10 years (1984 to 1993). The months of January and July were used to represent winter and summer, respectively.

Water Demand	Average (MGD)	Maximum (MGD)
Winter	63	78
Summer	91	123

* Record peak was 160 MGD on June 6, 1988

Monthly water use by category could not be produced, since all residential accounts are quarterly accounts. This will change in the next few years as the City switches residential accounts to monthly billing as a result of the new Automatic Meter Reading (AMR) system.

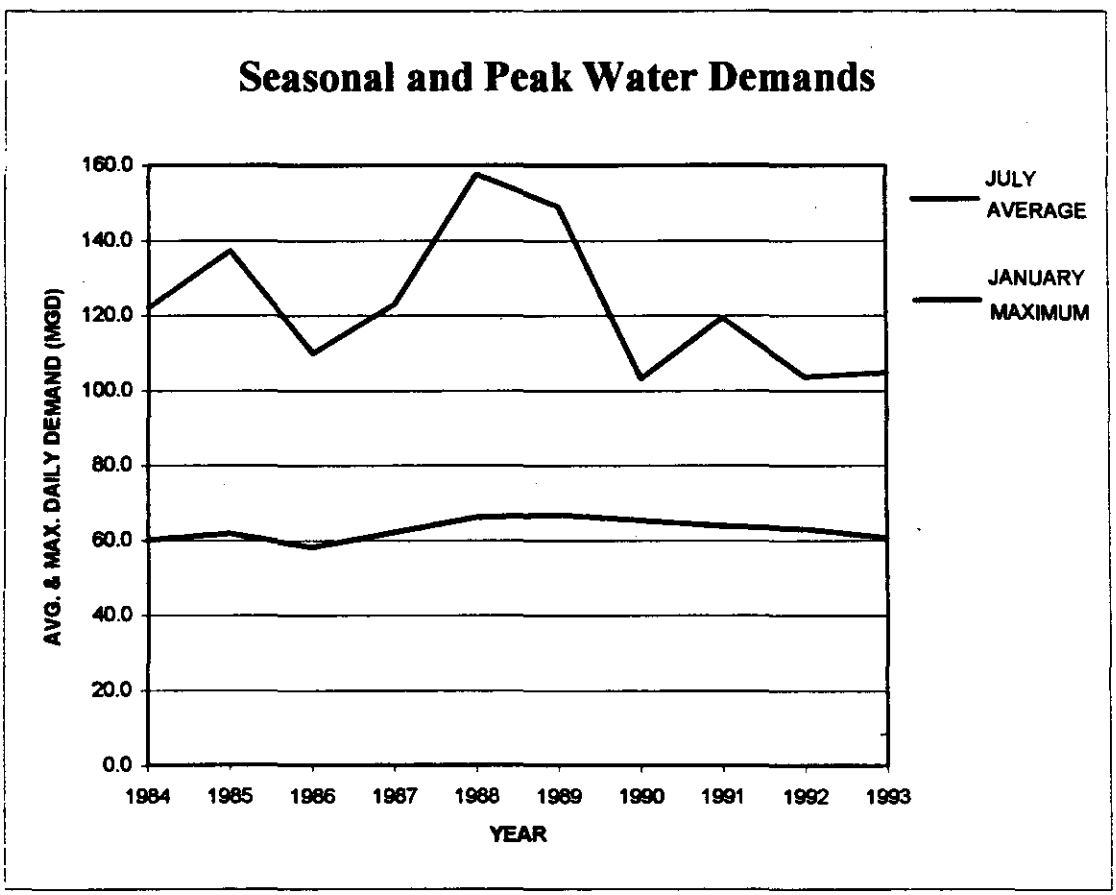
Table 17 provides a historical summary for seasonal average and peak demands over the last 10 years (1984 - 1993). The winter average daily demands are typically low and constant, since water usage is much lower in the winter. The winter standard deviation is 3 in compare to 15 for the summer.

The variation between average and maximum daily demands is also much less in the winter since water consumption is relatively constant (variation of 15 MGD compared to 32 MGD for the summer). The average daily winter data vs. the maximum daily summer data is plotted on Chart 17.

The ratio of maximum daily demand to annual average daily demand (defined as the Peaking Factor) has been a stable number of approximately 2.0, even during the 1988 drought. This indicates a reasonable baseline demand, as well as a properly-designed water system. A peaking factor in the Metro suburbs of 2.75 to 3.25 is seen as indicative of high summer use relative to winter use and indicates a generally over-designed water system. This will be discussed later in this report as it is related to the impact on the conservation potential.

Seasonal and Peak Water Demands

YEAR	MONTHLY AVERAGE DAILY DEMAND (MGD) JANUARY	JULY	MAXIMUM DAILY DEMAND (MGD) JANUARY	JULY
1984	60.3	91.4	74.6	122.2
1985	62.0	105.5	69.8	137.4
1986	58.3	81.7	65.2	110.1
1987	62.2	93.3	72.1	123.2
1988	66.3	116.5	79.3	157.8
1989	67.0	110.1	93.0	149.3
1990	65.4	78.0	96.8	103.3
1991	63.8	84.3	69.5	119.4
1992	63.1	75.6	85.0	103.8
1993	60.8	71.2	70.5	104.8



Note: The Maximum Amount of Water delivered to the Distribution System occurred on June 6, 1986 - 160,330,000 gallons

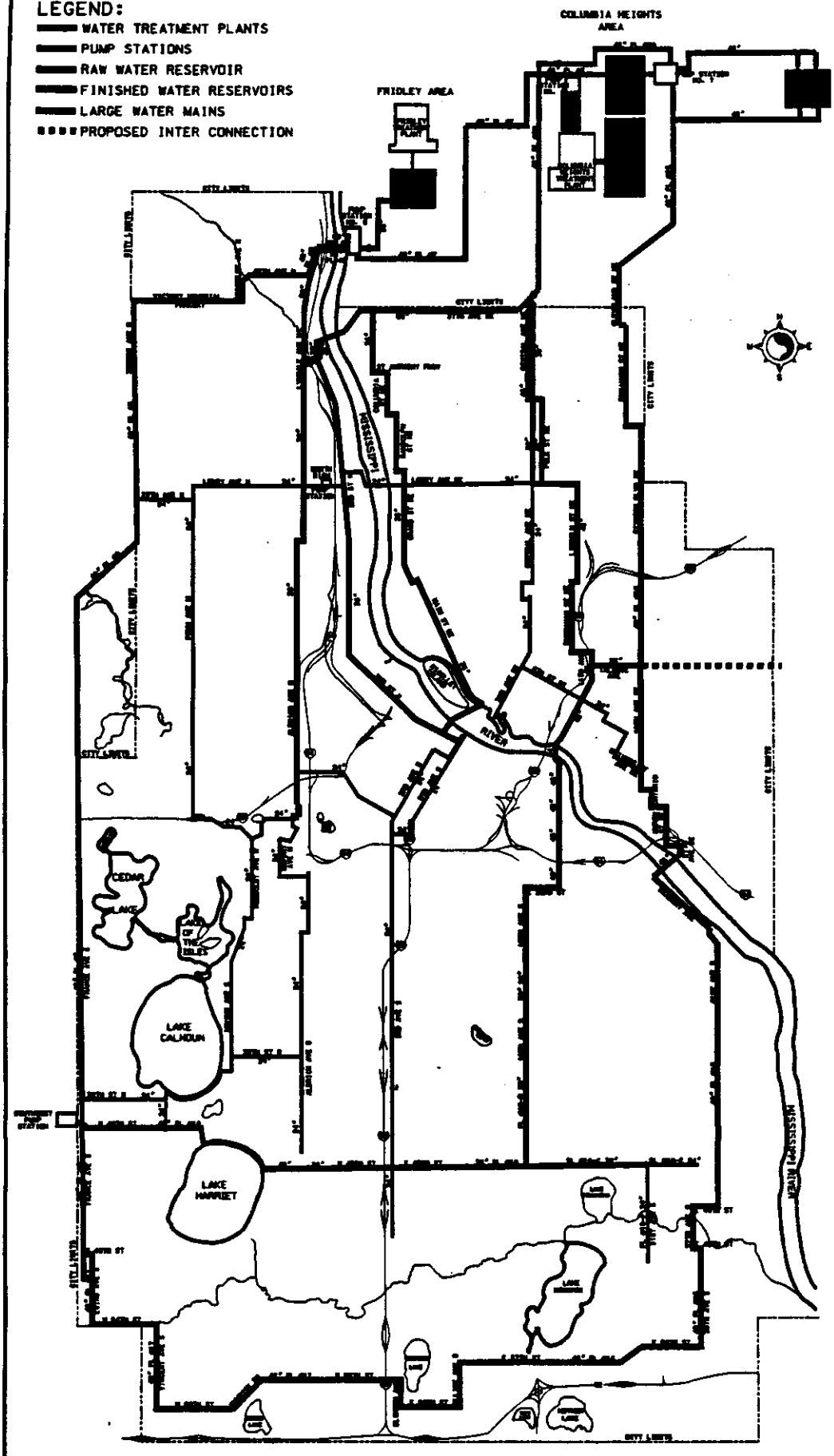
TABLE and CHART No.17

B. TREATMENT AND STORAGE CAPACITY

This section provides information on the Minneapolis Water Works treatment plants' capacity and the City of Minneapolis and its suburban customers to store water. A Water System Facilities Map is included (next page) which indicates the location of treatment plants, storage facilities, pumping stations and major transmission and distribution mains.

The following table lists all major Minneapolis Water Works facilities and the year they were built.

FACILITY	YEAR
75 million gallon Softened Water Reservoir	1897
Pump Station #4	1904
Columbia Heights Filtration Plant (CHFP)	1913
45 million gallon Finished Water Reservoir (Columbia Heights)	1913
Pump Station #5	1927
Fridley Filtration Plant (FFP)	1927
16 million gallon Finished Water Reservoir (Fridley)	1927
Fridley Softening Plant	1940
Pump Station #6	1940
Pump Station #7	1950
16 million gallon Finished Water Reservoir (Fridley)	1952
20 million gallon Finished Water Reservoir (Hilltop)	1952
20 million gallon Finished Water Reservoir (Hilltop)	1954
Dewatering Plant	1973
Pump Stations #1, #2 and #3	1973
10 million gallon Finished Water Reservoir (Columbia Heights)	1978
Pump Station #8	1978
L.O.T.P. and Permanganate Building	1995



CITY OF MINNEAPOLIS, MINNESOTA
WATER SYSTEM FACILITIES

1. Water Treatment Plant Capacity

The Minneapolis Water Works treatment uses lime softening prior to filtration. The following is a list of the treatment plants and their production capacities in million gallons daily (MGD).

Treatment Plant	Softening Plant	Fridley Filter Plant	C. H. Filter Plant
Design Capacity	180	135	80
Average Production	70	50	20
Firm Capacity	150	115	60

The total treatment capacity has been sufficient to meet the water needs of the City and its suburban customers. The maximum recorded daily demand was 160 MGD on June 6, 1988. An increase of the softening plant capacity is being studied; the total filtration capacity is 215 MGD, which is 20% higher than the softening capacity. Enhanced softening with corresponding softening plant addition is being studies relative to anticipated EPA Regulations.

2. Storage Capacity

The City has an in-ground storage structure (settling basin) for softened water storage with a design capacity of 75 million gallons. This settling basin has a useable capacity of 60 million gallons in case of an emergency.

The tables on the following page list the in-ground reservoirs and elevated tanks for the City of Minneapolis and its suburban customers.

Finished Water Storage
City of Minneapolis

Location	Volume (MG)	Year Built
Columbia Heights Treatment Plant Complex	45 10	1913 1976
Fridley Treatment Plant Complex	16 16	1927 1952
Hilltop Property (New Brighton)	40	1954
Washburn Tower Elevated Tank	1.5	1932

Finished Water Storage
Suburban Customers

In-Ground Reservoirs		
Customer	Location	Capacity
JWC	Golden Valley Crystal Crystal	9 9 10
Bloomington	32nd Street Reservoir @ Treatment Western	20 4 3

Elevated Tanks		
Customer	Location	Capacity
JWC	Golden Valley New Hope Medicine Lake	1½ ½ 1½
Bloomington	Portland Avenue Northwestern	1½ 1½
Columbia Heights	Columbia Heights	¼

The storage facilities have been adequate in providing the maximum recorded hourly demand experienced by the system of approximately 197 MGD at 8:00pm on June 6, 1988.

The existing useable storage capacity provides adequate protection, according to the Minnesota Water Works Operations Manual. The current recommendations listed in the manual state that the storage volume should be equal to the average daily demand for the system, excluding fire protection requirements.

The storage capacity may not be adequate during periods of emergencies or drought, even if conservation measures are implemented; this will be discussed later in the report.

The Minneapolis Water Works is planning to increase the finished water storage capacity to provide additional capacity for emergencies such as source contamination or plant outages, and to provide additional time off-line for repairs. This will require a plan review from the Minnesota Department of Health (MDH).

C. SOURCE OF WATER SUPPLY

The Minneapolis Water Works has a single supply source, namely the Mississippi River, with two intake systems in the Fridley Area (according to literature 73% of large cities have a single source). The main intakes are at P.S. #5, which was constructed in 1927 with an eight (8) pump layout. The existing pumps and their capacity are as follows:

Number of Pumps	Capacity Each
4	30 MGD
4	20 MGD

The design capacity of P.S. #5 intakes is 200 MGD while the actual capacity is approximately 180 MGD.

The firm capacity of the P.S. #5 intake system is 150 MGD. The firm capacity is the production capability with the largest pump out of service. Firm capacity meets the Water Works Operations Manual' standard exceeding average day demand of 70 MGD and total capacity exceeds maximum monthly day demand of 140 MGD.

The alternate intake system at Pump Station #4 is approximately 2 feet lower than the main intakes at P.S. #5. This system can be used during severe lowered elevation of the River. The alternate intakes are located south of P.S. #5 in Fridley, near the Camden Bridge. This system was constructed in 1904 with a four (4) pump layout. The existing pumps and their capacity are as follows:

Number of Pumps	Capacity Each
2	30 MGD
2	20 MGD

The design capacity of P.S. #4 intakes is 100 MGD, while the actual capacity is approximately 80 MGD.

The following tables list the intakes information including pump number, age and capacity; motor starter year and horsepower.

MINNEAPOLIS WATER WORKS' MISSISSIPPI RIVER INTAKES

Main Intake at P.S. #5					
Pump Number	Year Installed	Horsepower (hp)	Motor Starter Year	Capacity (GPM)	Design Capacity (MGD)
16	1927	200	1981	13,900	20
17	1927	200	1981	13,900	20
18	1927	200	1981	13,900	20
24	1931	350	1981	20,800	30
26	1939	350	1981	20,800	30
27	1939	350	1981	20,800	30
37	1970	250	1990*	13,900	20
41	1970	350	1990*	20,800	30

* new motor

Alternate Intakes - P.S. #4					
Pump Number	Year Installed	Horsepower (hp)	Motor Starter Year	Capacity (GPM)	Design Capacity (MGD)
14	1918	1800	1982	20,800	30
15	1921	1800	1982	20,800	30
28	1938	1200	1982	13,900	20
35	1959	1250	1982	13,900	20

The average annual production for the last 10 years was 25,000 MGY (25 Billion Gallons). Annual withdrawal is largely dependent upon weather conditions and consumer's changing demands. The annual range varied from 22 billion gallons (10% lower than average) to 30 billion gallons (20% higher than average).

The River intakes are located in the pool created by the Upper St. Anthony Falls (USAF) Dam. The main intakes are approximately five (5) miles upstream from the USAF Lock. The flow characteristics of the River have been thoroughly documented in the U.S. Army Corps of Engineers' St. Paul District's Reports.

Under extreme emergency conditions (zero flow in the River) the Minneapolis Water Works has an estimated maximum 20-day supply of water, if the alternate intakes at P.S. #4 are used to withdraw from the pool of the USAF Dam.

In response to the drought in 1988, the St. Paul District, U.S. Army Corps of Engineers reviewed the low flow portion of its water control plan for the Mississippi Headwaters Lakes projects. The review conclusions and their impact on the Minneapolis Water Works supply source is addressed later in this report.

A Section 22 study was also completed with the Corps of Engineers and USGS relating to 1988's low flow conditions.

In terms of water quality, the Mississippi River has been a source of water of reasonably consistent quality. The variation in water temperature, turbidity and color are handled by adjustments to the treatment process. Incidents of chemical spills will be addressed later in this report.

The raw water quality parameters, their variations and averages for the last five years are listed in the following table.

RAW WATER QUALITY PARAMETERS

PARAMETER	Average	Maximum	Minimum
Temperature (°C)	12	26	1
Turbidity (NTU)	8.6	27	2.2
Threshold (odor)	37	80	3
Color	42	81	23
pH	8.31	8.70	7.84
Total Hardness (ppm)	201	265	142
Alkalinity (ppm)	172	226.5	127.5
HCO3 (ppm)	162	219	113
Calcium Hardness (ppm)	135	170	92
Fluoride (ppm)	0.18	0.28	0.10

D. ADEQUACY OF SYSTEM TO SUPPLY DEMAND

This section addresses the adequacy of the existing water source and the water supply system components to sustain current and projected demands. The treatment, storage and pumping firm capacities meet the recommendations listed in the Minnesota Water Works Operations Manual.

1. Historic Water Levels and Flow Data

The Mississippi River low flow discharge figures (cfs) at Anoka are listed in Table 18. These low flow frequency characteristics data was taken from USGS Water Resources Investigation Report 86-4353. These low flow discharge figures are also plotted on Chart 18.

The statistically projected 100-year, 1-day low flow rate in the Mississippi River is approximately 500cfs. The 1-day low flow is of importance to the City of Minneapolis because of the limited water storage available in its system.

According to Metro Council's 1988 Short-Term Water Supply Plan, the historical flows at Anoka were:

Flow (cfs)	Flow (MGD)	Date
602	388	9/10/34
529	340	8/29/76
842	542	7/30/88

The St. Paul District Corps of Engineers released its Mississippi Headwaters Low Flow Review in October 1990 and concluded that the routine low flow discharged are adequate for present conditions for all its 6 dams at the Mississippi Headwater Lakes project and low flow conditions. The report was completed in response to concerns raised during the 1988 drought and low flows on the Mississippi River.

One of the conclusions of this report is that the available information indicates no overriding technical reason to permanently increase the specific discharge figures for the existing low flow plan. The plan apparently served reasonably well during low flow conditions in 1977 and 1988.

In the event that flow conditions lower than 1977 or 1988 exist and human health and safety would be endangered due to insufficient potable water, the District formulated plans for releasing emergency supplemental flows.

The Corps of Engineers has concluded that an emergency would exist if the National Weather Service's 30-day outlook predicted that Mississippi River discharges at Anoka would drop below 554 cfs. Under those conditions, the St. Paul District Engineer would temporarily meet the emergency with additional discharges from one or more of headwaters project lakes. Under this drought condition, conservation measures need to be implemented to reduce demand; which will be discussed later in this report.

Mississippi River Low Flow Frequency Characteristic Data at Anoka

PERIOD	2 YEARS	5 YEARS	10 YEARS	20 YEARS	50 YEARS	100 YEARS
30 DAYS	2910	1790	1340	1030	752	601
7 DAYS	2510	1570	1180	923	683	552
1 DAY	2030	1280	990	791	608	506

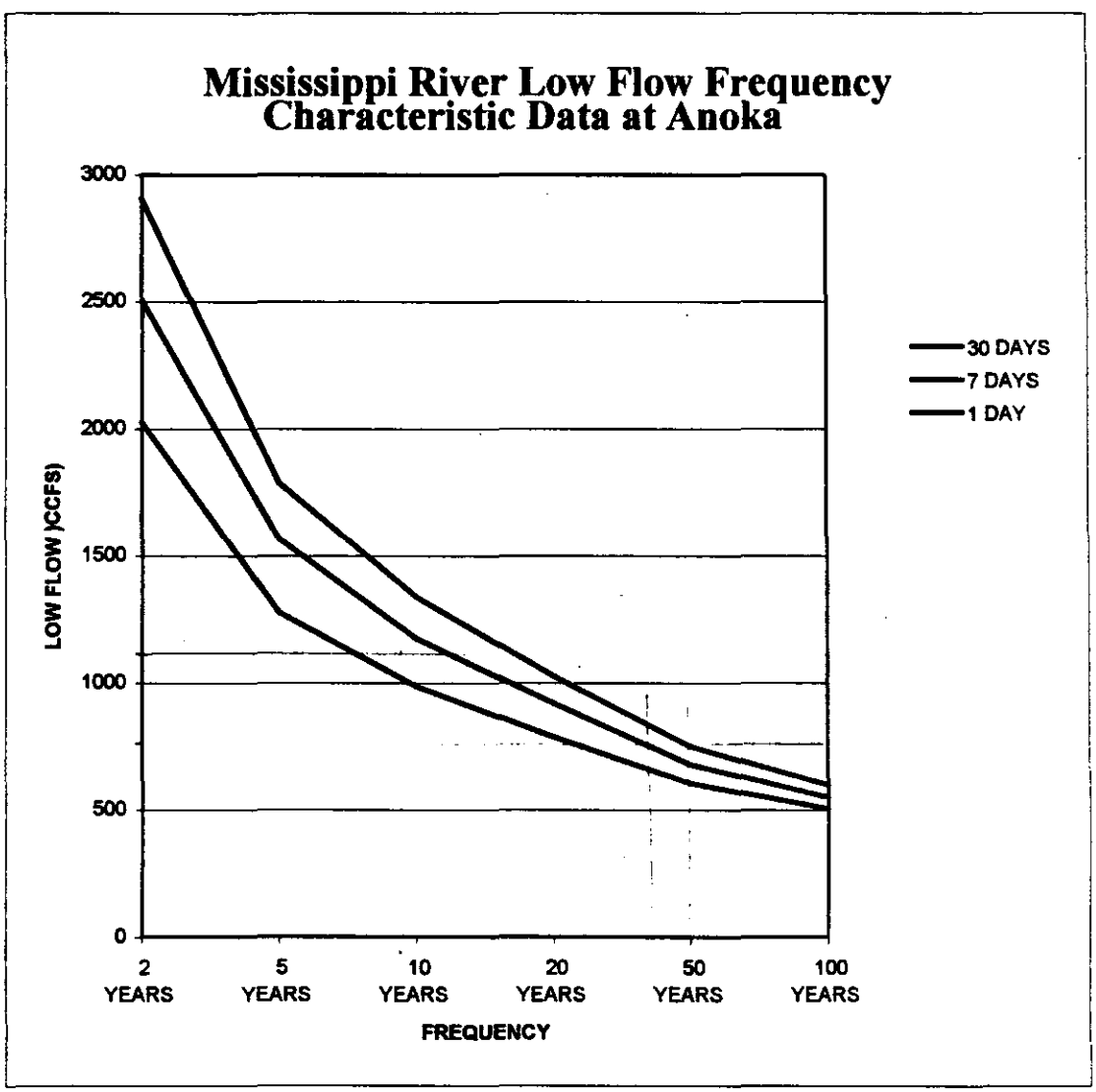


TABLE and CHART No.18

2. Adequacy of Resource to Sustain Current and Projected Demands

As can be seen from the preceding discussion, River flows have never dropped to a point where withdrawal was threatened. However, the possibility of contamination of the supply could have similar results in terms of supply shortage. This will be discussed in Part II, Emergency Planning.

In terms of water levels, the Minneapolis Water Works system is not vulnerable if water levels on the Mississippi River drop so low, which was previously thought to be a threat that the intakes could not have functioned. This is according to Section 22 Report"Water Resources Planning Assistance in Support of Minnesota" produced by the St. Paul Corps of Engineers and other agencies.

At the critical low flow, the River elevation would still be high enough to provide sufficient submergence of the Minneapolis intakes for it to function. Additionally, relating to safe intake operation during extended low flow, the occurrence of elevation sags at the lock during lockage would be insignificant at a distance of 2.4 miles. The closest Minneapolis intake is 4.4 miles upstream of the lock.

Table 19 lists Metro Council's projected population growth in Minneapolis and its suburban customers. As mentioned earlier in the report, system demand has been and will continue to be relatively stable or will slightly increase (2% City; 5% Suburbs). Population forecast data is also presented on Chart 19.

In conclusion, based on historic water levels and low flow data, the water source and intake system are adequate to meet all existing and foreseen future demands, based on the projected population growth.

3. Adequacy of Supply System to Sustain Current & Projected Demands

The existing water treatment, storage and distribution systems are adequate to meet both current and projected service area population demands. Population forecasts were based on Metro Council's Sept. 1994 reports. These figures will be re-evaluated after the year 2000 Census.

a. Water Treatment Plants

The Minneapolis Water Works has two treatment complexes. The first one was built in 1913 at 4500 Reservoir Blvd. in Columbia Heights with an 80 MGD capacity. The second one was built in 1927 at 4500 Marshall Street NE in Fridley with a 135 MGD capacity. In 1940, a Softening Plant was built and a Dewatering Facility was added in 1973, both at the Fridley complex. The plant capacities should be sufficient to sustain current and projected demands. Plant upgrades are discussed in item 4 below.

Population Forecasts

YEAR	BLOOMINGTON	COL. HTS.	CRYSTAL	EDINA	GOLDEN VALLEY	HILLTOP	NEW HOPE	MINNEAPOLIS
1990	86,335	18,910	23,788	46,070	20,971	749	21,853	368,383
2000	91,500	19,600	23,800	47,000	21,200	750	23,300	370,500
2010	97,500	19,600	24,300	48,000	21,500	750	24,200	373,000
2020	102,000	19,600	24,300	48,500	21,500	750	24,500	375,000

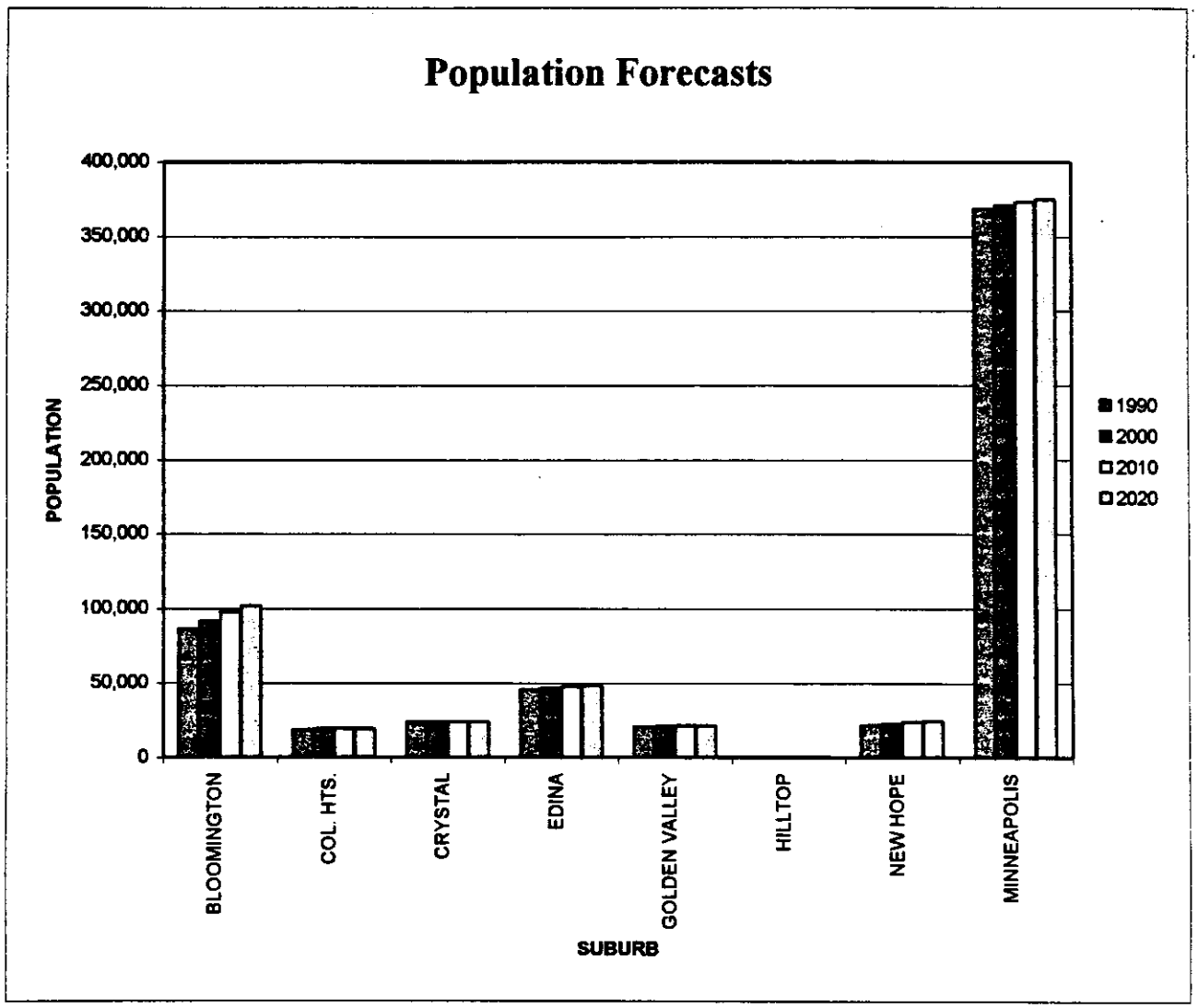


TABLE and CHART No.19

b. Storage Facilities

Due to demand management (large customers draw at off-peak hours) and an adequate storage capacity. To date, the Minneapolis Water Works has not had difficulty meeting demands. The Minneapolis Water Works has plans to build new finished water reservoirs for added capacity in case of plant outages, source emergencies and to improve the ability for maintenance and repair. This should also help, along with conservation measures when necessary, to ease the system demand peaks. The City has a usable capacity of one (1) day of finished water and is considering increasing it to a three-day capacity.

c. Distribution System

The City of Minneapolis has a pipe loop 48-inch diameter bordering the City which provides for a perimeter water transmission system from the treatment plant north of the City (refer to attached map in Section B). There are five (5) 36-inch to 48-inch mains that bring the water to the City's interior, while numerous 24-inch mains distribute the water.

There are approximately 1,000 miles of pipe in the Minneapolis distribution system, ranging from 6-inch to 48-inch diameter along with an elevated tank and three booster pump stations for high service areas. The distribution system has 14 thousand valves and 8 thousand hydrants and a great deal of redundancy for re-routing water in case of local emergencies.

The Minneapolis Water Works has been replacing older watermains to reduce breaks. This has been coordinated with the City's 30-year residential paving program which is near completion. The Minneapolis Water Works has also just completed cleaning and cement mortar lining all of the major large mains, including the dual River-Crossings which carry water from the treatment plants to areas west of the Mississippi River.

The system has experienced a number of leaks and breaks over the years, but nothing has interrupted service for more than several hours. The City of Minneapolis experiences 26 main breaks per year, which is the lowest among similar large cities. The Minneapolis Water Works also started a program for cleaning and lining small water mains. The impact of minimizing water main breaks and repairing leaks will be discussed in both Emergency and Conservation Planning sections of this report. Overall, the distribution system is adequate to sustain current and projected demands.

4. Plans to Expand or Modify the System

The Minneapolis Water Works has a Ten-Year Plan (1996 to 2005) for potential expansions and modifications of the water system due to: expected future state and federal mandates, need for upgrade or replacement of existing aging facilities and equipment and need to increase treatment dependability while decreasing the likelihood of emergencies. The following table lists the areas of improvements and their related projects.

Minneapolis Water Works' Ten-Year Plan,
Major Capital Improvement Projects

Area of Improvement	Related Projects	Funding Required*	Schedule **
Pollution Control	Dewatering Plant Expansion	$11 million	2005
Alternate Water Supply	Mpls. Chain of Lakes St. Paul Interconnection	$24 million $10 million	1999 1998
Treatment ***	Pre-Sedimentation Basin Softening and Coag Basins Expansion at Fridley	$6 million $11 million	2003 2000
Emergency	Finished water storage	$29 million	1997
Pumping	Feed-Line Redundancy	$2 million	1996

* Budget estimates

** Approximate schedule

*** A feasibility study of the treatment scheme and processes is underway to determine needed upgrades. Repairs and replacement of worn equipment will take place on a regular schedule (preventive) and on an as-needed basis.

E. SUMMARY OF DATA

The Service Area Population is relatively stable with approximately 2% growth in Minneapolis and less than 4% overall growth over the next 25 years, since first-tier suburbs have few areas left to develop. There have been little or no increases in the total water production or in the total number of Minneapolis service connections.

The low average residential per capita use of 60-70 gallons per capita daily (gcd) is indicative of low residential outdoor use. Newer communities that are establishing new lawns have higher residential per capita consumptions.

The low peaking factor (ratio of maximum daily demand-to-annual average daily demand) of 2.0 is indicative of a reasonable baseline demand. Non-residential customers add mostly to the base and not the peak demand. This is relevant to conservation potential which will be discussed later in the report.

The water source and intakes are adequate in terms of meeting existing average and peak demands, as well as future projected demands. There are alternate intakes in case of an outage in the main intake system. The vulnerability of contamination, due to a single water source, will be discussed in the Emergency Planning portion (Part II) of this report. The supply shortage due to drought will be addressed in the Conservation Plan (Part III) of this report.

Treatment plants have sufficient capacities to sustain current and projected demands. Major upgrades in treatment areas will be prioritized by late-1996, when the feasibility study in completed addressing anticipated state and federal regulations. Increase finished water storage capacities is being planned to protect against emergencies.

The water distribution system is adequate to sustain current and projected demands with no major upgrades.

PART II - WATER EMERGENCY PLANNING

During periods of limited water supplies, the Minneapolis Water Works, as a public water supplier, is required to allocate water based on the priorities established in Minnesota Statutes 103G.261.

First Priority Domestic water supply, excluding industrial and commercial uses of municipal water supply, and use for power production that meets contingency requirements.

Second Priority Water uses involving consumption of less than 10,000 gallons per day.

Third Priority Agricultural irrigation and processing of agricultural products.

Fourth Priority Power production in excess of the use provided for in the contingency plan under first priority.

Fifth Priority Uses, other than agricultural irrigation, processing of agricultural products, and power production.

Sixth Priority Non-essential uses. These uses are defined by Minnesota Statutes 103G.291 as lawn sprinkling, vehicle washing, golf course and park irrigation, and other non-essential uses.

While initial emergency responses may include actions to augment supplies and/or reduce demands, severe water shortages would require water allocations in accordance with the above-listed statute priorities.

The following Emergency Response Procedures are a part of an overall emergency plan. Additional information relating to emergency planning is available in the following Appendices:

- **Appendix C**, Water Defense Network for Supply Protection Measures;
- **Appendix D**, Emergency Assessment for the Major Water Supply Components;
- **Appendix E**, M.W.W. Emergency Response Plan for Hazardous Incidents.

A. EMERGENCY TELEPHONE LIST

The tables on the next two(2) pages list the Minneapolis Water Works' Emergency contacts, City personnel, contacts in adjacent counties and cities, as well as appropriate local, state and federal emergency contacts.

Minneapolis Water Works		Day Phone	Off-Hours
4.	**Pump Station #5 Dispatcher**	661-4949	661-4949
7.	**East Side Yard Dispatcher**	673-5600	673-5600
2.	**Superintendent of Operations**	661-4915	661-4949
3.	**Lab Supervisor**	661-4923	530-8045
5.	**Pumping Supervisor**	661-4947	538-1752
6.	**Assistant Pumping Supervisor**	661-4946	661-4949
1.	**Director, Water Works**	673-2418	661-4949
8.	**Superintendent of Distribution**	673-5601	673-5600
9.	**General Foreman/Distribution Maintenance**	673-5600	673-5600
10.	**Superintendent, Plant Maintenance**	661-4937	636-3519
11.	**General Foreman, Plant Maintenance**	661-4955	539-5657
12.	**Superintendent, Planning & Design**	661-4902	661-4949

City of Minneapolis	Day Phone	Off-Hours Phone
City Engineer/Director, Public Works	673-2443	673-3000
Emergency Preparedness	673-2870	348-7210
Health Department	673-2301	673-3000
POLICE and FIRE	911	911

Suburban Customers	Phone Number
Bloomington	948-8731 or 8774
Columbia Heights	782-2882 or 2891
Crystal	531-1160 or 1166
Edina	927-8865
Golden Valley	593-8030 or 8075
Hilltop	571-2023
New Hope	533-4823

Adjacent Communities	Phone Number
Brooklyn Center	569-3390
Fridley	427-1212
Lauderdale	631-0300
New Brighton	631-3736
Richfield	861-9165
Robbinsdale	537-4534
Roseville	490-2200
Saint Anthony	789-8881
St. Louis Park	924-2557
St. Paul	489-1600

Counties	Phone Number
Anoka County	421-4760
Dakota County	437-4760
Hennepin County	348-3000
Ramsey County	482-5238

State and Federal Agencies	Phone Number
U.S. Army Corps of Engineers	290-5200
Minnesota Pollution Control Agency	296-6300
Minn. Department of Health	623-5000
Department of Natural Resources	296-6157
Metropolitan Council	291-6359
State Duty Officer	649-5451
National Response Center	1 (800) 424-8802

The following Table is an Emergency Call-Up List. Listing in ranking order are the names of Minneapolis Water Works personnel responsible for making decisions in specific emergency situations. The first person on the list shall respond; if necessary, contact the following person to notify of any emergency. Other appropriate personnel may be contacted to respond to the emergency.

Emergency Situation	Contact	Job Title	Day Phone	Eve Phone
Source Water	Pump Station #5	Dispatcher (several)	661-4949	661-4949
	Bob Bauer	Pumping Supervisor	661-4947	538-1752
	Larry Cole	Lab Supervisor	661-4923	530-8045
	Adam Kramer	Superintendent of Operations	661-4915	538-0342
Treatment and Quality	Plants	Plant Operator (several)	Plants	Plants
	Plants	Plant Supervisor (several)	Plants	Plants
	Larry Cole	Lab Supervisor	661-4923	530-8045
	Adam Kramer	Superintendent of Operations	661-4915	538-0342
		Fridley Softening Plant	661-4918	661-4918
		Columbia Heights Filter Plant	661-4968	661-4968
		Fridley Filter Plant	661-4930	661-4930
		Dewatering Plant	661-4960	661-4960
Storage	Bob Bauer	Pumping Supervisor	661-4947	538-1752
	Adam Kramer	Superintendent of Operations	661-4915	538-0342
Pressure and Pumping	Bob Bauer	Pumping Supervisor	661-4947	538-1752
	Adam Kramer	Superintendent of Operations	661-4915	538-0342
	Harold Pulju	Superintendent Distribution	673-5601	673-5600
Distribution	East Side Yard	Dispatcher (several)	673-5600	673-5600
	David Metty	Foreman Distribution Maintenance	673-5600	673-5600
	Harold Pulju	Superintendent Distribution	673-5601	673-5600
Maintenance	Jim Heglund	Foreman Plant Maintenance	661-4955	539-5657
	Stu Kirschbaum	Superintendent Plant Maintenance	661-4937	539-5661

B. CURRENT WATER SOURCES AND SERVICE AREA

The Emergency Response Procedures include detailed information on the current water source and service area. For easy reference, information is included in **Appendix A.**

1. Description of Surface Water Source

See Section I-C Source of Water Supply for description of surface water source. **Appendix A-1** includes the following:

a. General Map - Showing Water Basin
b. Location Map - Showing MWW and Metro Area
c. Intake System Profile - Showing river and the Intakes' relevant info.
d. Pump Station Table - Showing Motors and Pumps information
e. Raw Water Table - Showing Water Quality Parameters

2. Service Area

See Part I, Water Supply System Description and Evaluation for description of the Service Area. **Appendix A-2** includes the following:

a. Service Area Map - Showing Minneapolis and its Suburban Customers
b. System Map - Showing water all major System Facilities and Supply Lines
c. Treatment Facilities Map - Showing layout of Fridley Treatment Complex
d. Treatment Facilities Map - Showing layout of Col. Hts. Treatment Complex
e. Treatment Flow Diagram - Showing Treatment Process' Steps

C. PROCEDURE FOR AUGMENTING WATER SUPPLIES

The Minneapolis Water Works uses water from the Mississippi River as a single source to supply the City of Minneapolis, Joint Water Commission (Cities of Golden Valley, Crystal, New Hope) Columbia Heights and Hilltop, as well as parts of Bloomington and Edina Morningside.

The City of Minneapolis has no two-way inter-connection with any of its suburban customers. The City has enforceable wholesale agreements (water supply contracts) with each of the above public water suppliers.

1. Interconnections With Adjacent Communities

Interconnections with adjacent communities has been reviewed for use as an emergency or supplemental water supply. However, supply size, pressure and water quality differences prohibit potential interconnection with all adjacent communities except St. Paul. Minneapolis uses lime softening in their treatment process. All adjacent or non-distant public water suppliers, with the exception of Bloomington and St. Paul do not use softening. That will cause water quality problems.

Bloomington has very low excess capacity. A limited localized supply can be achieved by interconnecting with the City of Bloomington. Supply would be limited by Bloomington's system's lower capacity in comparison to Minneapolis and will only serve an isolated area near south of the City.

An interconnection with St. Paul Water Utility has been investigated, but not yet fully studied. The St. Paul Water Treatment Plant has a peak capacity of 140 MGD and is supplied by the Mississippi River, the Vadnais Chain of Lakes, four (4) deep wells and the Rice Creek Watershed.

The two cities have finished water of similar quality which would cause fewer difficulties, but the two systems operate at different pressures which may necessitate construction of a pumping station. Minneapolis has a pipe loop system 48-inch diameter bordering the City that provides higher pressure water than the St. Paul system. St. Paul has a tree configuration system where the edges of the service area are served by small mains. A pumping station would have to be installed at the St. Paul Filtration Plant to direct flow to Minneapolis and to boost pressures to the higher Minneapolis system pressure. The proposed interconnection is shown on a map in **Appendix B-2.**

The Minneapolis/St. Paul interconnection could be very useful in providing a baseline supply to both cities for firefighting, basic sanitation and domestic needs in case of an emergency. It could also help maintain reserves in both cities for short scheduled maintenance shut-downs. The St. Paul supply system might need improvements and reserve capacity of the St. Paul system might need to be expanded in order for it to meet future demands. Minneapolis has approved and funded a portion of this study.

2. Conjunctive Use of Surface and Ground Waters

In 1987, the U.S. Geological Survey (USGS) in cooperation with the City of Minneapolis, began a study to evaluate the ground-water-flow system underlaying and near the Minneapolis Water Works treatment plant in Fridley, as an alternate or supplement to the current surface water source. The study examined the

effects of ground water withdrawals on flow in the ground water system and the Mississippi River near the plant and, in lesser detail, a part of the seven-county Twin Cities Metropolitan Area. A map showing this information is included in **Appendix B-1**.

The report, published in 1990, describes the construction, calibration and application of a numerical ground-water-flow model that simulates the aquifer system, consisting of Prairie du Chien-Jordan aquifer and overlaying units in the study area.

The numerical ground-water-flow model was developed to help:

- Estimate the hydrologic response of the aquifer system to increased ground water withdrawals.

- Determine the hydraulic connection between the Prairie du Chien-Jordan aquifer, overlaying aquifer units and the Mississippi River.

- Estimate the effect of groundwater withdrawals on water levels in wells and the extent to which these withdrawals induce flow from areas of known ground water contamination.

The study concluded that "Contaminated water from areas of known contamination could move towards depressions in the potentiometric surfaces of the confined-drift and the St. Peter aquifers and Prairie du Chien-Jordan aquifers if additional ground water were withdrawn near the Minneapolis Water Works. The presence of the bedrock valley beneath the Minneapolis Water Works and discontinuities in the upper-drift confining unit create the potential for the downward movement of contaminants from the surficial sand and gravel deposits to the underlaying aquifers." A copy of the report's Summary and Conclusions is included in **Appendix B-1**.

Currently, there are no high-capacity wells that could be hooked up to the City water supply system in the event of a water emergency. In addition, direct injection of high pressure un-softened water into water mains would cause numerous quality and pressure-related problems. However, the existing air conditioning wells, which must be phased out in the next 15 years due to laws passed in 1989 Legislature, could be used to provide an emergency supply or augment existing source in case of a supply shortage.

The group of wells in the Downtown Minneapolis Area could supply up to 45 MGD. This is the sum of appropriations that are currently allowed by DNR Permits which are identified on a map in **Appendix B-2**. This map also shows a route of a pipeline to collect the water from the Downtown Area and a pump station to pump it to the Fridley Plant for softening and treatment.

This option would require the DNR to allow the air conditioning wells to remain active and approvals from the MN Dept. of Health for re-using the water. Issues of liability, owner access, potential contamination of the water and its impact on health and reliability would make this option too complicated to implement.

3. Alternative Sources of Water

In response to the 1988 drought, the Minneapolis Water Works began a five(5)-phase study with a Consulting Engineering Firm specialized in the water supply field to formulate a range of possible water emergency supply alternatives for consideration. These five(5) phases are:

Phase I- A review of past studies and a listing of all previously suggested alternatives

Phase II - Public input on the first phase, including additional supply alternatives

Phase III - Further attempts to formulate innovative and imaginative solutions to water supply problems

Phase IV - Preliminary study and screening of alternatives and selection of alternative for further study

Phase V - Analysis of the selected alternatives in more detail to determine their comparative feasibility

The report, completed in September 1991, described the results of each phase. Phase V provided conclusions and recommendations on a group of reasonable water supply alternatives for further study; a copy of which is attached in **Appendix B-2**.

Four possible requirements for reserve raw water capacity were identified. The **first** requirement was for short-term spill or contingency. This appears to be the most pressing and realistic possibility. Based on past spill history and projected travel times, it appears that a fourteen-day supply at 80 MGD would be more than adequate for this purpose.

The **second** requirement was for long-term spill or contingency. This could include severe contamination of the River due to continuing releases from upstream sources. This was not well defined; further study of the upstream watershed was necessary to determine the possible magnitude of such "worst-case" contamination. For purposes of the study, a thirty-day reserve was believed to satisfy almost any spill condition.

The **third** requirement was a reserve for drought conditions. It was shown that there is no absolute need for a drought reserve, since even the lowest recorded River flows have been more than adequate to supply Minneapolis and St. Paul. However, a reserve capacity for drought could serve three purposes:

- To assist other agencies in maintaining flows in the River for maintenance of fish and wildlife habitat;

- To assist the Metropolitan Waste Control Commission by supplying dilution water for the Metro Treatment Plant;

- To reduce public perceptions of shortages of drinking water and assist in arriving at rational water use decisions during drought conditions.

For these purposes, a supply of 80 MGD for 30 days would be optimal, although smaller reserves might assist somewhat in these goals.

The **fourth** requirement for reserve capacity was to help in the event of a plant emergency or shut-down. Such shut-downs could range from minor shut-downs for maintenance to major catastrophes caused by natural disaster striking the Water Works. in this event, a thirty-day supply would be desirable. However, the reserve would have to be a finished water reserve since the plant would not be available to treat raw water.

The study identified ten (10) potential options for the City to pursue. A copy of the Barr Report Recommendations is attached in **Appendix A-3**. The Minneapolis Water Works has since narrowed the consideration and selection process to a combination of the following three (3) potential options:

First - Create Additional Finished Water Reservoir Capacity

Second - Interconnect Minneapolis and St. Paul water systems

Third - Pump from The River to Store in Minneapolis Chain of Lakes

D. DEMAND REDUCTION PROCEDURES

1. Demand Reduction Potential

Information on water demand (from Part I of this report) was used to evaluate the potential for demand reduction from each water usage category. Based on data from the last three (3) years for the City of Minneapolis and the most recent data from it's suburbs, the following assumptions were made:

- Suburban customers' water use represents an average of 22% of the total Minneapolis Water Works' production

- For residential use, the winter per capita figure was considered as the baseline for essential household use.

- The other data was taken from the 1992 breakdown of water use by consumers as that year was considered a typical year, in terms of water use (temperatures and precipitation).

- The average residential use represents 35% of the total City water use (excluding the suburbs).

- Large accounts consume 40% of the total non-residential water use.

- The City included the institutional water use (hospitals, schools, nursing homes and day care centers) and hotels and apartment complexes as essential domestic use.

- The total of water volumes for the priority categories equals the average demand for the system

Data on water use by statutory priority category is provided in the following table:

* Demand Priority	Demand (MGD)	Cumulative Demand (MGD)
1	30	30
2	12	42
3	(1.0)	43
4	(0.0)	43
5	5.0	48
6	7.5	55.5 **

* Demand priority is based on water allocation priorities established in Minnesota Statutes 103G.261 (also listed at the beginning of this chapter, Part II)

** Total demand is equal to the average daily demand for the City of Minneapolis only

The total water use for the Minneapolis Water Works system, based on the best available information for the suburban customers, is provided in the following table.

* Demand Priority	Demand (MGD)	Cumulative Demand (MGD)
1	37	37
2	16	53
3	(1.0)	54
4	(0.0)	54
5	6.5	60.5
6	9.0	70 ***

*** Total demand is equal to the average daily demand for the Minneapolis Water Works Service Area.

2. Short-Term Demand Reduction Procedures

In the event of a water shortage, the City of Minneapolis has a number of means available to adopt in order to achieve short-term reductions in water demands.

Initial reduction in water usage can be encouraged by requesting voluntary actions from all water consumers. Procedures for more stringent reduction measures are available for use during critical water deficiencies (refer to City Ordinance in Sec. II-G regarding declaration of emergency, enforcement and violation penalty).

Stage 1

Voluntary action can be requested during the early stages of any supply shortage or an emergency. This can be achieved by including informational flyers on water conservation with the monthly water bills.

Stage 2

This level can be achieved by a stronger appeal to all consumers to reduce water usage. Press releases in newspapers and radio and televisions announcements are effective ways to achieve demand reduction.

Stage 3

During Stage 3 phase consumption reduction measures can be taken to restrict non-essential water use (priority six). Odd-even watering ban and car-washing by individuals are just a few examples to reduce residential summer peak demands.

Stage 4

At this phase, a complete ban on all non-essential priorities six uses can be implemented. Total sprinkling ban and car-washing can be prohibited. Supplies to priority five can be reduced.

Stage 5

At this stage of an emergency, the City can impose a total water ban on any outside use. Priority five uses can be restricted to their base winter demand levels. In addition, residential water users can be urged to use water only for essential domestic purposes such as drinking, cooking, basic sanitation.

E. PROCEDURE FOR WATER ALLOCATION

Water will be allocated in accordance with statutory water use priorities during periods of limited water supplies. The City of Minneapolis will allocate water based on the priorities established in Minnesota Statutes 103G.261. These priorities were listed earlier in the beginning of Part II of this report.

F. TRIGGERS FOR IMPLEMENTING PLAN COMPONENTS

In implementing emergency planning response procedures, the supply augmentation, demand reduction and water allocation procedures shall all be considered.

1. Plan Activation for Severe Sudden Emergency

Severe Sudden Emergency can take place if water supply systems (source, intakes, treatment, reservoirs, pumping, transmission or distribution systems) cannot supply baseline demand. River spills, power failure, treatment plant outage, reservoir contamination or major watermain breaks could create such a severe sudden emergency situation. This can affect the whole water supply system or part(s) of the system.

Additional restriction (coordinated with the MDH, Boil Water, etc.) may apply with Mandatory Restriction (phase 5).

2. Plan Activation for a Drought Condition Emergency

Metropolitan Area short-term water supply plan (Metro Council, February 1990 - Publication No. 590-90-035) outlined the criteria and established the triggers for implementing emergency responses for drought conditions. The basis for Metro Area Plan of 1990 (MAP-1990) was river flows at the Anoka dam.

The Metropolitan Council Short-Term Water Supply Plan, published in February 1990, determined a minimum flow value of 554 for the Mississippi River at Anoka in order to meet critical water needs.

The minimum flow value is based on 132 cfs (85 MGD) minimum water use required by the Minneapolis Water Works. This was based on 1988 usage with mandatory conservation measures in place. Other critical use requirements include 350 cfs minimum navigation requirement by Corp of Engineers St. Paul District for one lockage per hour at USAF lock, 70 cfs minimum water use requirement by St. Paul Water Utility and 2 cfs consumptive use by Northern States Power (NSP) Company.

The Area Drought Coordination Matrix was initially developed by the State Drought Task Force convened by the Governor, and later refined by the Minn. DNR - Division of Waters and the Corps of Engineers following the drought of 1988, of which a copy is included on the next page. The drought matrix provides the framework for cooperative actions by State, Federal and local government in response to increasingly serious drought conditions.

For the Mississippi River 72-hour flow at Anoka, the MAP-90 established the following triggers and actions required:

a. At 1200 cfs at Anoka; Institute Voluntary Conservation Program in order to reduce demand on the River and begin coordination with St. Paul Water Utility to optimize River withdrawal.

b. At 1000 cfs at Anoka; Institute Sprinkling Restrictions to reduce demand (This is the 7Q10).

c. At 750 cfs at Anoka; Institute Mandatory Conservation Program to reduce demand to 85 MGD.

d. At 554 cfs at Anoka; Corps of Engineers release water and Minneapolis Water Works coordinate with Drought Task Force.

The potential for water availability during the onset of a drought are almost impossible to predict. Significant increases in demand should be balanced with preventive measures to conserve supplies in the event of prolonged drought conditions.

G. ENFORCEMENT

Minnesota Statutes Chapter 462.357, subdivision 1 provides cities with the authority to undertake water supply conservation planning measures. The City of Minneapolis has, in place, an Ordinance that shall allow the City Engineer to declare an emergency during critical water deficiencies *"caused by shortage of water supply or lowering of water pressure in the water mains".*

The City Ordinance was issued in 1989 stating that...

> *"The City Engineer or the appointed representative of the City Engineer shall declare the existence of such an emergency as and when it becomes necessary, shall determine the period of such an emergency and the termination thereof, shall decide the daily hours of restriction, the method of restriction, and shall decide upon the proper notification to customers of such restrictions."*

Agency Drought Coordination Matrix

Condition and Program Phase	State and Federal Actions	Public Water Suppliers	Industrial	Agricultural and Private
1. NORMAL CONDITIONS: • Water quantity is adequate for normal purposes; water quality is acceptable under normal management • Normal releases from reservoirs • Normal precip/weather patterns/hydrologic conditions	• Develop precipitation, streamflow, ground water, and water quality monitoring programs. • Conduct state and regional water studies and coordinate recommended actions. • Assist public water suppliers and local government in developing emergency water management plans. • Establish public education program • Emergency planning is needed in a general sense.	• Develop Emergency Water Management Plans. • Develop additional storage and treatment facilities, evaluate distribution system. • Adopt standby rates, other necessary ordinances and codes, and establish mutual aid agreements, interconnections, conservation education, etc.	• Develop *individual* Emergency Water Management Plans. • Develop additional wastewater storage. • Develop alternative water storage, and conservation measures. • Purchase standby equipment and install permanent equipment as necessary for recycling.	• Develop emergency water management plans. • Evaluate need for irrigation. • Enlarge ponds, purchase tanks, drill wells, install conservation devices and livestock watering tanks, etc. • Evaluate agricultural water use and find where conservation could be used. • Evaluate domestic water use and install water saving devices, etc. to reduce stress on supply source.
2. DROUGHT WATCH: • Lower than normal precipitation, declining streamflows and groundwater levels. • Palmer Index, Frost, Reservoir and lake levels, snow/water content, streamflow, groundwater condition result in a 30, 60, 90 day outlook that is deficient.	• "Drought task force" initial meeting (see agency list). • Intensify selected monitoring activities. • State initiates an awareness program via media, etc.	• Monitor water sources and daily water use for specific purposes and anticipate user demand. • Monitor potential conflicts and problems.	• Monitor water source and daily water use for specific purpose and anticipated demand. • Monitor water quality.	• Monitor water sources and daily water use for specific purposes and anticipate demand.
3. CONSERVATION PHASE: • Water quantities/water quality deteriorating or conflicts among users. • Agency/Utilities appeal to public for voluntary conservation. • Public awareness program. • Closely monitor drought indicators. • Monitor NWS 30, 60, 90 day weather and precipitation projections. • Monitor NWS streamflow projections.	• More frequent "task force" meetings to exchange water supply and water quality data and discuss actions. • Monitor systems and users having past problems and monitor plan implementation. • Respond to local and individual appeals for assistance. • State agencies issue orders to water suppliers and/or dischargers. • Public information about conditions. • Public water conservation education/ encourage.	• Implement "conservation" phase of plan triggering point. Potential conservation measures include curtailment of outside uses, education, and pricing. • If conservation goal is not obtained, implement restrictions. • Notify MDNR of source conflicts.	• Institute re-cycling, cut back production, store wastewater, alter production schedule per emergency industrial water management plan during a drought. • Notify MDNR of source conflicts.	• Continue conservation of domestic supplies. • Notify MDNR of source conflicts. • Implement water conservation measures for agricultural uses.
4. RESTRICTION PHASE: • Insufficient supplies to meet all demands. • Allocation suspensions taking place. • Continued decline in water supply and/or water quality. • Utilize drought indicators. • Utilize NWS 30, 60, 90 day weather and precipitation projections. • Closely monitor NWS streamflow projections.	• Same responses as in Conservation Phase and State implements mandatory restrictions. • State Contingency Actions accomplished (example: ease NSP thermal permit). • Consider emergency releases from reservoirs above the low flow plans.	• Implement "restrictions" phase of plan triggering point. Restrictions could include banning of some outdoor water uses, per capita quotas, cut-backs to non-residential users. • Notify MDNR of source conflicts.	• Institute additional cut-backs in production, storage of wastewater, or changes in production schedule, etc. per emergency industrial mgmt. plan or Commissioner's orders for suspensions. • Notify MDNR of conflicts.	• Same responses as in Conservation Phase. • Follow MDNR allocation restrictions on irrigation.
5. EMERGENCY PHASE: • Severe water supply or water quality problems. • Highest priority water supplies not being met. • Threatened or actual power "brownouts". • MAPP (NSP power pool) resources threatened • Start monitoring of drought indicators. • Start monitoring of weather and streamflow projections.	• Governor responds to critical situations by declaring an emergency. • MDEM implements emergency operations plan. • State agency mediates conflicts. • Consider Corps PL 99 authorities. • Implement emergency releases from reservoirs above low flow plans.	• Provide bottled water and sanitation supplies to users. • Make hospitals, firefighting, etc. priority. • Initiate hauling of water. • Comply with State Commissioner's Orders.	• Comply with Governor's Emergency Declarations. • Coordinate emergency action with local government. • Implement hauling water for sanitation, domestic uses.	• Request local government assistance in obtaining water for domestic purposes, and in supporting livestock. • Implement hauling water, etc. in cooperation with local government.

The City's Penalty Ordinance declares that...

> *"For a first violation of the declaration of emergency, the occupant of the premises or the owner thereof will receive a warning of the offense. Subsequent violations of the declaration of emergency will result in a turnoff of the water supply to the premises. Written notice posted on the premises at the time of the violation will be considered sufficient notice prior to turnoff of the water supply. No water supply which has been turned off because of a violation of this article shall be turned on until twenty-five dollars ($25.00) has been paid to the Minneapolis Water Works Department, together with the regular charge for turning off and on water service."*

H. WATER SUPPLY PROTECTION

This section addresses long-term preventive programs and measures that can help reduce the risk of emergency situations. Detailed information on source protection and supply system risk assessment can be found in **Appendices C and D.**

Appendix C includes information on several programs that the Minneapolis Water Works is actively involved in as a continuous effort to protect our valuable water source.

- The River Defense Network is a community-based spill prevention and response effort linking local, regional and state government, industry and trade groups. The central goal of the River Defense Network is to prevent spills and to protect the Mississippi River from contamination resulting from spills.

- U.S. EPA, Minneapolis/St. Paul Sub-Area Contingency Plan - This Area Contingency Plan (ACP) is designed to coordinate timely and effective responses by federal On-Scene Coordinators (OSC), various federal agencies, state and local officials, and private industry to minimize damage resulting from releases of oil or hazardous materials.

- U.S.G.S. Upper Mississippi River Basin National Water Quality Assessment (NAWQA) - The NAWQA program is designed to describe in the status and trends in the quality of the nation's ground and surface water resources and to link the status and trends with an understanding of the natural and human factors that affect the quality of these resources.

- The NAWQA program integrates information about water quality ranging in spatial scales from local to national and focuses on water quality conditions that affect a large portion of the population.

- Fridley Community Awareness and Emergency Response (CAER) - Thus purpose of Fridley CAER is to facilitate integration of local industry and public safety emergency response plans, inform the community about emergency response planning and promote awareness of preventive practices which will reduce the risk of an accident.

A description of the major components of the Minneapolis Water Works supply system and a list of their potential emergencies, consequences and back-up options is included in **Appendix D**. Preventive measures are also addressed.

This information is used for risk assessment to perform critical components and system analysis and to prioritize preventive maintenance for the most vulnerable units of the water system components. System improvement suggestions are also listed.

The following major components were analyzed in **Appendix D**:

D-1 Raw Water Source
D-2 Collection System / Main Intakes
D-3 Collection System / Alternate intakes
D-4 Treatment System / UNIT: Fridley Softening Plant
D-5 Treatment System / UNIT: Dewatering Plant
D-6 Treatment System / UNIT: Fridley Filtration Plant
D-7 Treatment System / UNIT: Columbia Heights Filtration Plant
D-8 Finished Water Storage
D-9 Transmission and Distribution System

The Emergency Procedure for source contamination is detailed on the following page.

EMERGENCY PROCEDURE

Source Contamination

1. If contaminants are detected in the Mississippi River, the threat and hazard potential must be identified. If immediate determination cannot be made the pumps and plants shall be shut down until the threat and potential hazard are determined.

2. Based on these results the plants and pumps are either kept out of service or put back into service. Based on the estimated length of shut down a determination of whether to call the consecutive systems (suburban customers) to stop withdrawal must be made. The extent of contamination will determine how quickly the State Duty Officer should be called.

3. If the determination cannot be made by staff on duty the call list must be activated. Notify the Laboratory Supervisor to identify the type of contaminant and determine whether the contaminants can be removed during the treatment process.

    a) If contaminants can be removed during treatment, the river gates may be opened.

    b) If contaminants can be removed by modifying the treatment process, the cost and benefits shall be evaluated.

    c) If contaminants cannot be removed during treatment, the river gates shall remain closed until the contamination has been mitigated. Depending on the estimated length of shut down a determination of when to activate the downtown call list shall be made.

4. Attempt to determine the source of the contaminant and document. This will activate potential public notification and conservation measures.

5. If the river intakes or treatment facilities have been contaminated and the Water Works does not have proper equipment or experience, a decision by management may be made to contact Bay West at (612) 291-0456.

1. Analysis of Previous Supply Problems

Spills have occurred in the past upstream from the Minneapolis Water Works intake. The following table shows past spills as reflected in the records of the Minneapolis Water Works.

Date	Location	Type	Duration
3/17/75	BN Yard, Fridley	Diesel Fuel	2 days
7/23/75	BN Yard, Fridley	Diesel Fuel	2 days
3/8/77	BN Yard, Fridley	Diesel Fuel	4 days
5/10/80	BN Yard, Fridley	Diesel Fuel	4 days
7/31/81	NSP Plant, Monticello	Low-level radionuclides	10 hours
5/27/83	BN Yard, Fridley	Diesel Fuel	5 days
1/9/84	FMC, Fridley	Cyanide Metal Plating Wastes	11 hours
7/26/85	Brooklyn Center	Raw Sewage	6 hours
7/8/86	Mounds View	Gasoline *	1 day
3/23/89	BN Yard, Fridley	Diesel Fuel	4 days

* Spill contained at Locke Lake Dam and did not reach the River.

The duration ranged from a minimum of six hours to a maximum of five days. All of the incidents involving spills of more than one day were related to diesel fuel spills in the Burlington Northern Rail Yards. In most cases, the spills in the yard has presumably occurred during the winter or during periods of dry weather. The fuel was subsequently flushed into the River via storm drains following heavy periods of rainfall or snowmelt. Shutdowns have been avoided by lowering intake gates to keep out floating oil. During the longest contamination episode, the intake was further protected by stretching booms from the shore to an island just upstream from the intake. This created a backwater where less oil accumulated. Fire hoses were also use to move surface oil away from the intakes.

The Minneapolis Water Works operates plant maintenance and distribution maintenance shops with experienced trade personnel on a full-time basis. A full-scale meter shop also maintains, repairs or replaces all water meters within the City of Minneapolis.

The plant maintenance shop continuously services, repairs and replaces old equipment and instrumentation to insure proper operation. It also handles all facilities/building maintenance.

The distribution office has a preventive maintenance program (exercising valves, flushing hydrants, detecting leaks, etc.). Distribution system repairs are also performed by full-time crews from this office. All the shops stock supplies and parts to reduce repair time in the event of an emergency.

2. Wellhead Protection

This does not currently apply to the Minneapolis Water Works supply system.

3. Reserve Monitoring

As was discussed earlier in this report, the Minneapolis Water Works maintains records of River flows at Anoka, and water levels at the intakes, as well as daily, monthly and annual withdrawals. These records were used to establish triggers for water shortages or emergencies.

PART III - WATER CONSERVATION PLANS

Minnesota Rules 6115.0770 require water users to employ the best available means and practices to promote the efficient use of water. Laws of Minnesota 1993, Chapter 186 also requires public water suppliers to implement demand reduction measures before seeking approval to construct new wells or increases in authorized volumes of water.

The Energy Policy Act of 1992 established water efficiency standards for plumbing fixtures manufactured after January 1, 1994 for use in residential settings. Similar standards for commercial establishments are being phased-in by 1997.

Water suppliers are encouraged to evaluate conservation as a potential alternative to developing supplemental water sources in order to meet peak demands for non-essential water uses.

This chapter reviews the role of conservation for the City of Minneapolis and evaluates the conservation potential for the Minneapolis Water Works Service Area. It also presents specific water conservation plans and measures, as well as adoption and implementation programs.

A. ROLE OF CONSERVATION

The role of short-term water conservation measures is to reduce water demands when supplies are limited. The role of long-term conservation measures is to help satisfy the ever-increasing demands being placed on water resources.

The following factors are also important to consider:

- The Minneapolis Water Works has mostly **non-consumptive** withdrawals from its source (the Mississippi River), which provides an abundant supply for all existing and projected demands in all non-emergency situations (refer to River Flow Records at Anoka).

- Overall City growth and water demand has remained stable and increases in appropriations are not being sought

- The Minneapolis Water Works has no plans to expand its plant capacities to provide for summer non-essential uses.

- The City of Minneapolis is not developing supplemental water sources to meet peak demands, but rather considering alternate sources for emergencies.

The Minneapolis Water Works' conservation plans are intended to meet the following three (3) goals:

First Reduce unnecessary demand for water

Second Improve the efficiency in use

Third Minimize losses due to leaks

The City has already implemented several programs that contribute to meeting the conservation plans' goals. The specific measures are presented in Section C below.

B. WATER CONSERVATION POTENTIAL

Water demands information from Part I of this report was analyzed to provide an assessment of the different water conservation programs' potential. The following facts are of special importance.

- The Minneapolis residential water demand (largely associated with consumptive outdoor uses, priority six, non-essential) only represent less than 40% of the total Minneapolis average demand. Typical metro suburban systems (comprise primarily of residential consumers) ratio of residential-to-total water use range from 60-80%. Higher non-residential water use ratio add mostly to the base and not the peak demand.

- Residential per capita use has averaged 60-70 gcd for the past 10 years, and only rose to 83 gcd during the drought of 1988. These are lower than most metro suburban systems.

- Un-metered water has averaged 8½% for the last 10 years which is below the AWW's recommended threshold of 10%. Further reduction in this area is currently sought.

- The commuting (non-Minneapolis-residents) working population in the Downtown area and the seasonal student population of the U of M, Minneapolis Campus were not included in the population figures, although they contribute to a higher water demand during the day.

- The peaking factor (ratio of maximum daily - to annual average daily demand) has been a stable number of approximately 2.0 since the 1988 drought. This indicates a reasonable baseline demand. A peaking factor in the metro suburbs of approximately 3.0 is seen as indicative of high summer use relative to winter use and leads to an over-conservative designed water system. This is not the case in Minneapolis.

These facts and others, which describes the historical and current water demand indicators (from Part I, Water Supply System Description and Evaluation) shed a great deal of light on the potential for water conservation in the City of Minneapolis. They also help identify certain areas where promoting wiser water use would have the greatest impact and help in prioritizing specific conservation program efforts. The existing and planned measures that the City of Minneapolis has for short-term demand reduction and long-term water conservation are described below in detail.

C. WATER CONSERVATION PROGRAMS

This section describes the short-term conservation measures that are available for use in an emergency. It also addresses the long-term measures to achieve the goals of the City of Minneapolis' conservation plan. These goals are as follows:

First - Reduce Unnecessary Water Demand

Second - Improve the Efficiency in Use

Third - Minimize Losses and Waste

Short-term demand reduction procedures were listed earlier under emergency response procedures, which is included in Part II of this report (please refer to Section D, Item 2).

Long-term conservation plan is multi-faceted. The Minneapolis Water Works utilizes various conservation techniques which support each other in achieving the overall effectiveness of the plan as well as improving the overall efficiency in water use. The following is a survey of some specific elements that are included in the plan:

1. Metering

The Minneapolis Water Works meters all its customers, including public facilities. Water meters vary in size from 5/8-inch to 12-inch. The City of Minneapolis believes that its metering program causes the consumers to conserve water. The City provides an account history of past water use habits to all customers in their water bill (ie. water use during the same period last year).

Customers are also more likely to conserve water because they pay for what they use, not a flat charge. Several studies have shown that water demand is decreased by approximately 20% when customers are metered and charged based on their usage by volume.

The City of Minneapolis has a full-scale meter repair shop that handles all meters within the City, except fire meters. An average of 6,000 meters were being repaired each year (from 1980-1985).

Large volume accounts are read and billed each month. Residential meters have been read every three months. Residential accounts will be read every month as Automatic Meter Readers (AMR) are installed.

The City of Minneapolis has embarked upon a five-year, $20 million water meter replacement program that is near completion. The meter reading is accomplished through a central computer call-in. This will not only result in more accurate water consumption figures but also provide more timely (monthly v. quarterly) detection of any excessive use or potential leaks. Implementation of the AMR system is scheduled to be completed in 1996.

2. Water Audits, Leak Detection and Repair

Un-accounted-for water is calculated on an annual basis. Information was presented in Table 14 and Chart 14 in Part I of this report. That unbilled amount has averaged 8½% over the last 10 years (1984 to 1993). This is less than the AWWA recommendation of 10% but still is a significant volume. The City identified where the conservation's highest return in this area is. The disposition of some un-metered or unbilled water uses and their average annual estimated volumes and actions taken to reduce them are listed here:

- Softened water, 100 MG per year (non-retrievable) - The Minneapolis Water Works now has in place a system by which softened water, after being pumped to lagoons, can be recycled back to treatment. Minneapolis also recycles the filter backwash and dewatering plant thickener overflow water to re-enter the treatment process.

- Finished water, 300 MG per year - This includes screen washes at intake pump stations, Softening and Filtration Plant uses, Dewatering Plant and Meter Shop uses, as well as Distribution System uses for watermains and hydrant flushing programs, etc. In January 1994, the Minneapolis Water Works installed a new travelling water screen flushing and forebay cleaning system at the main intakes at P.S. #5. This cleaning system uses River water which will save 23 MG of finished water annually.

- Municipal uses, 50 MG per year - This varies depending on fires, street cleaning and sewer. Other municipal uses, such as Park Board, are not included. Conservation measures taken for municipal buildings are presented late in the report and also in **Appendix F**.

Other causes for losses due to un-accounted-for water include:

- Meters under-registering
- Un-authorized or un-metered and un-billed uses
- Watermain breaks and leaks

The meter shop calibrates and maintain all large meters and also tests, repairs or replaces older meters to prevent unaccounted-for water due to under-registering meters.

The Minneapolis Water Works has a full-time leak investigator on staff. The leaks reported or detected are investigated and repaired as soon as possible, if the leak is on a City main. If the leak is determined to be on a private service line, the consumer is notified by mail that the leak must be repaired no later than 15 calendar days from the date of the letter. If the leak is not repaired during this time, the Minneapolis Water Works shall have the necessary repairs made and charge the customer.

In the last 30 years, the City of Minneapolis has replaced watermains and lead service lines to reduce breaks on older mains. Replacement of watermains is tied into the City's 30-year residential paving program. All large mains (24-inch to 48-inch) that have not been recently replaced have been cleaned and cement mortar lined to minimize internal corrosion.

Corrosion due to outside effects (soil, aggressive ground water, etc.) is minimized by a Minneapolis Water Works Comprehensive Corrosion Control Program that is administered by a full-time coordinator on staff. New installation, continuous monitoring, replacement and repair is also done by City personnel. The Minneapolis Water Works utilizes blended polyortho-phosphate as a corrosion inhibitor as part of treatment.

The City's water distribution maintenance yard has several crews to fix leaks and repair gates and hydrants to minimize water losses. The City also maintains a supply of spare parts and piping and accessories (flanges, couplings, joint materials, etc) as well as sleeves, valves, gates and parts, specials (tees, elbows, etc.) and related supplies in order to be able to respond to leaks and watermain breaks as soon as they take place or are detected.

The "water-off" program is another program that contributes to the overall water conservation plan. The City monitors water bills of elderly and lower-income water consumers. Water audits are used to determine if customers have leaking fixtures, etc. that need to be repaired.

The United Association of Plumbers Local 15 Minnesota Mechanical Contractors and the Plumbing Service Industry Council sponsor and donate time and materials to repair leaking appliances and retro-fit old fixtures.

3. Conservation-Oriented Water Rates

The City of Minneapolis has metered all its water customers for years and billed for water based on volume consumed and meter size. The City has an increasing block rate for monthly and quarterly minimum charges based on meter size (from 5/8-inch to 12-inch) and higher rates for quarterly, non-residential fire protection based also on meter size (from 2-inch to 12-inch).

The volume based water rates for direct customers are uniform. The current rates for inside City customers is $1.23/billing unit. The billing unit equals 100 cubic feet (100cf). The current rate for outside City customers is $1.38/100 cubic feet. Wholesale rates to other municipalities and other public water suppliers vary per contract.

The Minneapolis Water Works believes that the combination of metering all customer accounts, uniform (not declining) block rates and a monthly billing cycle promote wise use of water and contribute positively to conservation. Sewer rental rates are also based on water usage which further promotes water conservation.

4. Regulation

Minnesota Statutes Chapter 462.357, subdivision 1 provides cities with the authority to undertake water supply conservation planning and zoning. Please refer to City Ordinances regarding water restriction for short demand reduction in case of any water shortage emergency (see Part II, Section G). The high summer demand of 1988 was reduced by 20% using Stage II procedures. This reduced demand was further cut by another 30% using Stage IV procedures. Both procedures are outlined in Item II-D,2.

The Energy Policy Act (EPA) of 1992 mandating only high-efficiency plumbing fixtures be manufacture after January 1, 1994, is predicted to have a great impact on long-term water conservation. The new fixtures' water consumption is approximately half of the older models. Studies have shown that these fixtures contribute to more than 50% of indoor residential use. The overall Minneapolis residential water use accounts for more than 50% of the total annual water consumption.

5. Education and Information Programs

A funded study is near completion by the Center for Energy and Urban Environment on water conservation for Minneapolis. The study report is due shortly.

A wide range of educational materials on water-saving habits is available to consumers. Some bill inserts are sent periodically to customers in various categories. Individual accounts are reviewed and unusual consumption increase are investigated. The new AMR and monthly billing systems will significantly reduce water waste.

The Minneapolis Water Works, in cooperation with AWWA, provides information regarding general conservation practices (pamphlets, video, etc.) upon request. This information is also handed out during tours of water treatment facilities. The Minneapolis Water Works staff also distributes this information to schools, universities and others, as part of their presentation to many organizations.

Water conservation materials are also available for use during periods of limited water supplies, when public awareness of conservation is high.

6. Retro-Fitting Programs

The Minneapolis Plumbing Inspection personnel are presently doing a study on reducing the amount of water used per flush from 3.0 gallons to 1.6 gallons to conserve usage in the City-owned buildings. A copy of the Minneapolis Municipal Conservation Program can be found in **Appendix F**.

Each Spring the United Association of Plumbers Local 15, the Mechanical Contractors and the Plumbing Service Industry Council sponsor and donate time and materials to retro-fit old fixtures. This service is available for the needy and elderly consumers.

The federal Energy Policy Act of 1992 also established national water efficiency standards for plumbing fixtures manufactured after January 1, 1994 for use in residential settings. Minnesota implemented similar standards. The following table shows a comparison between low consumption plumbing fixtures older fixtures.

Fixture	pre-1980	1980's	Current Requirements
Toilet, gal/flush	5.0	3.5	1.6
Urinals, gal/flush	4.0	3.0	1.0
Faucet, GPM	5.0	3.5	2.5
Showerhead, GPM	5.0	5.0	2.5

Similar standards for commercial establishments are being phased-in by 1997.

7. Pressure Reduction

Pressure reduction can be used to make customer save on water. However, this may have limitations due to firefighting minimum pressure requirements. Pressure reducing valves are incorporated within the system in high service areas as necessary to reduce leaks and consumption.

D. ADOPTION OF PLAN

After the DNR has reviewed and approved the plan, it will be presented to the City Council for review and action. This plan, will then be reviewed and updated every ten years.

PART IV - METROPOLITAN COUNCIL ITEMS

The Laws of Minnesota 1993, Chapter 186, requires that all local units of government in the Seven-County Twin Cities Metropolitan Area prepare an amendment to the local comprehensive plan to address water supply.

This chapter is organized according to the guidelines established by the Metropolitan Council. To make the plans consistent with the law, many references are made to Part I through Part III.

A. DESCRIPTION OF THE MUNICIPAL SYSTEM

Part I, Sections A through D and Part II, Section B of this report fulfill the requirements of this section.

B. WATER UTILITY OPERATIONS

1. Policies and Objectives

The Minneapolis Water Works' mission is to extend an affordable, cost effective system to ensure that quality water is available to meet the requirements of Minneapolis' citizens and other customers, while preserving our environment.

2. Goals and Standards

The City of Minneapolis' Conservation Programs are intended to meet the following goals:

First	Reduce the unnecessary demand for water
Second	Improve the efficiency in use
Third	Minimize losses and waste of water

C. CONSERVATION PROGRAM

Part III, Sections A through D of this report fulfill the requirements of this section.

D. EMERGENCY PREPAREDNESS / CONTINGENCY PLAN

Part II, Sections A and C through H of this report fulfill the requirements of this section.

E. COORDINATION OF PLANNING EFFORTS WITH OTHER SUPPLIERS AND PUBLIC AGENCIES

1. Inter-Community Sharing

As was discussed in Part II, Section C, Item 1. of this report, the Minneapolis Water Works has no two-way inter-connection with any of its suburban customers. Inter-connections with adjacent communities can be used for emergency and supplemental water supply.

An inter-connection with the Saint Paul Water Utility has been explored, but not yet fully studied. The two cities have finished water of similar quality (both use lime softening) which would cause fewer problems. The two systems operate at different pressures which may necessitate construction of a pumping station.

The Minneapolis / Saint Paul inter-connection could be very useful in providing a baseline supply to both cities in case of an emergency. It can also help maintain reserves in both systems for short-term scheduled maintenance shut-downs. Minneapolis has approved and budgeted its portion of the cost of a comprehensive inter-connection study.

2. Joint Pursuit of Alternate Sources and Protection of Existing Sources

Part II, Section C, Item 6 and Part II, Section H and **Appendix B** of this report fulfill the requirements of this section.

F. PROBLEMS AND POTENTIAL SOLUTIONS

Part I, Section D of this report fulfills the requirements of this section.

G. WELLHEAD PROTECTION PROGRAM

This section is not applicable to Minneapolis, as it is not currently served by ground water.

H. IMPLEMENTATION PROGRAM

1. Official Controls

In addition to promoting wise water use, the following City Ordinances and Regulations will be used to achieve the objectives and the components of the water supply plan.

a. City Ordinances

Part II, Section G of this report fulfill the requirements of this section.

b. Energy Policy Act

Part III, Section C, Item 6 of this report fulfills the requirement of this section. The City of Minneapolis inspects new construction to verify that the more efficient fixtures are being used.

2. Capital Improvement Program (CIP)

The Minneapolis Water Works' Major Capital Improvement Projects (Ten-Year Plan) are listed in Part II, Section D, Item 4 of this report. Only coagulation expansion at the Fridley Filtration Plant, replacing filters at the Columbia Heights Filtration Plant and increasing Finished Water Storage are currently funded projects. Additional funding will be required for the rest of the CIP projects.

The following programs continue to be included in the City of Minneapolis' annual operating budget.

- New water meter replacement and repair program
- Enforcement of regulations regarding water-efficient plumbing fixtures
- Water audits, leak detection and repair programs
- Water-Off program
- Minneapolis Municipal Conservation program

3. Impact on the Local Comprehensive Plan

The adoption of this Water Supply Plan, aimed at reducing unnecessary demand, improving efficiency and minimizing water waste and loss, will not have any negative impact on the local comprehensive plan, community growth or economic development.

LIST OF APPENDICES

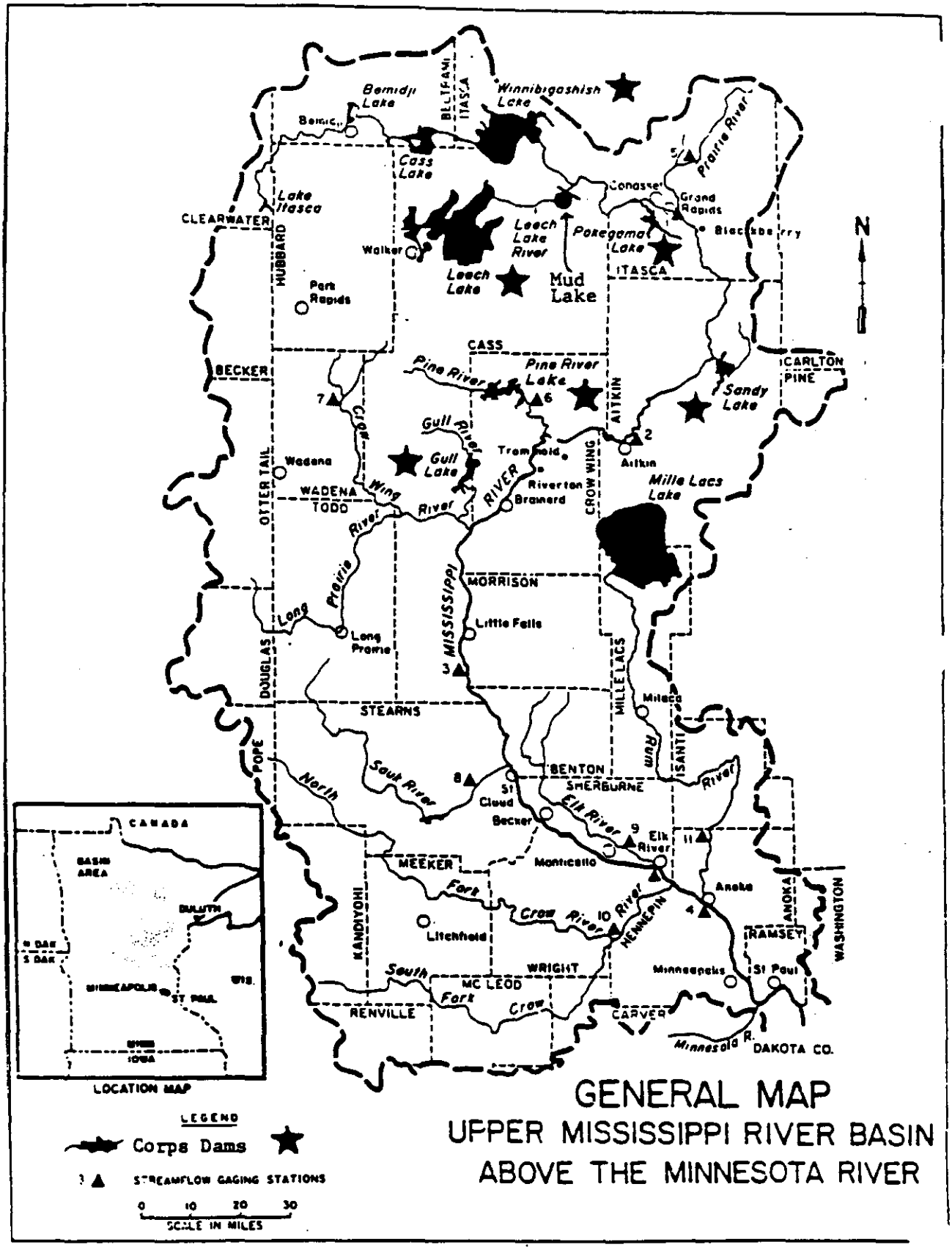
Appendix A:	**Water Source and Service Area Information Maps and Attachments**
A-1	Water Source Information
A-2	Service Area Information
Appendix B:	**Augmenting Water Supplies Reports' Conclusions**
B-1	Water Resources Investigation
B-2	Alternate Water Supplies Study
Appendix C:	**Water Defense Network for Supply Protection Measures**
Appendix D:	**Emergency Assessment for Major Water Supply Components**
D-1	Raw Water Source
D-2	Collection System, Main Intakes - Pump Station #5
D-3	Collection System, Alternate Intakes - Pump Station #4
D-4	Treatment System, Softening Plant
D-5	Treatment System, Dewatering Plant
D-6	Treatment System, Fridley Filtration Plant
D-7	Treatment System, Columbia Heights Filtration Plant
D-8	Finished Water Storage
D-9	Transmission and Distribution System
Appendix E:	**Emergency Response Plan for Hazardous Material Incidents**
Appendix F:	**Minneapolis Municipal Water Conservation Program**

APPENDIX A

Water Source and Service Area Information Maps and Attachments

A-1 Water Source Information

A-2 Service Area Information



(Source : U.S Army Corps of Engineers- Report)

Appendix A-1-a

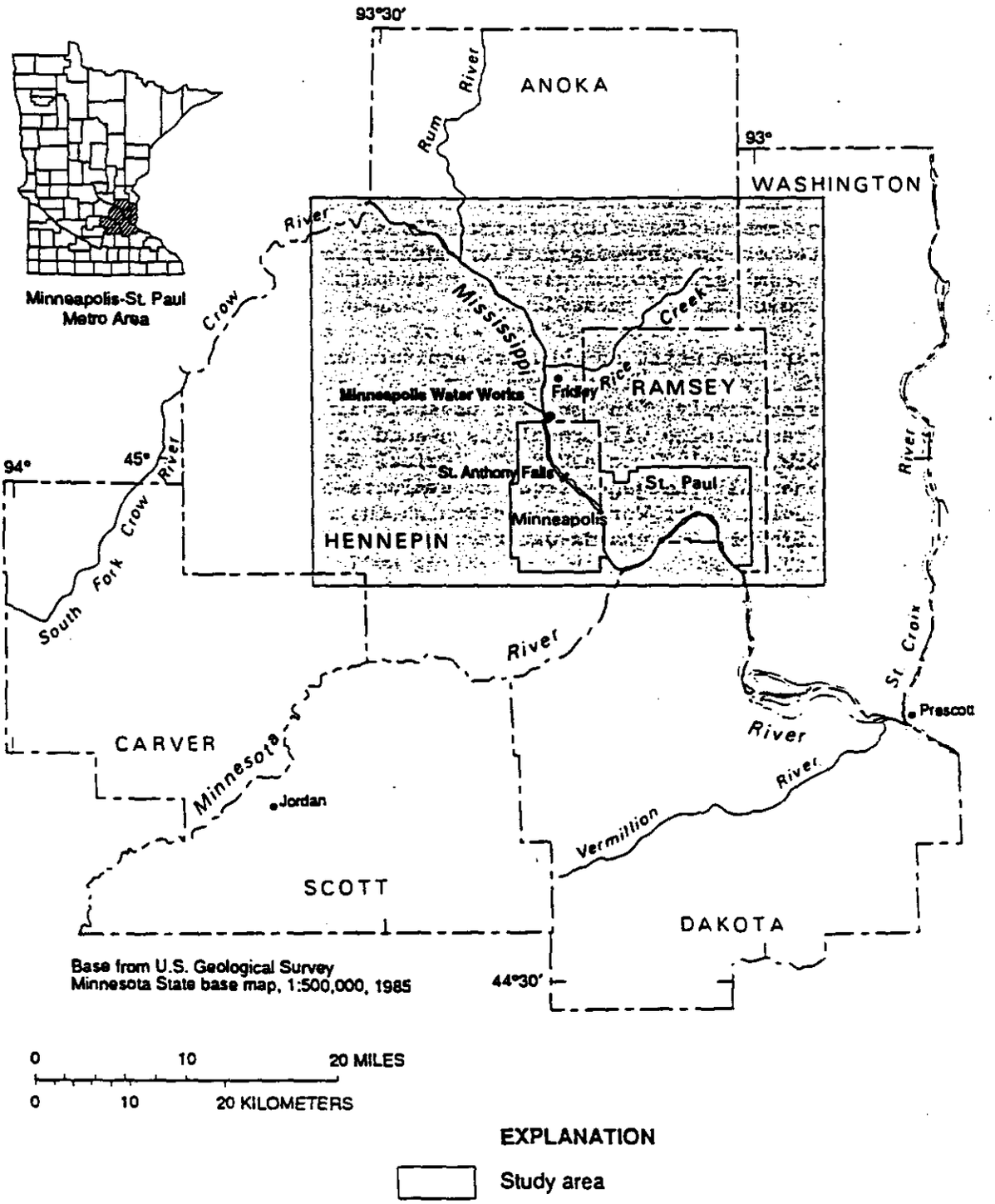


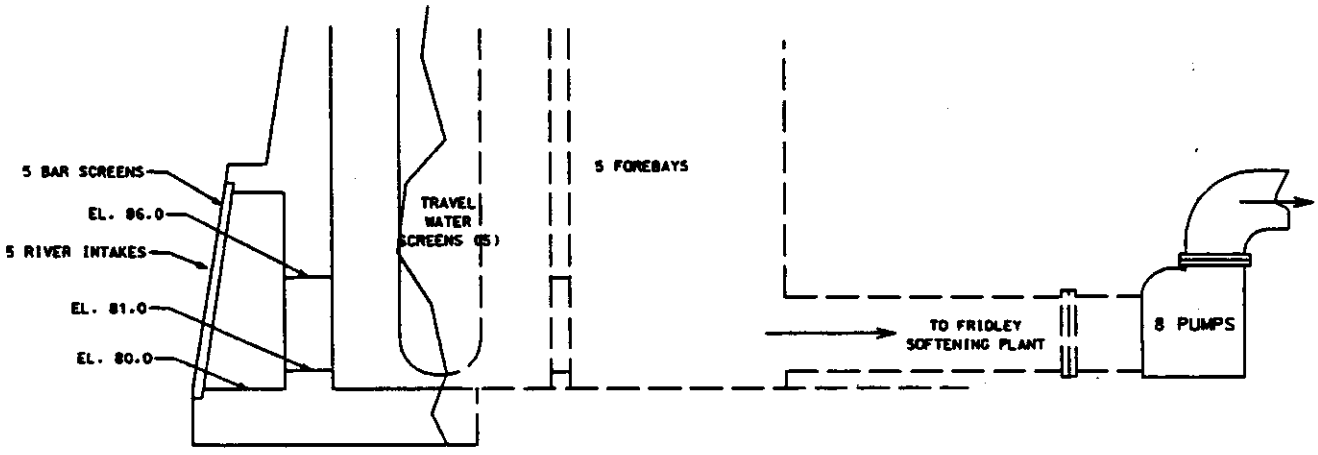
Figure 1.–Location of study area, the Minneapolis Water Works, and the seven-county Minneapolis-St. Paul Metropolitan Area.

(Source : U.S.G.S-Report)

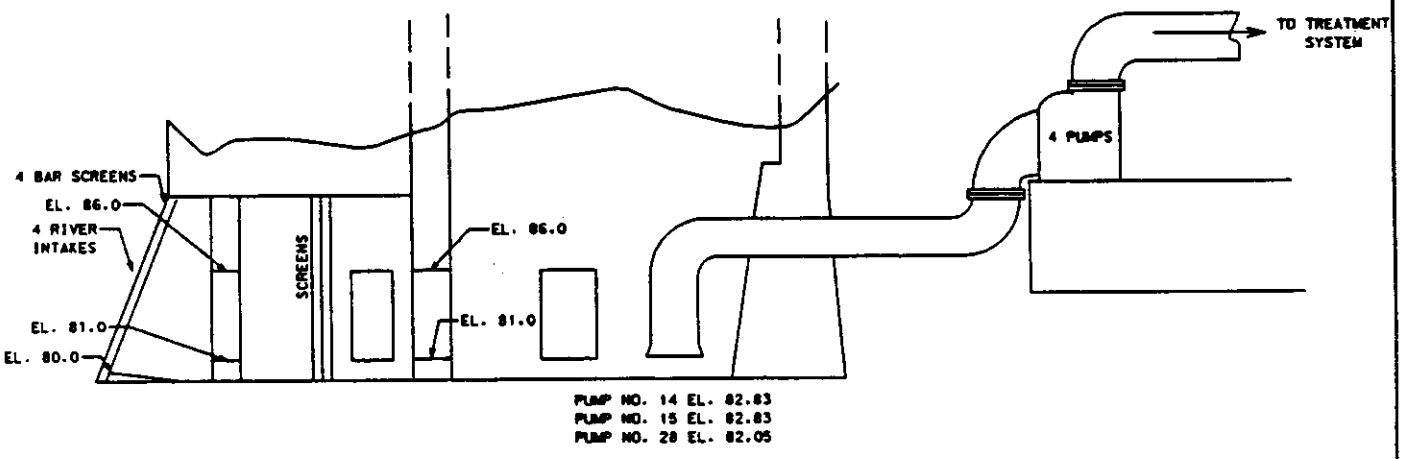
Appendix A-1-b

MINNEAPOLIS WATER WORKS
MISSISSIPPI RIVER INTAKE SYSTEM

(Appendix A-1-c)



CROSS SECTION OF MAIN INTAKES
AT PUMP STATION 5



CROSS SECTION OF ALTERNATE INTAKES
AT PUMP STATION 4

MINNEAPOLIS WATER WORKS' MISSISSIPPI RIVER INTAKES

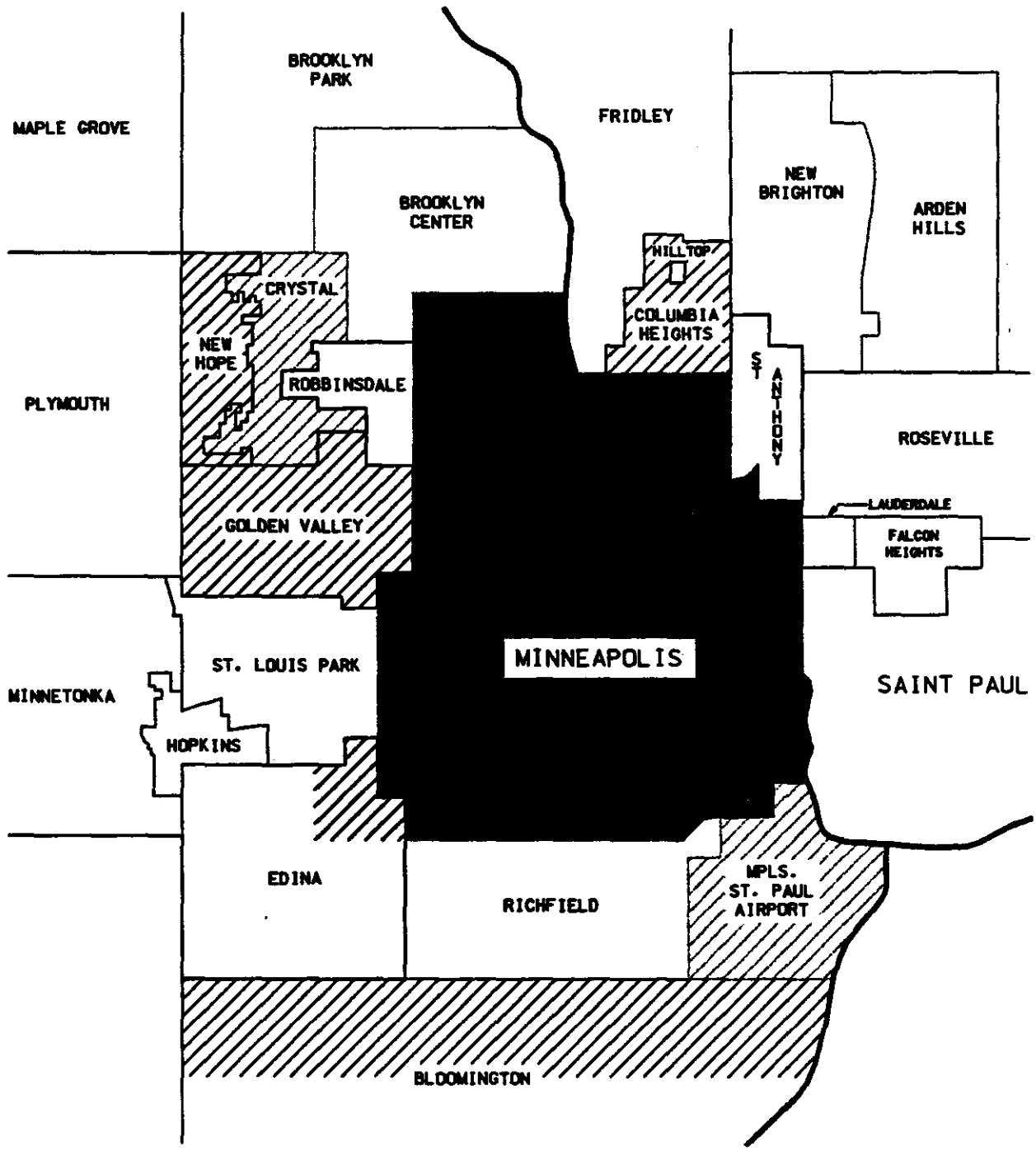
Main Intake at P.S. #5					
Pump Number	Year Installed	Horsepower (hp)	Motor Starter Year	Capacity (GPM)	Design Capacity (MGD)
16	1927	200	1981	13,900	20
17	1927	200	1981	13,900	20
18	1927	200	1981	13,900	20
24	1931	350	1981	20,800	30
26	1939	350	1981	20,800	30
27	1939	350	1981	20,800	30
37	1970	250	1990*	13,900	20
41	1970	350	1990*	20,800	30

* new motor

Alternate Intakes - P.S. #4					
Pump Number	Year Installed	Horsepower (hp)	Motor Starter Year	Capacity (GPM)	Design Capacity (MGD)
14	1918	1800	1982	20,800	30
15	1921	1800	1982	20,800	30
28	1938	1200	1982	13,900	20
35	1959	1250	1982	13,900	20

RAW WATER QUALITY PARAMETERS

PARAMETER	Average	Maximum	Minimum
Temperature (°C)	12	26	1
Turbidity (NTU)	8.6	27	2.2
Threshold (odor)	37	80	3
Color	42	81	23
pH	8.31	8.70	7.84
Total Hardness (ppm)	201	265	142
Alkalinity (ppm)	172	226.5	127.5
HCO3 (ppm)	162	219	113
Calcium Hardness (ppm)	135	170	92
Fluoride (ppm)	0.18	0.28	0.10

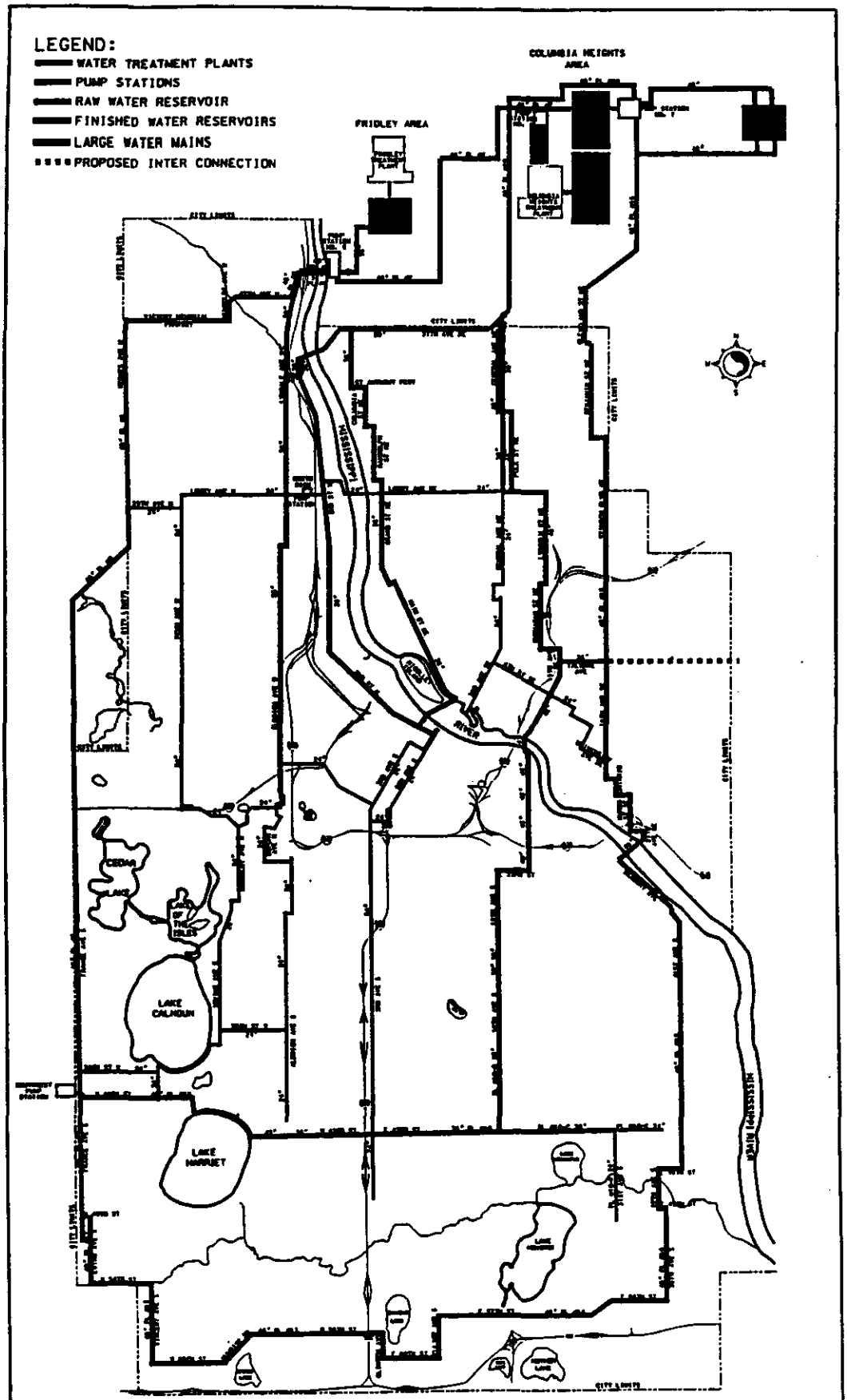


MINNEAPOLIS WATER WORKS SERVICE AREA

NOTE:

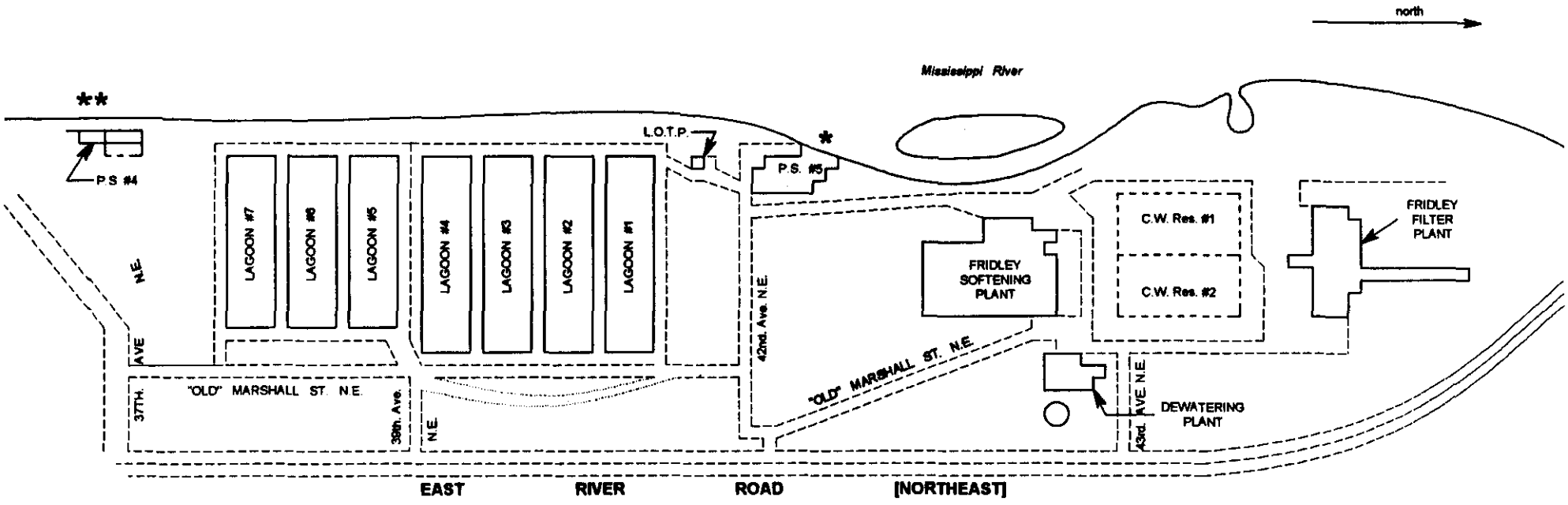
SHADED AREAS INDICATE SUBURBS WHICH USE CITY WATER

APPENDIX A-2-a



CITY OF MINNEAPOLIS, MINNESOTA
WATER SYSTEM FACILITIES

Appendix A-2-b

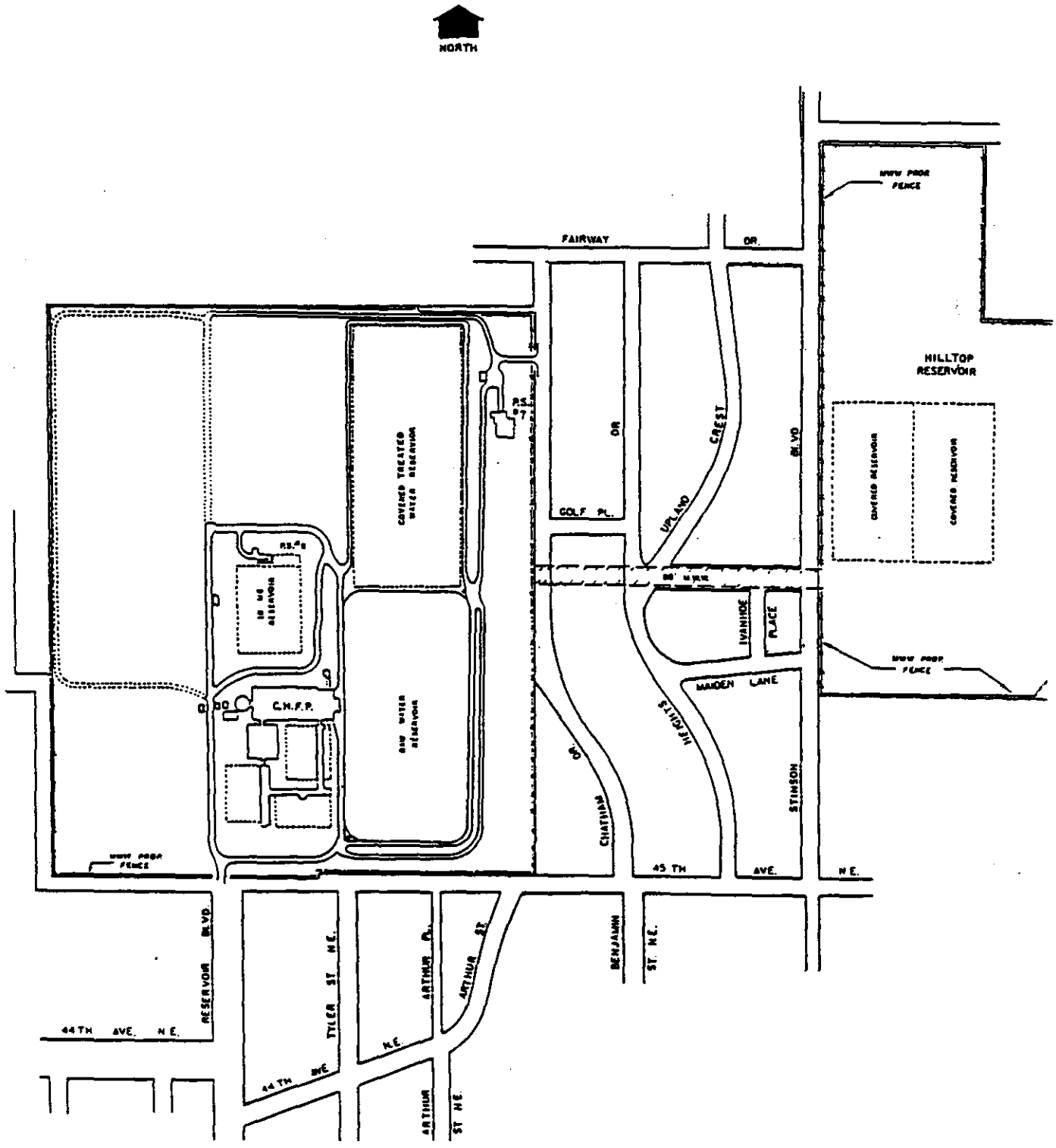


* - Main Intakes

** - Alternate Intakes

MINNEAPOLIS WATER WORKS
FRIDLEY AREA COMPLEX

APPENDIX A-2-C



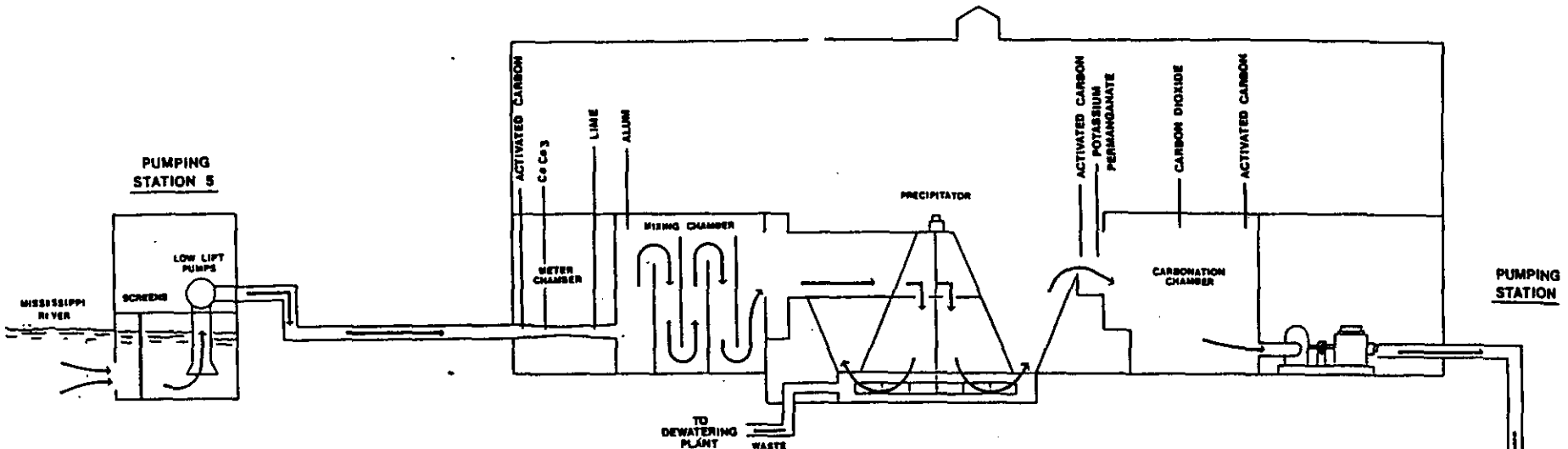
COLUMBIA HEIGHTS - HILLTOP

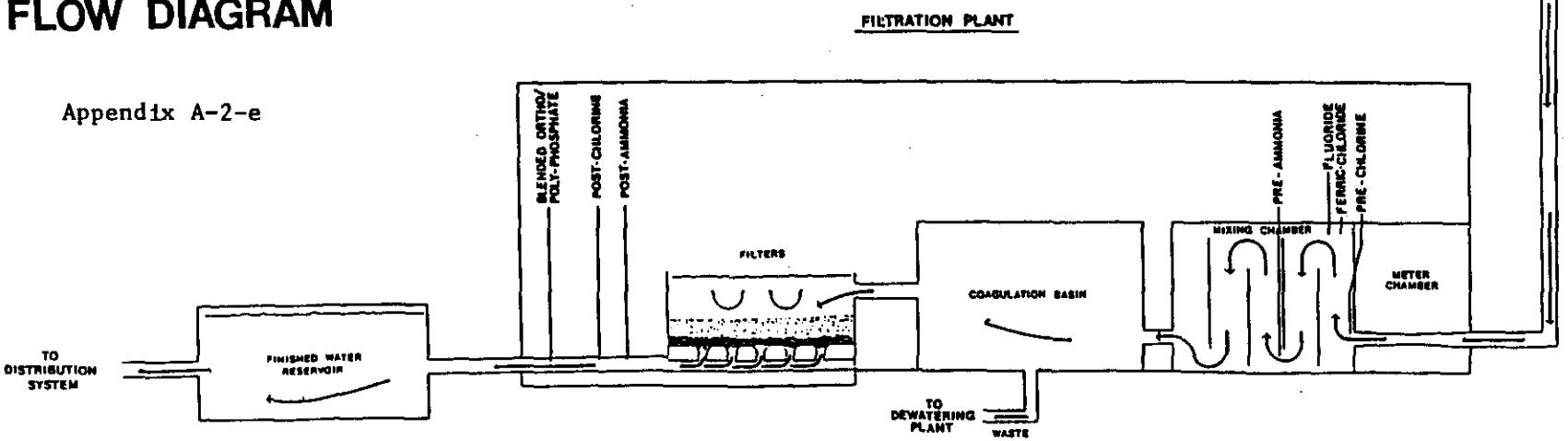
AREA MAP

Appendix A-2-d

TREATMENT FLOW DIAGRAM

Appendix A-2-e





APPENDIX B

Augmenting Water Supplies Reports' Conclusions

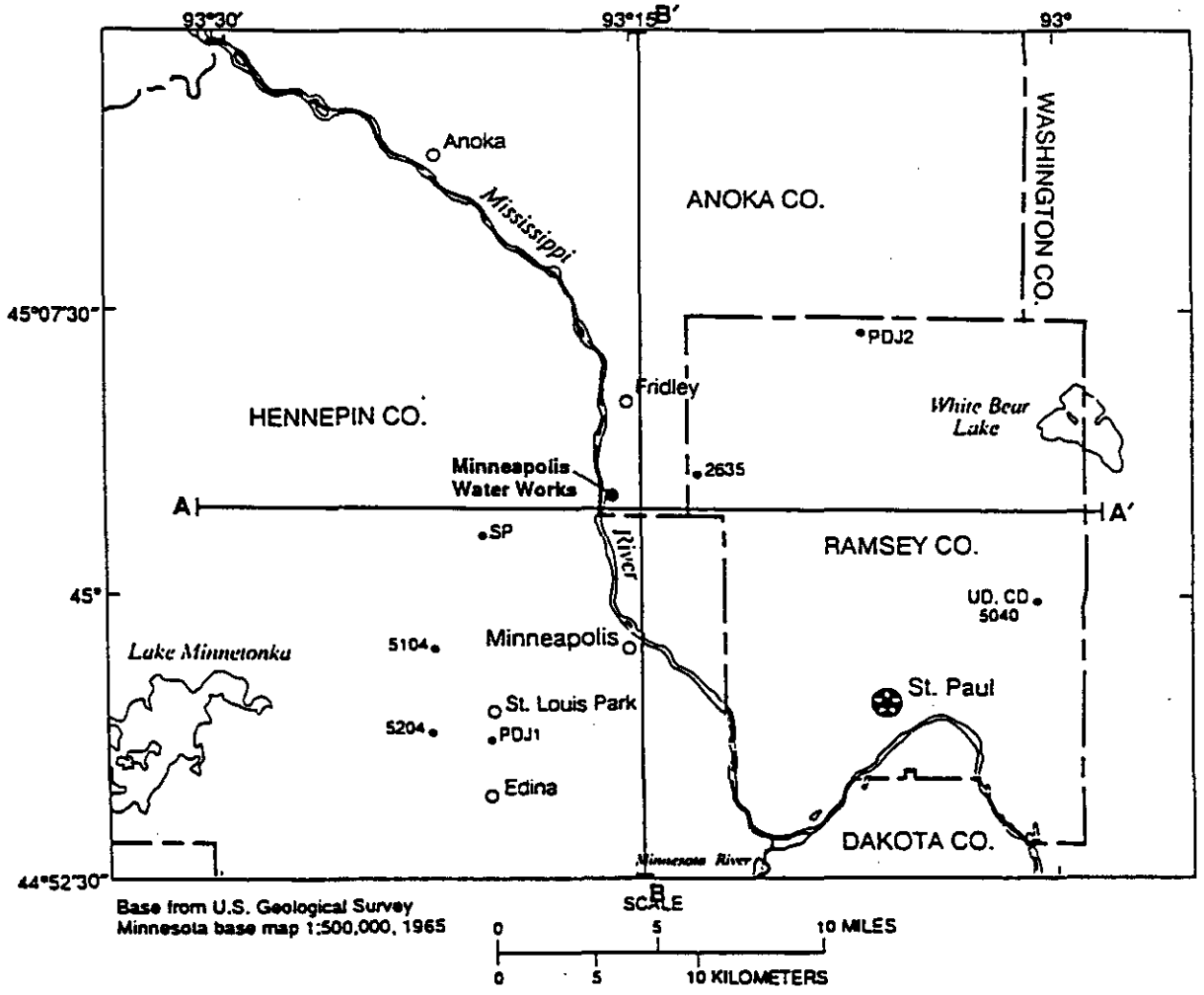
B-1 Water Resources Investigation

B-2 Alternate Water Supplies Study

Simulation of Ground-water Flow in the Prairie du Chien-Jordan and Overlying Aquifers near the Mississippi River, Fridley, Minnesota

U.S. GEOLOGICAL SURVEY
Water-Resources Investigations Report 90-4165

Prepared in cooperation with the
Minneapolis Water Works

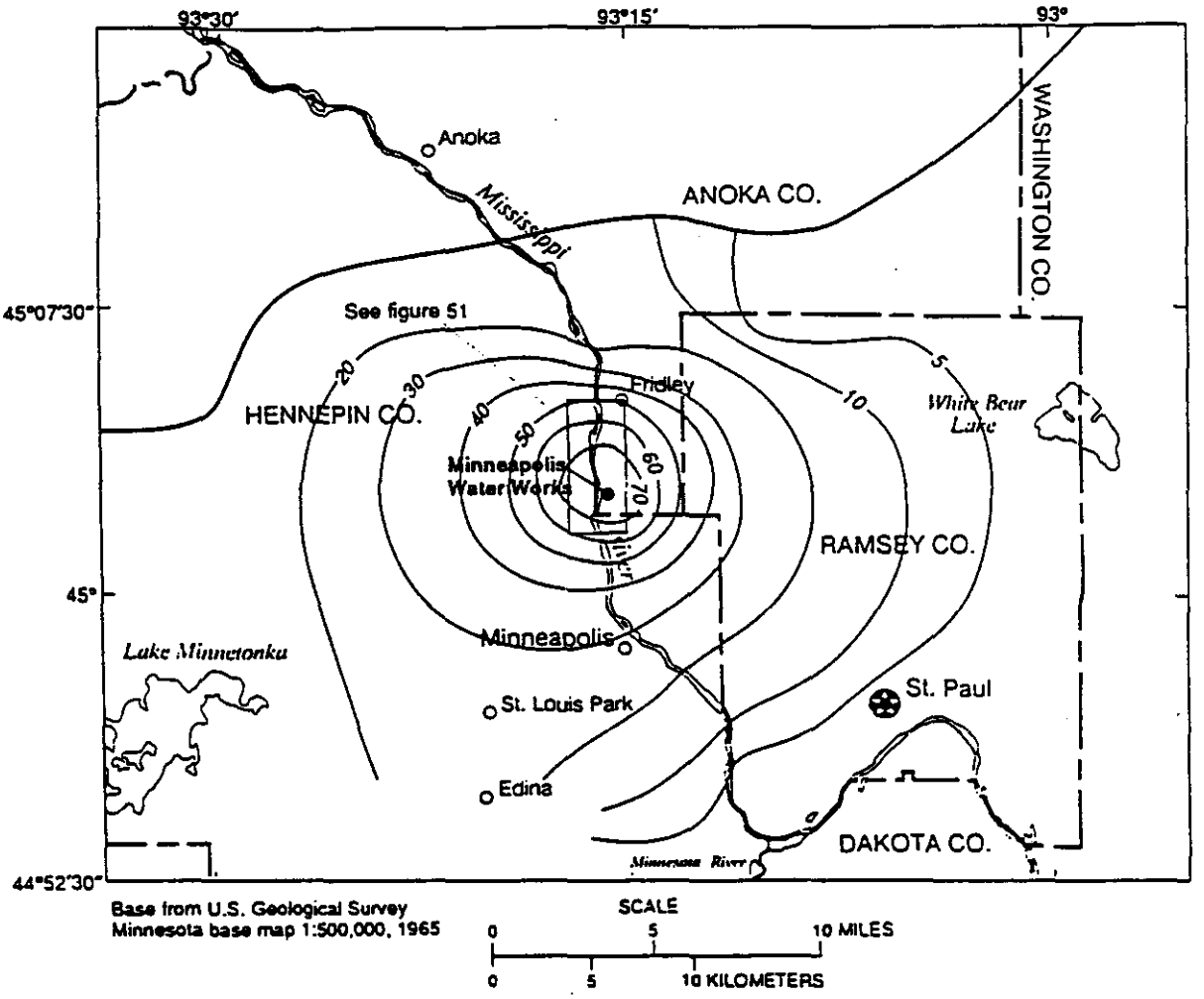


EXPLANATION

B——B′ Trace of geologic section

PDJ1 • Observation well--Table 1 provides a cross-reference between the short name for each well shown on this figure and the township-range-section, U.S. Geological Survey identification number, and Minnesota unique number for each well.

Figure 2.–Trace of hydrogeologic sections, and locations of observation wells.



EXPLANATION

Generalized aquifer boundary

—20— Line of equal simulated drawdown in the Prairie du Chien-Jordan aquifer-- Interval variable, in feet.

Figure 50.—Simulated drawdowns in the Prairie du Chien-Jordan aquifer at the end of the "late summer" stress period for hypothetical 1-year transient simulation of eight model cells (SP1 through SP8) with additional ground-water withdrawals totaling 85.1 cubic feet per second from the Prairie du Chien-Jordan aquifer.

SUMMARY AND CONCLUSIONS

A three-dimensional, numerical ground-water-flow model was developed to gain a better understanding of the ground-water-flow system and its response to withdrawals near the Minneapolis Water Works in Fridley, Minnesota. The model was developed to help (1) estimate the capacity of the aquifer system to yield water to wells, (2) determine the hydraulic connection between the Prairie du Chien-Jordan aquifer, overlying aquifers, and the Mississippi River, and (3) estimate the effects of ground-water withdrawals on water levels in wells and the extent to which these withdrawals induce flow from areas of known ground-water contamination.

Two bedrock aquifers (St. Peter and Prairie du Chien-Jordan), two glacial aquifers (unconfined- and confined-drift), and four confining units (upper drift, basal-drift, basal St. Peter, and Decorah-Platteville-Glenwood) are simulated in the ground-water-flow model. The distribution of sand and gravel deposits and the much less permeable clay and silt confining units within the drift is highly variable and complex and is generally not well known. A surficial layer of sand and gravel as much as 60-ft thick underlies the Mississippi River valley and the Anoka Sand Plain. A discontinuous layer of silty to sandy clay (upper drift confining unit) underlies the unconfined-drift aquifer and hydraulically separates it from the underlying confined-drift aquifer. The glacial drift is underlain by the St. Peter aquifer, or the Prairie du Chien-Jordan aquifer in bedrock valleys and in the northern part of the study area. In the southern part of the study area, the glacial drift is underlain by the Decorah-Platteville-Glenwood confining unit.

The basal St. Peter confining unit consists of siltstone and shale at the base of the St. Peter Sandstone and, where present, hydraulically separates the St. Peter aquifer from the underlying Prairie du Chien-Jordan aquifer. The surface of the St. Peter Sandstone was highly dissected by erosion, and the basal St. Peter confining unit is thin and discontinuous in the northern part of the St. Peter's extent.

The Prairie du Chien-Jordan aquifer is the major source of water for wells in the study area and accounts for about 80 percent of the total ground water pumped in the seven-county Twin Cities Metropolitan Area. Withdrawals from the Prairie du Chien-Jordan aquifer have resulted in long term (1885-1980) declines in hydraulic heads in the aquifer ranging from 0 to 48 ft. The Prairie du Chien-Jordan aquifer is underlain by the St. Lawrence-Franconia confining unit, which is considered to be a relatively impermeable layer regionally.

The bedrock surface in the study area is dissected by deep valleys filled with glacial drift and alluvial material. The Minneapolis Water Works is underlain by a buried bedrock valley that provides hydraulic continuity between the bedrock aquifers, the overlying glacial drift, and the Mississippi River. The bedrock valley and discontinuities in the upper drift confining unit also provide a pathway for the potential downward migration of contaminants from the surficial glacial deposits to the Prairie du Chien-Jordan aquifer.

The Mississippi River is the major stream draining the study area and is the regional discharge area for the aquifers. The gain in flow of the Mississippi River in the study area attributable to ground-water discharge, was estimated to be about 110 ft^3/s on the basis of average January (low-flow) conditions.

Initially, a two-layer ground-water-flow model was developed to test the sensitivity of selected hydrologic properties and boundary conditions of the Prairie du Chien-Jordan aquifer, basal St. Peter confining unit, and the confined-drift and St. Peter aquifers. The model was calibrated for steady-state conditions for a period before substantial ground-water development (1885-1930). Hydraulic head was found to be most sensitive to changes in the hydrologic properties controlling the discharge of water from the confined-drift and St. Peter aquifers to the Mississippi River. Simulated leakage to the confined-drift and St. Peter aquifers was 2.0 in/yr.

After calibration of the two-layer model, a three-layer model was constructed to represent, in descending order, the unconfined-drift aquifer, the upper drift and Decorah-Plateville-Glenwood confining units (upper confining unit), the confined-drift and St. Peter aquifers, the basal-drift and basal St. Peter confining unit (lower confining unit), and the Prairie du Chien-Jordan aquifer. The three-layer model was calibrated for two steady-state conditions: (1) conditions before substantial ground-water development (1885-1930), and (2) conditions during a period of significant pumping stress (1970-79). Transient calibration was accomplished by simulating (1) an aquifer test conducted at the Minneapolis Water Works site, and (2) a period during which seasonal changes in hydraulic head were significant and sufficient ground-water-level data was available (1987).

Sensitivity analyses for the steady-state simulation that represented conditions prior to substantial ground-water development indicated hydraulic heads were most sensitive to changes in the vertical hydraulic conductivity of the upper confining unit, which controls the amount of discharge from the confined-drift and St. Peter aquifers and the Prairie du Chien-Jordan aquifer to the unconfined-drift aquifer and subsequently to the Mississippi River. Simulated recharge to the unconfined-drift aquifer was 6.5 in/yr. Leakage to the confined-drift and St. Peter aquifers from overlying deposits varies, depending on the vertical hydraulic conductivity of the overlying deposits, the saturated thickness of the deposits, and the hydraulic head difference between the water table and the potentiometric surface of the confined-drift and St. Peter aquifers. Simulated leakage to the confined-drift and St. Peter aquifers outside the boundaries of the unconfined-drift aquifer varied spatially from 1.0 to 2.3 in/yr.

The principle of superposition was used in the steady-state simulation for a period of significant pumping stress (1970-79). When using superposition to solve ground-water-flow problems, the appropriate quantities are changes in hydraulic head and flow rather than absolute values of head and flow. Sensitivity analysis for the steady-state simulation for the period of significant pumping stress (1970-79) indicated that hydraulic heads were most

sensitive to changes in the vertical hydraulic conductivity of the upper confining unit and decreases in the vertical hydraulic conductivity of the lower confining unit. The simulated recharge and leakage rates, representing the change in recharge caused by the simulated withdrawals by wells, were zero for the unconfined-drift aquifer and ranged from 0 to 3.0 in/yr for the confined-drift and St. Peter aquifers.

The principle of superposition was also used in the transient aquifer-test simulation. For the calibrated best-fit simulation, the vertical hydraulic conductivity of the Mississippi riverbed material was increased from 1.0 to 2.25 ft/d. Hydraulic heads were relatively insensitive to variations in specific yield for the unconfined-drift aquifer and storage coefficients for the confined-drift and St. Peter aquifers and Prairie du Chien-Jordan aquifer.

The transient simulation for 1987 reproduced fluctuations in hydraulic heads caused by seasonally variable ground-water withdrawals and recharge and leakage rates during 1987. The simulation was calibrated by adjusting seasonal recharge and leakage rates until the simulated hydraulic heads acceptably matched water levels measured in wells. Simulated recharge to the unconfined-drift aquifer varied seasonally, ranging from 0 to 2.3 in. Simulated leakage to the confined-drift and St. Peter aquifers also varied seasonally (0.4 to 2.1 in. per season) as well as spatially (2.6 to 5.7 in/yr).

The calibrated transient simulation for 1987 was used to simulate the effects of hypothetical ground-water withdrawals near the Minneapolis Water Works on hydraulic heads in the aquifers and ground-water discharge to the Mississippi River. Transient hypothetical simulations were made for periods of 1 year and 5 years. Additional ground-water withdrawals of 21.6 ft^3/s to 85.1 ft^3/s were simulated from four or eight model cells during the "early summer" and "late summer" stress periods. Hypothetical 1-year transient simulations with total simulated withdrawals from the Prairie du Chien-Jordan aquifer of 42.55 ft^3/s from four model cells resulted in maximum simulated increases in drawdowns in the Prairie du Chien-Jordan aquifer ranging from 60 to 85 ft at the end of the "late summer" stress period. Simulated hydraulic heads in the confined-drift and St. Peter aquifers and the Prairie du Chien-Jordan aquifer rebounded and quickly approached equilibrium conditions following the cessation of the hypothetical ground-water withdrawals. Simulated hydraulic heads at the end of the "fall" stress period in the cell(s) with additional ground-water withdrawals were only about 2.5 ft lower than the simulated hydraulic heads at the end of the "fall" stress period for the calibrated transient simulation for 1987. A hypothetical 1-year transient simulation with total simulated withdrawals of 85.1 ft^3/s (from eight model cells) from the Prairie du Chien-Jordan aquifer resulted in maximum simulated increases in drawdowns of about 130 ft in the Prairie du Chien-Jordan aquifer and about 105 ft in the confined-drift and St. Peter aquifers.

A hypothetical transient simulation was made for a period of 5 years by recycling the 1987 seasonal withdrawal and recharge and leakage rates for each of the 5 years. Total simulated additional hypothetical withdrawals from the Prairie du Chien-Jordan aquifer during the "late summer" stress period were 42.55 ft^3/s. The 5-year hypothetical transient simulation resulted in little decline in hydraulic heads in the confined-drift and St. Peter aquifers and Prairie du Chien-Jordan aquifer from year to year at the end of corresponding stress periods. Hydraulic heads at the end of the "late summer" and "fall" stress periods during the fifth year were approximately the same as the corresponding heads during the first year of the simulation.

The calibrated steady-state model for 1970-79, which was based on the principle of superposition, was used to simulate the effects of hypothetical ground-water withdrawals near the Minneapolis Water Works under steady-state conditions. Simulations were made by varying the rate and distribution of hypothetical ground-water withdrawals. Total simulated withdrawals of 42.55 ft^3/s from four model cells pumping from the Prairie du Chien-Jordan aquifer resulted in simulated drawdowns exceeding 200 ft in the Prairie du Chien-Jordan aquifer in the pumped cell(s). Actual drawdowns of comparable magnitude near the Minneapolis Water Works would result in hydraulic heads declining below the top of the aquifer and a change from confined to unconfined conditions. Simulations with total withdrawals of 21.45 ft^3/s and 21.6 ft^3/s from the Prairie du Chien-Jordan aquifer resulted in drawdowns in the Prairie du Chien-Jordan aquifer in the pumped cell(s) ranging from about 70 to about 80 ft. A simulation with withdrawals of 21.6 ft^3/s from the confined-drift and St. Peter aquifers resulted in drawdowns of about 110 ft in the confined-drift and St. Peter aquifers in the pumped cells and about 55 ft in the Prairie du Chien-Jordan aquifer.

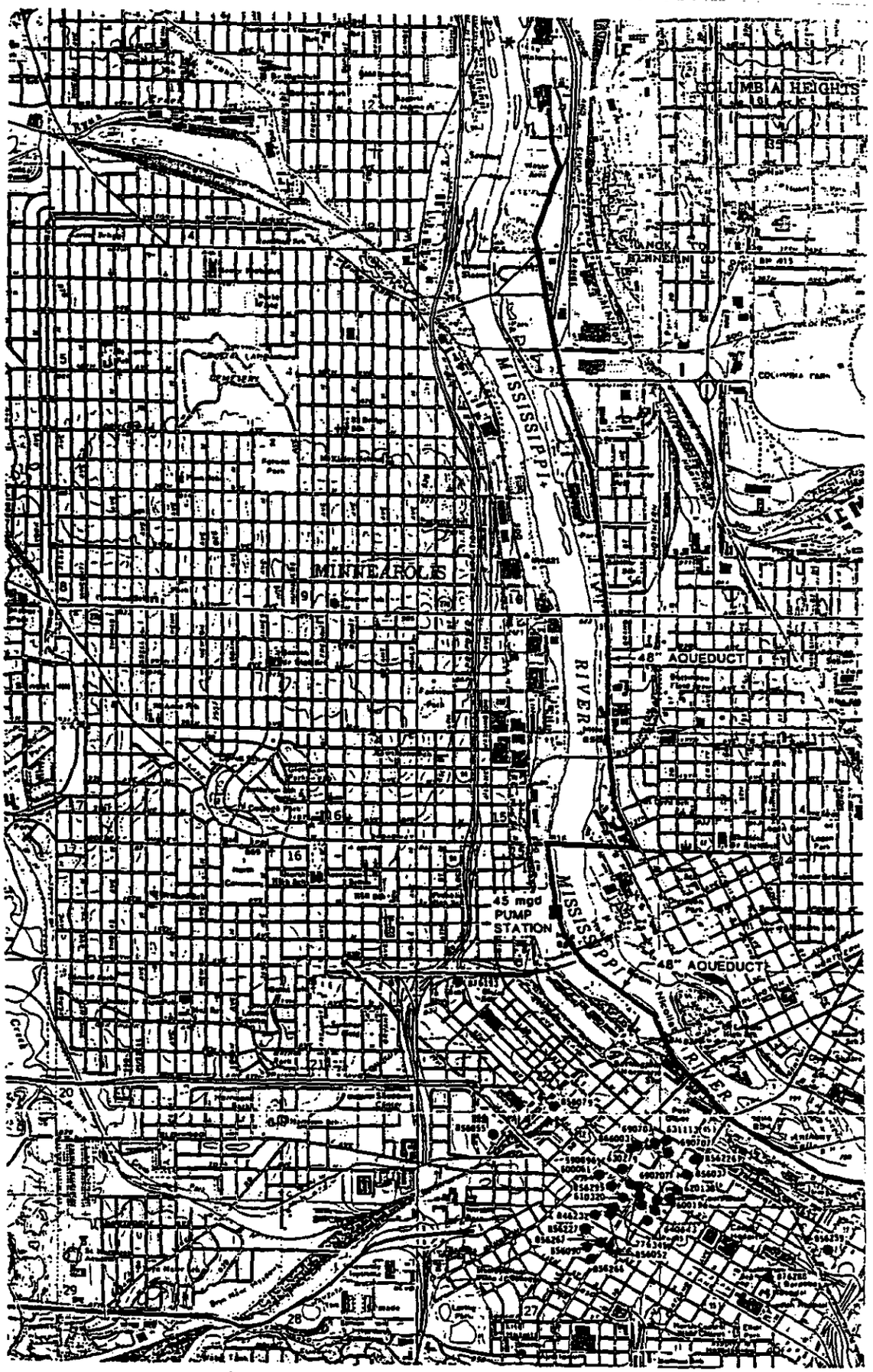
Contaminated water from areas of known contamination would move toward depressions in the potentiometric surfaces of the confined-drift and St. Peter aquifers and Prairie du Chien-Jordan aquifer if additional ground water were withdrawn. Additional ground-water withdrawals comparable to those simulated for this study would result in significantly increased drawdowns and the diversion of water from sites of known contamination near the Minneapolis Water Works toward the pumping centers.

Alternative Water Supplies

Minneapolis Water Works
City of Minneapolis

September 1991

Barr
Engineering Company



NORTH

0 2000 4000

Scale in Feet

● A/C Well Location

856055 MDNR Appropriation Permit Number

Route of Collector Pipeline

Figure 1

LOCATION OF AIR CONDITIONING WELLS

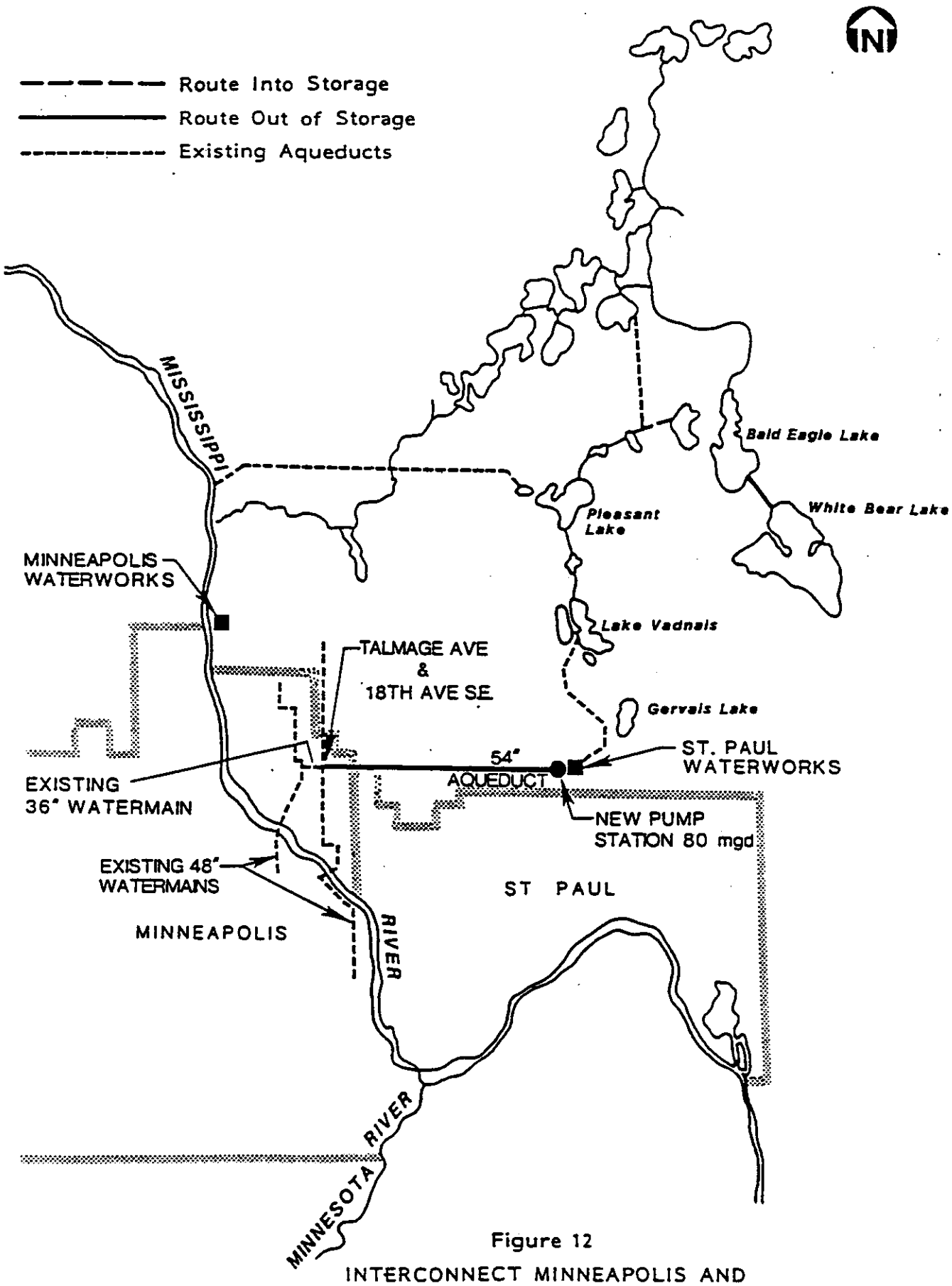


Figure 12

INTERCONNECT MINNEAPOLIS AND ST. PAUL WATER SYSTEMS

Section V:
Conclusions and Recommendations

The alternatives that were studied in this report may be broken down into four different means of providing reserve water supply: development of groundwater, storing water in natural lakes, creating new storage reservoirs, and connecting existing water supply systems. The costs range from a low of $17,000,000 for utilizing existing air conditioning wells to $101,000,000 for the development of a new well field in Fridley, which would include treatment of the water to remove known contaminants. Most of the projects would cost somewhere in the range of $30,000,000 to $50,000,000.

The anticipated minimum time to implement, the present worth, and supply capabilities of each of the alternatives is presented in Table 5-1. Table 5-2 presents an assessment of how well each alternative would satisfy the four emergency scenarios considered for this report:

1. short-term contamination of the Mississippi River
2. long-term contamination of the Mississippi River
3. reserve supply for drought contingency
4. treatment plant emergency shutdown.

The most desirable solution would be one that meets the needs of all four scenarios. The environmental, political, and cost considerations must be balanced with the technical capabilities for each alternative in the final selection process. A good (G) rating on the table indicates that the alternative would meet the needs of the particular scenario well. A fair (F) rating indicates that the alternative meets some of the needs but falls short on other concerns, e.g., an alternative may be able to supply 80 mgd to the City, but only for a period of 5 days. A poor (P) rating indicates the alternative would be very poor at meeting the design requirements.

All of the alternatives are capable of providing the total design requirement of 80 mgd except for the alternative that would utilize existing air conditioning wells. This alternative is considered capable of producing about 45 mgd that could be captured for use by Minneapolis. Using this alternative would require locating an additional water source to provide the City with the required supply.

The City may wish to give some consideration to combining portions of two or more alternatives to reduce the overall cost of the emergency supply. Another concept would be to provide a short term emergency supply, such as the Minneapolis Chain of Lakes alternative, to provide for contamination events only, and search for reservoirs upstream on the Mississippi to supplement the natural river flow during times of drought.

Table 5-1
COST AND SUPPLY SUMMARY FOR TEN ALTERNATIVES

Alternative	Years to Complete	Construction and Operation, Present Worth	Rough Estimate of Land Costs	Approximate Total Cost	Flow Rate, MGD	Maximum Duration, Days
A. Add Wells for Minneapolis Supply Distributed System	3	$31,000,000	$4,500,000	④ $36,000,000	80	NA
B. Add Wells for Minneapolis Supply: Fridley Well Field	6	96,000,000	5,000,000	⑩ 101,000,000	80	NA
C. Use Existing Air-Conditioning Wells	3	17,000,000	5,000,000	② 22,000,000	45	NA
D. Pump from St. Croix to Lakes: Pleasant Lake Option	6	32,000,000	6,900,000	⑤ 39,000,000	80	30[1]
E. Pump from St. Croix to Lakes: Rice Creek Reservoirs Option	6	36,000,000	6,000,000	⑥ 42,000,000	80	30[1]
F. Pump from Mississippi River to Lakes: Minnetonka Option	6	57,000,000	11,000,000	⑧ 68,000,000	80	30[1]
G. Pump from Mississippi River to Lakes: Minneapolis Chain of Lakes Option	4	23,000,000	250,000	③ 24,000,000	80	14
H. Create Raw Water Reservoir	7	48,000,000	10,000,000	⑦ 58,000,000	80	14
I. Create Finished Water Reservoir	7	45,000,000	40,000,000	⑨ 85,000,000	80	5
J. Interconnect Minneapolis and St. Paul Water Systems	4	21,000,000	—	① 21,000,000	80[2]	30[2]

NA - Maximum duration of alternative supply not applicable to groundwater alternatives. A minimum duration of 30 days is expected. Long duration withdrawals may affect other users.

[1]Duration may be extended by lowering lakes beyond the values listed in the report.

[2]Flow rate and duration available from St. Paul are dependent upon St. Paul's treatment plant discharge capacity, other users, and raw water supplies.

Table 5-2
RANKING OF ALTERNATIVES' ABILITY TO MEET MINNEAPOLIS' NEEDS

Alternative	Short-Term Contamination	Long-Term Contamination	Drought Contingency	Treatment Plant Inoperative
A. Add Wells for Minneapolis Supply Distributed System	F	F	F	F
B. Add Wells for Minneapolis Supply: Fridley Well Field	G	G	G	P
C. Use Existing Air-Conditioning Wells	F	F	F	P
D. Pump from St. Croix to Lakes: Pleasant Lake Option	G	G	G	P
E. Pump from St. Croix to Lakes: Rice Creek Reservoirs Options	G	G	G	P
F. Pump from Mississippi River to Lakes: Minnetonka Option	G	G	G	P
G. Pump from Mississippi River to Lakes: Minneapolis Chain of Lakes Option	G	F	P	P
H. Create Raw Water Reservoir	G	F	P	P
I. Create Finished Water Reservoir	G	P	P	G
J. Interconnect Minneapolis and St. Paul Water Systems	F	F	F	F

G = Good F = Fair P = Poor

This report has provided an initial appraisal of the construction and operation costs associated with the alternatives that appeared to be most attractive. In addition it attempted to assess some political and environmental concerns. At this time the City of Minneapolis could begin to meet with other government agencies and citizen groups to further assess these aspects of the proposed projects. From the results of these meetings and the information presented in this report, the City may then narrow the selection of alternatives for future consideration. Additional study will then be required to more accurately predict the construction, operation and maintenance costs associated with each of the alternatives retained.

The next study should include a survey of all proposed locations for pump station or aqueduct construction, mapping of this information, and preliminary designs for each alternative selected for further analysis. A reasonably detailed survey will be required to determine the technical feasibility of construction along all of the proposed corridors. The maps prepared from the surveys should show proposed easements and property acquisitions necessary for each alternative. The values of the various properties included in the easements or purchases should be assessed by a real estate appraiser so that this cost can be refined in future cost estimates. A preliminary design showing the major features of each system proposed should also be prepared. This will aid in discussions of the alternatives and in preparing more detailed cost estimates.

Also a concern for future studies is a more detailed assessment of environmental impacts. An Environmental Assessment Worksheet should be prepared for any alternative that may have an environmental impact. An Environmental Impact Statement may be necessary for the alternatives that require treatment of water for contaminants, or construction of dams or other means of raising the normal water elevation.

APPENDIX C

Water Defense Network for Supply Protection Measures

THE MISSISSIPPI RIVER DEFENSE NETWORK

The River Defense Network is a community-based spills prevention and response effort linking local, regional, and state government, industry, and trade groups. The Blandin Foundation has been the primary funder during the recently completed project design phase; committee members have also provided project planning funds. The Minneapolis Water Works funded most of the matching grant funds for the Corp of Engineers work.

The central goal of the River Defense Network is to prevent spills and to protect the Mississippi River from contamination resulting from spills. The accomplishment of this goal rests on an adequately informed, trained, and equipped network of local first responders, emergency managers, and water planners.

In December 1991, the Minnesota Environmental Quality Board, at the request of the Minneapolis Water Works, requested that the St. Paul District of the U.S. Army Corps of Engineers assist in planning for spill response and water supply management for the Mississippi River upriver from the Twin Cities. In May 1993, the Corps published its report in response to this request. Since the publication of this report, two major workshops have been convened, and two committees have worked to define the River Defense Network and develop an implementation plan to put it in place.

Implementation of the River Defense Network is now underway, funded by the LCMR and the Blandin Foundation, with the Corps of Engineers providing matching funds. Primary management responsibility for this work lies with the Metropolitan Council and the Mississippi Headwaters Board. The River Defense Network implementation phase is centered on the following major elements:

Technical Studies - determining spill response equipment needs and placement, identifying ecologically and economically sensitive sites, and assessing relative hazards of potential spill sources;

Educational Materials - developing River protection plans, monitoring protocol, and land use and watershed management principles, and raising community awareness of chemical use in river communities;

Riverine Emergency Management Model Refinement - updating the computer model and verifying assumptions with respect to river transport times and the fate of spilled material;

Data Base Management - consolidating seven, currently separate, data bases relating to spill potential and River management; and

User's Manual - preparing a manual for use by responders that will include an inventory of potential spill sources, spill responders, and River users along the River, an explanation of communications protocol, descriptions of spills management responsibilities, identification of equipment deployment sites and a description of spill response procedures.

Responsibilities
The Area Committee has three primary responsibilities:

(1) Preparation of ACP;
(2) Coordination among Federal, State and, local officials to enhance contingency planning efforts; and
(3) Work with Federal, State, and local officials to expedite decisions for the use of countermeasures, including chemical spill control agents and other mitigating substances.

Sub-Areas
Sub-area Committees are established as necessary to prepare plans at a more local or sub-area level. These Sub-area Committees are responsible for working with the State and local officials to prepare a plan for joint response efforts, including identification of environmentally and economically sensitive areas.

The Region V RRT established the Twin Cities metropolitan area for development as the second EPA Region V-led Sub-area Pilot plan. The Twin Cities metropolitan area is comprised of seven counties, including: Hennepin, Ramsey, Anoka, Washington, Dakota, Scott, and Carver.

U.S. GEOLOGICAL SURVEY UPPER MISSISSIPPI RIVER BASIN NATIONAL WATER QUALITY ASSESSMENT (NAWQA)

The NAWQA program is designed to describe the status and trends in the quality of the Nation's ground and surface water resources and to link the status and trends with an understanding of the natural and human factors that affect the quality of these resources.

The NAWQA program integrates information about water quality ranging in spatial scales, from local to national, and focuses on water quality conditions that affect a large portion of the population.

The building blocks of the NAWQA program are the assessments from the individual study units, which are or will be conducted in 60 of the major hydrologic basins of the nation. The Upper Mississippi River Basin is one of the study units.

Study unit investigations consist of activities lasting four to five years, followed by five years of low-level monitoring. Each cycle is intended to be repeated.

Within each four to five year assessment period there will be a three year period of intensive data collection. Intensive data collection for the Upper Mississippi River Basin (UMIS) NAWQA will begin in Federal fiscal year 1996.

Study unit goals include characterizing geographic and seasonal distribution of water quality in relation to human activities and natural features. Ground water, surface water

and ecological characteristics will be used to evaluate the geographic and seasonal variability in water quality and to determine contaminant sources and transport.

An important product of the study will be an understanding of the effect of the seven county Twin Cities metropolitan area on water quality. The ground water part of the study will focus on major bedrock aquifers in the Twin Cities Artesian Basin and on important unconsolidated aquifers.

National Synthesis (the national component of the NAWQA program) goals include:

(1) Comparing and contrasting the geographic and seasonal distribution of selected contaminants and water quality conditions;
(2) Assessing similarities and differences in relations between contaminant sources and water quality conditions across a broad range of physiographic and hydrologic conditions; and
(3) Evaluating the National implications between water quality and specific human activities and natural conditions found in the study units.

Study unit investigations consist of four main components which have different, but related goals:

Retrospective analysis - The review and analysis of existing water quality and ecological data. This provides a historical perspective for the study.

Environmental setting analysis - Describe the natural and anthropogenic features of the study unit that probably affect water quality. This analysis is used in the design of data collection efforts.

Occurrence and distribution assessments - This is the major part of the three year period of intensive data collection. Data collection and assessments characterize geographic and seasonal distribution of water quality conditions in relation to major contaminant sources and background conditions.

Source, transport and effect studies - Special follow-up studies of selected priority contaminants in selected areas to address specific questions about the characteristics and cause of water quality degradation.

Long-term monitoring - Assessment of long-term changes of water quality conditions. The effort tracks the status and trends of surface and ground water quality over time.

Objectives

Identify key physical and chemical constituents indicative of water quality in important aquifers in the UMIS study unit.

Identify key physical, chemical, and biological constituents indicative of water quality in rivers in the UMIS study unit. Estimate the distribution and annual stream load of selected chemicals.

Describe the relation of water quality to regional land use practices in major aquifers and in major streams.

Identify predominant factors that affect the load and concentration of "target constituents" measured in water and aquatic animals.

Describe seasonal variability of selected "target constituents" in ground and surface waters.

Describe the long term trends of "target constituents" in water.

Design sampling schemes for surface water, ground water, and aquatic fauna to effectively monitor for long-term trends in water quality.

FRIDLEY COMMUNITY AWARENESS AND EMERGENCY RESPONSE

Community Awareness and Emergency Response (CAER) is a concept developed in 1985 by the Chemical Manufacturers Association in response to the tragedy in Bhopal, India, where some 2,000 people died or suffered serious health effects as the result of an accidental release of a poison gas from a chemical plant.

Fridley CAER was formed in the fall of 1992 using the national CAER Program as a guide. The purpose of Fridley CAER is to facilitate integration of local industry and public safety emergency response plans, inform the community about emergency response planning, and promote awareness of preventive practices which will reduce the risk of an accident.

Members may share information, share equipment or services, share plans for emergency response, and/or assist in emergency responses.

APPENDIX D

Emergency Assessment for Major Water Supply Components

D-1 Raw Water Source

D-2 Collection System, Main Intakes-Pump Station #5

D-3 Collection System, Alternate Intakes-Pump Station #4

D-4 Treatment System, Softening Plant

D-5 Treatment System, Dewatering Plant

D-6 Treatment System, Fridley Filtration Plant

D-7 Treatment System, Columbia Heights Filtration Plant

D-8 Finished Water Storage

D-9 Transmission and Distribution System

APPENDIX D-1

COMPONENT: RAW WATER SOURCE

DESCRIPTION

The Mississippi River intakes are located in the pool created by the Upper St. Anthony Falls (USAF) Dam.

POTENTIAL EMERGENCIES

1. Chemical Hazard Spill
2. Severe Drought (extreme low flows)
3. Raw Water Quality Problems

BACK-UP OPTIONS (Numbers refer to the numbers in Potential Emergencies)

1. One (1) day raw water storage and one (1) day of usable finished water storage.
2. City declare EMERGENCY and limit water use (refer to City Ordinance)
3. Treatment modification or public declaration to "boil water".

CONSEQUENCES

1. Can't treat River water until contamination has been mitigated.
2. Prohibit non-essential use (according to priority set by State Statutes).

PREVENTATIVE MEASURES

1. Plan spill response / Mississippi River Defense Network
3. None except modify existing treatment (to predict and treat for all types of contaminants is unforeseeable).

SUGGESTIONS

1. Protect intakes or create more raw water and/or finished water storage.
2. Develop alternate sources

APPENDIX D-2

COMPONENT: COLLECTION SYSTEM
UNIT: Main Intakes / Pump Station #5

Note: Abbreviations
PL = Pipe Line
FSP = Fridley Softening Plant
FFP = Fridley Filter Plant
CHFP = Columbia Heights Filter Plant
UPS = Uninterruptable Power Supply
FCW = Fridley Reservoir
CHCW = Columbia Heights Reservoir
HTCW = Hill Top Reservoir
MGD = Million Gallons Per Day

DESCRIPTION

This Pumping Station has a design capacity to pump 200 MGD from the River to the first step in the treatment process. This Building is also capable of delivering 220 million gallons of finished water to the consumer.

POTENTIAL EMERGENCIES

(1) River Contamination
(2) River intakes Grates Freezing or clogging w/debris.
(3) Power outage.
(4) Fire Explosion.
(5) Phone Service Interruption.
(6) Mechanical Failure.
(7) Natural Disaster

BACK-UP OPTIONS

(1) (2) (3) (4) C.W.'s & raw water basin C.H. 24 Hr. Supply of water.
(2) There are 5 River intakes not all are required to be in service at one time.
(3) Feeders from NSP are all placed where they are not as vulnerable as residential power supplies.
(3) We have several small portable generators and a truck mounted 440 V 75 A generator to provide power for repair equipment and some building systems.
(3) We have a supply of water that we need no electric power to deliver.
(3) (4) (7) #4 Pumping Station can supply 80 MGD to treatment.
(4) (7) Supply water to city by way of 16PL and 20PL and the new #9 Pumping Station under construction.
(5) Backup Red phone system.
(5) Code call.
(5) Cellular Phone for isolated failure.
(5) If long term interruption is anticipated get two way radios from radio shop.
(6) Most every critical piece of equipment has a backup counter part or bypass

CONSEQUENCES

(1) (3) (4) (7) Loss of ability to supply raw water to FSP, FFP.
(2) Short term shut down at treatment plants.
(3) (4) Lower than normal city water pressure.
(5) Slower reaction time to emergencies
(6) In most cases none.
(7) Loss of ability to supply finished water to the City from #5 Station.

PREVENTIVE MEASURES

(1) On going River Management effort between Army Corps of engineers and EPA. R.E.M.M.
(3) (4) (6) (7) We have a complete in house repair facility with trained employees that can make or fix almost anything.
(2) (3) (4) (6) (7) We have an alarm system that will give us advanced warning in some cases.
(2) Inspect intakes on regular interval and manually rake ice and debris from trash rack as required. If problem becomes unmanageable by regular work crew additional personnel are called in to help with the problem.
(3) We have several feeders from NSP.
(4) Flammable materials are not stored in pump station.
(4) Electrical disconnects are easily accessible.
(4) Fire extinguishers are readily available.
(5) U.P.S. for phone system.

SUGGESTIONS

(1) (2) (3) (4) (7) Pursue Alternate Water Sources Options.
Create Additional finished water storage as a back-up supply.
Perform more on-going preventive maintenance.

APPENDIX D-3

COMPONENT: COLLECTION SYSTEM
UNIT : Alternate Intakes / Pump Station #4

DESCRIPTION

This Pumping Station is capable of pumping 80 MGD from the FSP or the River to the C.H.F.P.

POTENTIAL EMERGENCIES

(1) River Contamination
(2) River intakes Grates Freezing or clogging w/debris.
(3) Power outage.
(4) Fire Explosion.
(5) Phone Service Interruption.
(6) Mechanical Failure.
(7) Natural Disaster.

BACK-UP OPTIONS

(1) (2) (3) (4) (7) C.W.'s & raw water basin C.H. hold approximately a 24 Hr. Supply of water.
(2) This station normal does not take water from the River but if we are operating in that mode there are 4 River gates, we don't need all 4 in order to operate the station at capacity.
(3) Feeders from NSP are all placed where they are not as vulnerable as residential power supplies.
(3) We have several small portable generators and a truck mounted 440 V 75 A generator to provide power for repair equipment and some building systems.
(3) We have a supply of water that we need no electric power to deliver.
(3) (4) (7) #6 Pumping Station can supply over 100 MGD to FFP.
(4) Supply water to city by way of 16PL and 20PL and the new #9 Pumping Station under construction. Using #7PL to maintain CHCW.
(5) Backup Red phone system.
(5) Code call.
(5) Cellular Phone for isolated failure.
(5) If long term interruption is anticipated get two way radios from radio shop.
(6) Most every critical piece of equipment has a backup counter part or bypass.
(7) #7PL Can be used to push water to CHCW.

CONSEQUENCES

(1) (3) (4) (7) Loss of ability to supply raw water to CHFP
(2) Normally no effect. But could cause a short term shut down at CHFP if we are operating in this mode.
(3) (4) (7) Lower than normal city water pressure if we are very high rates.
(5) Slower reaction time to emergencies
(6) In most cases none.

PREVENTIVE MEASURES

(1) On going River Management effort between Army Corps of engineers and EPA. R.E.M.M.
(3) (4) (6) (7) We have a complete in house repair facility with trained employees that can make or fix almost anything.
(2) (3) (4) (6) (7) We have an alarm system that will give us advanced warning in some cases.
(2) Inspect intakes on regular interval and manually rake ice and debris from trash rack as required. If problem becomes unmanageable by regular work crew additional personnel are called in to help with the problem.
(3) We have several feeders from NSP.
(4) Flammable materials are not stored in pump station.
(4) Fire extinguishes are readily available.
(5) U.P.S. for phone system.

SUGGESTIONS

(1) (2) (3) (4) (7) Pursue Alternate Water Sources Options.
Create Additional finished water storage as a back-up supply.
Perform more on-going preventive maintenance.

APPENDIX D-4

COMPONENT: TREATMENT SYSTEM
UNIT: Softening Plant

DESCRIPTION

The softening process, with a 180 MGD capacity includes removal of minerals and organic material, some disinfection, clarifying, pH adjustment and taste and odor control.

POTENTIAL EMERGENCIES

1. Power Outage
2. Chemical Delivery Interruption
3. Mechanical Failure
4. Natural Disasters - Flooding and Tornadoes
5. Phone System Interruption

BACK-UP OPTIONS

Only one plant, but all equipment and treatment units have redundancy.

CONSEQUENCES

1. No water treated.
2. No water treated or treated at unacceptable levels.
3. Not able to fully treat the water.
4. Floods - could short out pumps and transformers in the basements.
   Tornadoes - could damage parts of the treatment plant, but unlikely to destroy it completely.

PREVENTIVE MEASURES

1. Four lines into the complex.
2. Multiple sources of supply except $KMnO_4$ which can be replaced by carbon.
3. All machinery has at least one back-up which is maintained and used regularly.
4. Floods would flood basements first and we have large pumps in place which can pump out the water. A tornado can't be prevented but the building should at minimum be partially operational unless the main flume is destroyed.
5. Uninterruptable Power Supply (UPS)

SUGGESTIONS

Change out equipment more frequently.
Perform more on-going preventive maintenance.

APPENDIX D-5

COMPONENT: TREATMENT SYSTEM
UNIT: Dewatering Plant

DESCRIPTION

The Dewatering Plant in Fridley was built in 1973.
Lime residual processing and softened water recycling facility with pumping, thickening, centrifuging and storage capability.

POTENTIAL EMERGENCIES

Mechanical Failure, Chemical Reaction Freezing of Treatment Residuals, Natural Disaster, Power Outage, Transportation Curtailment, Telephone System Interruption

BACK-UP OPTIONS

Re-direct incoming flow to lagoons and/or by-pass Dewatering Plant Thickeners.

CONSEQUENCES

Inability to recycle softened water (2 to 2½ MGD depending on duration of outage)
Increased liquid and solids loading of lagoons
Delays the schedule for cleaning and repair of treatment units

PREVENTATIVE MEASURES

Preventive maintenance program
Maintain inventory of spare parts
Maintain treatment parameters on chemical dosages
Back up power supply (UPS)

SUGGESTIONS

Increase thickener and coag tank capacity
Increase monitoring of intake water quality and identify freezing precursors
Ongoing preventive maintenance with on-site personnel which provides familiarity of function and location of plant equipment.

APPENDIX D-6

COMPONENT: TREATMENT SYSTEM
UNIT: Fridley Filtration Plant

DESCRIPTION

The Fridley Filtration Plant (FFP), Minneapolis Water Works, functions as the main filtration plant for the City of Minneapolis and seven surrounding communities. The FFP receives water from the Fridley Softening Plant (FSP) that has been treated with the excess lime softening process.

Various chemicals are added to the softened water as it travels through the plant. Pretreatment additions to this 135 million gallon per day (MGD) facility include chlorine and ammonia for disinfection, fluoride for preventing tooth decay and ferric chloride for secondary coagulation. After these chemicals are rapidly mixed with the softened water the water flows into four coagulation sedimentation basins (each with a four million gallon capacity). In the basins the water velocity is reduced substantially to let floc form which reduces color and turbidity (cloudiness). After spending four to eight hours in the coagulation basins, the water proceeds to the twenty mixed media filters, flows through for final polishing (reduction of turbidity to typically 0.2 NTU). After filtration, the water is treated with chlorine and ammonia to bring the chlorine residual to 3.6-4.2 parts per million (ppm). A corrosion inhibitor is also added to help reduce lead levels in service lines and prevent formation of "red" water caused by corrosion of un-lined iron pipes. The finished treated water then proceeds to the thirty-two million gallon Fridley Reservoir and from there it is pumped to our one-half million customers throughout the Metropolitan Area.

POTENTIAL EMERGENCIES

1. Severe chlorine or ammonia leak
2. Gross contamination of the water
3. Natural disaster
4. Power failure
5. Mechanical failure
6. Chemical delivery problems

BACKUP OPTIONS

1-5 Columbia Heights Filtration Plant (80 mgd capacity)

6. Adequate chemical storage

CONSEQUENCES

1. Severe shortage in summer because of high demand
2. CHFP can supply limited quantities, FFP shutdown, severe shortage
3. FFP shutdown, however CHFP available, also interior chem supplies may allow quick startup @ FFP. "red" phone allows direct communication of all plants with dispatcher.
4. CHFP can assume full load in fall through spring, 50% in summer
5. Built in redundancy of all equipment allows transition without interruption.
6. Shortages could result in shutdown.

PREVENTIVE MEASURES

1. HAZMAT training for staff, coordination with fridley and mpls fire departments. Addition of extensive chlorine and ammonia alarm systems. Revision to cl_2 railcar system. Extensive revisions to CHFP cl_2 delivery system from pressurized to vacuum. Addition of cl_2 scrubber to minimize fugitive emissions.
2. Member, River defense network. Staff @ ps #5 & FSP monitor water, can shut down plants quickly
3. Physical separation of plants adds safety margin.
4. Installation of backup generator .
5. Pumps, storage of chemicals all redundant. Maintenance force on hand for repair and preventative maintenance
6. Adequate supplies of chemicals and availability from more suppliers.

SUGGESTIONS

1. Increase ties with fire dept. HAZMAT groups. Change to aqueous ammonia system to eliminate pressurized anhydrous ammonia
2. Increase communications with other agencies (epa, River defense net etc.)
3. add weather station to plant, link by computer with fire departments, alarm systems , and other operations staff.
4. Increase storage capacity for finished water. Activate CHFP basin for extra 65mg capacity.
5. Increase budget for equipment replacement. Maintain adequate staff for maint. And inspection.
6. Increase chemical storage capacity, secure contracts with multiple suppliers.

APPENDIX D-7

COMPONENT: TREATMENT SYSTEM
UNIT: Columbia Heights Filtration Plant

DESCRIPTION

The Columbia Heights Filtration Plant (CHFP), Minneapolis Water Works, functions as a supplemental filtration plant supplying extra water, up to 80 million gallons per day (MGD) during peak summer demands. The plant can carry a high percentage of the fall through spring demand (60-70 MGD) in the event that the Fridley Filtration Plant is shut down or operating at reduced rate. The CHFP has further advantages. If the Fridley Softening Plant should become disabled or the low lift pumps at Pumping Station No. 5 also become disabled, both facilities can be bypassed and water pumped to CHFP directly from the Mississippi River. Also, there is a 75 million gallon open reservoir that CHFP can draw from for 10 to 12 hours at 20 MGD providing some water to the system during either scheduled or emergency shutdowns of the Softening Plant or P.S #5.

The CHFP draws its softened water from its adjacent 75 million gallon open reservoir. Chlorine and ammonia are added for initial disinfection as well as ferric chloride (a coagulant that helps clarify the water) and fluoride for tooth decay. After traveling through the mixing chambers where the water and added chemicals are thoroughly mixed, the water proceeds into the six coagulation basins of 7.5 million gallon total capacity. In these basins, the water velocity is dramatically reduced to allow floc particles to form, coagulate, and settle out; increasing the clarity of the water and reducing its color. After spending three to nine hours in the coagulation basins, the water flows to twenty-four rapid sand filters, further reducing its turbidity (to levels of between 0.2-0.3 NTU) and giving the water its final "polish". After filtration, chlorine and ammonia are again added to the water to bring the chlorine residual to a level of 3.6-4.2 parts per million (ppm). A corrosion inhibitor is also added to help reduce lead levels in service lines and help prevent "red" water caused by corrosion of unlined iron pipes.

POTENTIAL EMERGENCIES

1. Severe chlorine or ammonia leak
2. Gross contamination of the water
3. Natural disaster
4. Power failure
5. Mechanical failure
6. Chemical delivery problems

BACKUP OPTIONS

1-5 Fridley Filtration Plant (135 mgd capacity)

6. Adequate chemical storage

CONSEQUENCES

1. Severe shortage in summer because of high demand
2. FFP can supply adequate amounts of water except in severe periods of demand. CHFP shutdown and contaminated areas drained.
3. CHFP shutdown, however, FFP available, also interior chem. Supplies may allow quick startup @ CHFP. "red" phone allows direct communication of all plants with dispatcher.
4. CHFP has full capacity with backup aux. Generator. However basin can only supply 10 mg if p.S.#5 Is shutdown.
5. Built in mechanical redundancy of all equipment allows transition without interruption.
6. Shortages could result in shutdown. FFP would be available to carry increased load.

PREVENTIVE MEASURES

1. HAZMAT training for staff, coordination with fridley and mpls. Fire departments. Addition of extensive chlorine and ammonia alarm systems and vacuum scrubber system.
2. Member, River defense network. Staff @ ps #5 & FSP monitor River water, can shut down plants quickly.
3. Physical separation of plants adds safety margin.
4. Backup generator available immediately.
5. Pumps, storage of chemicals all redundant. Maintenance force on hand for repair and preventative maintenance
6. Adequate supplies of chemicals, based on typical seasonal demands, must be kept on hand. Chemicals must be available from more than one supplier on short notice.

SUGGESTIONS

1. Increase ties with fire dept. HAZMAT groups.
2. Increase communications with other agencies (epa, River defense net etc.)
3. Add weather station to plant, link by computer with fire departments, alarm systems , and other operations staff.
4. Increase storage capacity for finished water. Activate CHFP basin for extra 65mg capacity.
5. Increase budget for equipment replacement. Maintain adequate staff for maint. And inspection.
6. Increase chemical storage capacity, secure contracts with multiple suppliers.
7. Use of aqueous ammonia

APPENDIX D-8

COMPONENT: FINISHED WATER STORAGE

DESCRIPTION

32 MG Reinforced Concrete Ground Reservoir at Fridley

40 MG Reinforced Concrete Ground Reservoir at New Brighton

45 MG Non-Reinforced Concrete Ground Reservoir at Columbia Heights

10 MG Reinforced Concrete Ground Reservoir at Columbia Heights

1½ MG Reinforced Concrete Elevated Tank @ South Minneapolis

POTENTIAL EMERGENCIES

1. Contamination
2. Power Outage
3. Natural Disaster
4. Structural Failure

BACK-UP OPTIONS (Numbers refer to the numbers in Potential Emergencies.)

1. Other reservoirs + 60 MG raw water storage
2. Alternate power supply for pumps (Columbia Heights and Hilltop feed by gravity)

3.&4. Other reservoirs and raw water storage.

CONSEQUENCES

1. Drain and disinfect
2. Can't pump water in and/or out of Fridley's reservoir

3&4 Partial or total collapse of structure

PREVENTIVE MEASURES

1. Fill cracks to prevent infiltration and protect with waterproofing membrane.
2. Maintain back-up power for pumps.
4. Perform Structural Preventive Maintenance

SUGGESTIONS

1. Protect in-ground reservoir against infiltration and cross-connection.
4. Perform regular inspection to watch for signs of structural deterioration.

APPENDIX D-9

COMPONENT: TRANSMISSION AND DISTRIBUTION SYSTEM

DESCRIPTION

48" Distribution mains perimeter the City. Five 36" to 48" mains bring water to the City's interior. Numerous 24" watermains distribute the water.

POTENTIAL EMERGENCIES

1. Water main breaks
2. Contamination
3. Broken valves

BACK-UP OPTIONS

1. Re-route water from other distribution mains

CONSEQUENCES

1. Localized loss of pressure possible

PREVENTIVE MEASURES

1. Excercise valves
2. Inspect distribution mains when they're down

SUGGESTIONS

1. Add water distribution mains for redundancy in suspect areas.

APPENDIX E

Emergency Response Plan for Hazardous Material Incidents

MINNEAPOLIS WATER WORKS

EMERGENCY RESPONSE PLAN

FOR HAZARDOUS MATERIALS INCIDENTS

May, 1991

I. PLANNING BASIS

A. Purpose

The purpose of this Hazardous Materials Emergency Response Plan is to establish a procedure for the timely mitigation of hazardous materials incidents within property of the Minneapolis Water Works at both the Fridley and Columbia Heights facilities.

In accordance with the provisions of Paragraph Q, 29 CFR 1910.120, adopted by reference in Minnesota Rules 5205.0010, the Minneapolis Water Works has developed this Hazardous Materials Emergency Response Plan.

B. Objectives

1. To describe operational concepts, organization, and support systems required to implement the plan.

2. Identify authority, responsibilities, and actions of federal, state, local and private industry agencies necessary to minimize damage to persons, the environment, and property, and to aid in mitigating the hazard.

3. Establish an organizational structure that has the ability to function within the property limits of the Minneapolis Water Works facilities at Fridley and Columbia Heights.

4. To use appropriately, those plant personnel, who have been trained to mitigate hazardous materials incidents.

5. This Hazardous Materials Emergency Response Plan may be implemented by any employee in the event of a spill, leak, or release of a hazardous material that threatens life or property and requires fire department response.

II. ADMINISTRATION

A. Scope

1. Geographical Factors

This plan is concerned with hazardous materials incidents that occur within the boundaries of the Minneapolis Water Works facilities that lie adjacent to a substantial urban population.

2. The Hazard

The hazard shall include actual or potential fires, spills, leaks, rupture, or contamination, and any threat to life safety involving chlorine or ammonia stored at either facility.

3. The Hazardous Materials

a. **Liquid Chlorine.**

Description: Pungent, irritating, greenish-yellow gas.

Fire and Explosion Hazards: Heavier than air; noncombustible in air, but most combustible materials will burn in chlorine as they do in oxygen; flammable gases and vapors will form explosive mixtures with chlorine. Reacts explosively, or forms explosive compounds, with many common chemicals, especially acetylene, turpentine, ether, ammonia gas, fuel gas, hydrocarbons, hydrogen, and finely divided metals.

Life Hazard: Toxic gas. Liquid chlorine will cause serious skin burns.

Storage configuration: See Annex A and B.

b. **Anhydrous Ammonia.**

Description: Colorless gas with extremely pungent odor.

Fire and Explosion Hazards: Flammable gas (flammable limits 16% and 25%, horizontal propagation). Presence of oil or other combustible materials will increase the fire hazard. Ignition temperature, 1204 degrees F. Ammonia gas is lighter than air (density 0.6).

Life Hazard: Causes varying degrees of irritation to the eyes, skin or mucous membranes; may severely injure the respiratory membranes; may severely injure the respiratory membranes with fatal results. Liquid anhydrous ammonia causes severe burns on contact.

Storage Configuration: See Annex A and B.

D.O.T Hazard Class

Chlorine: Non-flammable gas - DOT 1017

Ammonia: Non-flammable gas - DOT 1005

4. The Incident

This plan is designed to be used at any ammonia or chlorine incident associated with any mode of public or private transportation, facility and/or storage sites. The Incident Command System will be used for on-scene control and coordination throughout the incident as established by the standard operating procedures of the Fridley and Columbia Heights Fire Departments.

B. Authority and Responsibility for Responding

1. The Hazardous Materials Response Team (HMRT) consists of twenty two (22) persons from the on-site Waterworks staff who are in the process of training to the Hazardous Materials Technician (Industrial) level for chlorine and ammonia incidents. They will respond to spills, leaks, and releases of ammonia or chlorine incidents within the facilities and attempt to mitigate the effects of the incident at Level I.

2. The facility HMRT will be augmented and assisted by the Hazardous Materials Response Teams from the Fridley and Columbia Heights Fire Departments for any spill, leak or release at Level II and Level III.

III. HAZARDOUS MATERIALS INCIDENT CLASSIFICATION

There are three (3) levels of hazardous materials incident classification. The basis used for determining the level of a hazardous materials incident are:

1. Level of technical expertise required to mitigate the incident.

2. Extent of municipal, county, state, and federal government involvement.

3. Extent of required civilian evacuation.

4. Extent of injuries and/or deaths.

5. Extent and complexity of decontamination procedures.

A. Level I Incident

1. Spills, leaks, ruptures, and/or fires involving ammonia or chlorine that can be contained, extinguished, and/or abated using equipment, supplies, and resources immediately available at facility; *and*

2. Ammonia or chlorine incidents that do not require the evacuation of civilians.

3. Responders to <u>any</u> ammonia or chlorine incident must be prepared to conduct decontamination operations at any time during the operation.

B. Level II Incident

1. Ammonia or chlorine incidents that can only be identified, tested, sampled, contained, extinguished, and/or mitigated using resources normally on hand in the Hazardous Materials Response Team; an ammonia or chlorine incident that requires the use of chemical protective clothing and equipment.

2. Ammonia or chlorine incidents that require evacuation of civilians within the area of the facility; *and/or:*

3. Fires involving ammonia or chlorine that are permitted to burn for a controlled period of time, or are allowed to burn until the fuel load is exhausted.

4. This level of response will require personnel to approach and if trained and equipped, to make entry into a contaminated area. A decontamination capability is essential at this level.

5. Any HMRT qualified individual on an initial response has the authority to upgrade a Level I incident to a level II or higher hazardous materials incident.

C. Level III Incident

1. Spills, leaks, and/or ruptures that can only be contained and/or mitigated using the highly specialized equipment and supplies available to the Hazardous Materials Response Team; *and/or*

2. Fires involving ammonia or chlorine that are allowed to burn due to ineffectiveness or dangers of the use of extinguishing agents, runoff, or the unavailability of an extinguishing agent; and/or there is a real threat of large container failure; and/or an explosion, detonation, BLEVE, or container

failure has occurred which results in a contamination hazard; *and/or*

3. Ammonia or chlorine incident that requires evacuation of civilians extending across jurisdictional boundaries and/or there are serious civilian injuries and/or deaths as a result of the ammonia or chlorine incident; *and/or*

4. Ammonia or chlorine incident that requires a hazardous materials response team; and/or decontamination of civilians or response personnel are required at the scene; *and/or*

5. Ammonia or chlorine incident that has become one of multi-agency involvement of large proportions.

IV. INCIDENT COMMAND AND SCENE MANAGEMENT

A. Incident Commander

The Incident Commander (IC) shall be the first arriving MWW Haz Mat Technician until properly relieved by a designated MWW supervisor or fire department officer responsible for supervising the mitigation of hazards at the scene of a ammonia or chlorine incident. Upon the IC's arrival, the IC shall secure and maintain control until the situation has been mitigated.

1. The Fridley/Columbia Heights Fire Departments shall furnish the Incident Commander for the scene of all ammonia or chlorine incidents within the city limits of Fridley or Columbia Heights. The fire department shall coordinate and direct all fire department activity at that particular scene to include but not limited to, interagency coordination, rescue and first aid, product identification, scene stabilization and management, suppression activities, protection of exposures, containment, agency notification, scene security, personal protection and decontamination.

2. Hazardous Materials Response Teams from other jurisdictions shall report to and take direction from the fire department Incident Commander.

3. The Incident Commander shall maintain close liaison with the On-Scene Coordinator.

4. Incident Commander Responsibilities

a. Determine what county, state, and federal agencies need to be notified and/or send a representative to the incident scene and convey this information to the On-Scene Coordinator. One call to the Minnesota Division of Emergency Management Duty Officer at 1-800-422-0798 and a request to notify other agencies will accomplish this task.

b. Identify and establish a Restricted Zone and insure that non-essential personnel are removed and kept out of that zone.

c. Upgrade the level of the incident as required and notify all participants via Anoka County dispatch.

B. On-Scene Coordinator

The On-Scene Coordinator (OSC) shall provide overall management and coordination of an ammonia or chlorine incident. The OSC shall be responsible for the identification of the incident resources and needs, the procurement of these resources and the coordination of the resource use, in order to mitigate the incident and protect life, property, and the environment.

The On-Scene Coordinator shall not be responsible for the detailed direction of technical tasks/procedures, but shall see that these procedures are accomplished. Scene management decisions are to be made with the assistance of expert advisors.

1. Freeways, State Roads

For all ammonia or chlorine incidents that occur on any freeway or state road, including those within the Cities of Fridley and Columbia Heights, the jurisdiction is that of the senior officer present of the Minnesota State Patrol. This officer may elect to assume the duties of On-Scene Coordinator if s/he is qualified to do so.

2. Within Fridley/Columbia Heights City Limits

a. For all ammonia or chlorine incidents that occur within the city limits of Fridley/Columbia Heights, an officer of the Fridley/Columbia Heights Fire Departments shall function as the On-Scene Coordinator.

b. Public and Private Property (Off-Road)

For all other ammonia or chlorine incidents that occur within the city limits of Fridley/Columbia Heights, a qualified officer of the Fridley/Columbia Heights Fire Departments shall function as On-Scene Coordinator.

C. Safety Officer

The Incident Commander will appoint a Safety Officer (SO) for every ammonia or chlorine incident. The SO will be a qualified fire department officer. The SO has two areas of responsibility - first, the safety of everyone operating on the incident scene and second, the safety of those operating within the HOT Zone. The SO has the authority to stop any operations that are deemed unsafe.

V. ISOLATION CONTROL ZONES

A. HOT Zone

1. The Hot Zone is the area immediately dangerous to life and health that requires complete, appropriate protective clothing and equipment based on product identification. Entry requires approval of the IC or appropriate sector officer and/or Safety Officer. Complete back up and rescue teams must be in-place at the perimeter before operations begin. Only those with a specific job assignment may enter for a limited time.

2. Identification of a HOT Zone shall be the responsibility of the IC prior to the arrival of a Hazardous Materials Technician who may recommend modifications if required.

B. WARM Zone

1. The WARM Zone is the area forward control for hazardous material operations outside the HOT Zone. Personnel protection is not required. The WARM Zone is restricted to operations and support personnel essential to hands-on work performance in the HOT Zone.

2. Identification of a WARM Zone shall be the responsibility of the IC prior to the arrival of a Hazardous Materials Technician who may recommend modifications if required.

C. COLD Zone

1. The COLD Zone is the safe area for those agencies directly involved in the operation which includes the IC, Command Post, representatives from appropriate agencies and the media.

2. Identification of a COLD Zone shall be the responsibility of the IC prior to the arrival of a Hazardous Materials Technician who may recommend modifications if required.

D. Decontamination Zone

1. The Decontamination Zone, normally located in the WARM Zone, shall be designated as necessary to provide personnel decontamination in an effort to reduce or stop the spread of suspected contaminants.

2. Identification and the set-up of the Decontamination Zone shall be done under the supervision of the Hazardous Materials Technician present on the scene.

MINNEAPOLIS WATER WORKS

HAZARDOUS MATERIALS EMERGENCY RESPONSE PLAN

[FRIDLEY & COLUMBIA HEIGHTS FACILITIES]

ANNEX A

THE OPERATIONS PLAN

I. ORGANIZATIONAL ROLES AND RESPONSIBILITIES

A. Anoka County Emergency Communications Center

Personnel of the Anoka County Emergency Communications Center are the central contact point with instructions and procedures relating to the alert or call-out of response forces, including the individuals with command responsibility for spill response within the jurisdiction. Depending on the severity of the situation as described by the initial caller, various levels of response will be established at one of the three levels as defined in the basic plan.

B. Fridley/Columbia Heights Fire Departments

Initially, the senior fire officer (Incident Commander) will be in charge of all emergency operations including the assignment of the Safety Officer and responsibilities to law enforcement agencies through the senior police officer on the scene.

C. Minnesota Pollution Control Agency (MN-PCA)

On arrival of the representative from MN-PCA, the fire department(s) will coordinate with the MN-PCA representative in relation to containment, cleanup, restoration and recovery. The representative from MN-PCA will not assume operational control but will advise the Incident Commander at the scene.

E. Minneapolis Water Works Hazardous Materials Response Team

Twenty two (22) Minneapolis Water Works personnel are in the process of training to the Hazardous Materials Technician (Industrial) Level. The HMRT is presently

equipped to deal with Level I incidents and to assist other HMRTs at the Technician Level.

F. **Five City Consortium Haz Mat Response Team (HMRT)**

The Five City (Blaine/Spring Lake/Moundsview; Columbia Heights, Coon Rapids, Fridley, and St. Anthony) HMRT consists of over 25 career and over 100 paid-on-call members recruited from five fire departments within the county who are trained to the Hazardous Materials Technician and Specialist level. This team has the capability to field 2-5 specially trained four-person teams for the specific purpose of responding to chemical emergencies. The Five-city HMRT can provide expertise and equipment specifically developed to help control and mitigate a hazardous material incident at Level II and III. It is the policy of the Five-city Team to advise the Incident Commander at the scene and to assume no operational control.

G. **Regional Response Team - EPA Region V**

On request to the State Duty Officer, Minnesota Division of Emergency Management, from local officials or via a request from MN-PCA, the Regional Response Team from EPA Region V may respond to a incident that exceeds the capability of local resources. On their arrival, On-Scene Coordinator duties may be handed over to the Region V Team Leader if that agreement is reached by the Incident Commander and the Team Leader.

II. GENERAL PROCEDURE FOR HANDLING AN AMMONIA OR CHLORINE INCIDENT.

A. The following general guidance applies to all employees responding to a hazardous material incident within the facility. The first HMRT member responding will assume the duties of Incident Commander until such time as relieved by a designated supervisor or fire department officer. That person's responsibilities will include:

1. **Initial Employee Response Action:**

a. For an uncontrolled spill of LESS THAN ONE (1) QUART of ammonia or chlorine, the following steps will be taken:

(1) Notifies the appropriate foreman and/or assigns at least one other person to assist in mitigating the spill/leak with

the appropriate personal protective equipment.

b. For a spill GREATER THAN ONE (1) QUART of ammonia or chlorine, the following steps will be taken:

(1) Evacuate the immediate spill area.

(2) Call 9-1-1 and:

(a) Report that an (ammonia or chlorine) spill has taken place.

(b) Give the location of the spill as in or near a specific building.

(c) Indicate if fire is present.

(d) Indicate if anyone is injured.

(e) Give the approximate amount spilled or leaking.

(3) Notify the dispatcher who will notify a designated supervisor and will open the appropriate gate. [See Annex B3] The foreman will:

(a) Determine if the spill is a Level I or II incident. If Level I, directs that spill/leak be mitigated and orders the appropriate response personnel to the spill/leak scene to assist.

(b) If the spill is Level II:

1 Directs the employee to a safe location, UPWIND and UPGRADE of the spill and to provide information to incoming fire personnel as to the location of the spill.

2 Determine if the size of the leak/spill requires site evacuation. If yes, orders evacuation of site.

3 Assigns one person to meet responding police/fire apparatus at 43d Avenue gate ensuring that responders arrive UPWIND of the spill/leak. If 43d Avenue Gate is NOT usable due to wind direction, directs that another gate be opened and notifies 9-1-1 dispatcher of that change.

4 Contacts dispatcher to shut down pump station #4 and/or #5, if appropriate.

5 Reports to the vicinity of the spill/leak site to coordinate with the first arriving fire department officer.

B. MEDIA RELATIONS

1. Public Information Officer - The Incident Commander will assign a fire officer to work with a representative of the facility as the Public Information Officer for the incident. This officer shall coordinate all media relations with both city and county public information officers as designated in the City Emergency Operations Plan.

2. Information on the hazmat incident will be released to the public in the following segments:

* Initial Report - The first assessment of the problem. This includes the cause of the incident, the size of the hazard, the units and agencies notified and on the scene, immediate Emergency Response Plan actions (e.g., evacuation), estimated time length of the incident, health warnings, and monitoring facilities (when necessary), and when and where to receive further updates.

* Regular Updates - A brief recap of the initial report. This includes new information received, changes in the status of the hazardous materials (e.g., movement of vapor cloud) and any further instructions for the health and welfare of those affected (overnight accommodations for those displaced).

* Final Report - A brief recap of the entire incident. This includes community and Emergency Response Plan actions and the estimated time line necessary to bring the community back to normal operations.

* Notify broadcasters and newspapers

- WCCO, Channel 4	612-330-2502
- KSTP, Channel 5	612-642-4428
- KMSP, Channel 9	612-925-4636
- KARE, Channel 11	612-541-8024
- Star/Tribune	612-372-4141
- Pioneer/Press	612-222-5011

C. DECONTAMINATION OF PERSONNEL AND EQUIPMENT

1. The nine-step decontamination procedure will be used at all ammonia or chlorine incidents where decontamination is required for fire department, support, or civilian personnel. This function needs to be set up as early as possible in the operation.

2. The decision to implement all or part of the decontamination procedure is based upon a field analysis of the hazards and risks involved by the Haz Mat Technicians in cooperation with the Incident Commander.

   a. The complete nine-step decon procedure will consist of the following actions:

ACTIONS	STEP/PROCEDURES	
Personnel enter decon area and drop tools on contaminated side. Move to Step 2.	Direction of Travel	1-Tools
Remove as much contamination as possible. Dilution is conducted inside diked area.		2-Run-Off Control Dike
Personnel are in SCBA. Move		

to Step 3.

Remove SCBA (keep facepiece) to contaminated side and move to Step 4 or don new SCBA and re-enter work area. Move to Step 4	3-SCBA Area
Remove protective clothing and place on contaminated side. Move to Step 5 or transport personnel to fixed decon facility.	4-Protective Clothing Area
Remove all personal clothing and isolate items on contaminated side. Bag personal items. Move to Step 6	5-Personal Clothing Area
Personal showering using soap and sponges. Bag cleaning items for disposal. Move to Step 7.	6-Shower Area
Personnel dry off. Bag towels. Put on clean clothing. Move to Step 8	7-Dry-off Area
Personnel receive medical evaluation and treatment as necessary. Move to Step 9.	8-Medical Evaluation
Identify personnel. Complete field records. Transport personnel to hospital or to a fixed decon facility for Steps 5-8.	9-Transport Area
	EXIT

D. CRITIQUE OF RESPONSE AND FOLLOW UP

1. Each response to a ammonia or chlorine incident that is under the control of the Fridley/Columbia Heights Fire Departments shall be formally terminated by the Incident Commander to ensure Emergency Response Personnel (ERP) safety, to establish a record of events, and to document the

lessons learned from the entire incident.

2. The Incident Commander in cooperation with the Superintendent of Water Treatment shall arrange for:

   a. Incident de-briefing for all level incidents to:

      (1) Insure that responders are informed of exactly what hazmats they were (possibly) exposed to, their signs and symptoms, and to arrange for them to undergo medical evaluation if applicable. Insure that exposure levels are logged for future reference.

      (2) Identify equipment damage and unsafe conditions requiring immediate attention or isolation for further evaluation.

      (3) Assign information-gathering responsibilities for a post-incident analysis and critique.

      (4) Summarize the activities performed by each sector, including topics for follow-up.

      (5) Reinforce the positive aspects of the response.

   b. Post-Incident Analysis in cooperation with the participating fire departments for all Level II and III responses for the purpose of reconstructing the incident to establish a clear picture of the events that took place during the incident.

APPENDIX F

Minneapolis Municipal Water Conservation Program

Minneapolis Muncipal Water Conservation Program

9/18/95

Buildings	# Floors	Water Closets	Urinals	Lavs	Sinks
PHC	5	48	N/A	N/A	N/A

	Per Fixture Expense (includes labor)	Total Expenses	Payback in years	Water savings
Low estimate	$323.00	$16,464.00	3	$5,516.00
High Estimate	$425.00	$21,360.00	3.9	$5,516.00

Public Health Center

Using a median figure of 11.09 units per day (unit equals 750 gallons), the PHC utilizes 4048 units or 3,035,888 gallons per year (gpy) of water. The median figure does not include the 20 units per day used for cooling in the summer months (June, July, August).

The total gpy is further calculated to focus on PHC's water usage for flushing toilets:

75% of total gpy = 2,276,916 or 3,036 units per year.

An inventory of PHC was conducted to determine if water savings could be obtained through retrofiting 48 water closets by reducing the current 3.6 gallons per flush to 1.6 gpf. This 2 gallon per flush savings calculated out:

Total adjusted gpy (2,276,916) divided by 3.6 gpf

= 632,477 flushes per year X 2 gallons savings

= 1,264,953 gallons saved divided by 750 gallons (one unit)

= 1,687 total units per year savings X $3.27 (per unit water and sewer costs combined)

= $5,516 in water savings per year.

DRAFT

Date: 1/1/95

PROJECT TITLE: Municipal Water Conservation Project - Public Health Center

PREPARED BY: Guy Fischer & Roger Van Tassel 9/18/1995

ORGANIZATION: Inspections

COMMENTS: This project involves the retrofit of water closets in the Public Health Center - City of Minneapolis. Enclosed is a Total Cost Assessment of this retrofit.

P2/FINANCE

Pollution Prevention Financial Analysis
and Cost Evaluation System

Version 2.1
Copyright 1995
Tellus Institute
Boston, MA

PROJECT TITLE: **CAPITAL COSTS** Date: 1/1/95

Municipal Water Conservation Project - Public Health Center

A boxed cell contains user input

Capital Costs	Cost	Totals	Ref.	Notes:

Purchased Equipment

48 Water closets @ $323/per fixture plus				
cost for changing out =	20,400			
$20/per fixture fee	960			
Delivery				
Sales tax				
Price for Initial Spare Parts		21,360		

Materials

Piping				
Electrical				
Instruments				
Structural				
Insulation				
		0		

Utility Connections and New Utility Systems

Electricity				
Steam				
Water				
Sewerage				
Remgeration				
Fuel				
Plant Air				
Inert Gas				
		0		

Site Preparation

Demolition and Cleaning				
Old Equipment/Rubbish Disposal				
		0		

Construction/Installation

In-house				
Contractor				
Vendor				
		0		

Engineering/Contractor

In-house Planning				
In-house Engineering				
Procurement				
Contractor/Consultant				
		0		

PROJECT TITLE: **CAPITAL COSTS** Date: 1/1/95

Municipal Water Conservation Project - Public Health Center

A boxed cell contains user input

Capital Costs	Cost	Totals	Ref.	Notes:
Start-up/Training				
In-house				
Vendor/Contractor				
Trials/Manufacturing Variances				
Training				
		0		
Contingency				
		0		
Permitting				
Fees				
In-house				
Contractor/Consultant				
		0		
Initial Charge for Catalysts and Chemicals				
		0		
Working Capital				
Raw Materials				
Materials and Supplies				
Product Inventory				
		0		
Salvage Value				
water closet salvage @ $5/closet =	240			
		240		

PROJECT TITLE: Municipal Water Conservation Project - Public Health Center

OPERATING COSTS

Date: 1/1/95

A boxed cell contains user input

Enter costs as positive values: Enter savings/revenues as negative values

CURRENT PROCESS			ALTERNATIVE PROCESS			
Item	Annual Cost ($/year)	Total	Item	Annual Cost ($/year)	Total	Difference =(Curr.-Alt.)
Direct Materials			**Direct Materials**			
		0			0	0
Waste Management (materials & labor)			**Waste Management (materials & labor)**			
Pre-treatment			Pre-treatment			
On-site Handling			On-site Handling			
Storage			Storage			
Treatment			Treatment			
Hauling			Hauling			
Insurance			Insurance			
Disposal		0	Disposal		0	0
Utilities			**Utilities**			
Electricity			Electricity			
Steam			Steam			
Water			Water	-5,516		
Sewerage			Sewerage			
		0			-5,516	5,516
Direct Labor			**Direct Labor**			
		0			0	0
Other			**Other**			
		0			0	0
Regulatory Compliance (materials & labor)			**Regulatory Compliance (materials & labor)**			
Manifesting			Manifesting			
Reporting			Reporting			
Monitoring			Monitoring			
Testing			Testing			
Labeling			Labeling			
Permitting			Permitting			
Training			Training			
		0			0	0
Insurance			**Insurance**			
		0			0	0
Revenues - Sale of Product			**Revenues - Sale of Product**			
		0			0	0
Revenues - Marketable By-products			**Revenues - Marketable By-products**			
		0			0	0
Total		0	Total		-5,516	5,516

PROJECT TITLE: Date: 1/1/95

Municipal Water Conservation Project - Public Health Center Page 5

CAPITAL AND OPERATING COST SUMMARY

NOTE: on this page, a boxed cell contains user input - default values are for illustration only.

NOTE: all entries shown as percentages must be entered as decimal numbers EXAMPLE: enter 0.4 for 40%

Capital Costs	$
Purchased Equipment	21,360
Materials	0
Utility Connections	0
Site Preparation	0
Installation	0
Engineering/Contractor	0
Start-up/Training	0
Contingency	0
Permitting	0
Initial Catalysts/Chemicals	0
Depreciable Capital	21,360
Working Capital	0
Subtotal	21,360
Debt Interest (Installatior	0
Total Capital Requireme	21,360
Salvage Value	240
Equity, %	100%
Debt, %	0%
Interest Rate on Debt, %	12%
Debt Repayment, years	5
Equity Investment	21,360
Debt Principal	0
Debt Interest (Installation)	0
Total Financing	21,360
Depreciation Period, year	7
Operating Period, years	15
Income Tax Rate, %	39%
Escalation Rate, %	5.0%
Cost of Capital, % (Discount Rate)	15.00%

Operating Costs		Current	Alternative	Difference (Curr.-Alt.)
Direct Materials		0	0	0
Waste Management		0	0	0
Utilities		0	-5,516	5,516
Direct Labor		0	0	0
Other		0	0	0
Regulatory Compliance		0	0	0
Insurance		0	0	0
Maintenance, % Capital				
Labor, %	0%	0	0	0
Materials, %	0%	0	0	0
Overhead, % Total Labo	0%	0	0	0
Labor Burden % Total Labor	0%	0	0	0
Revenues - Sale of Product		0	0	0
Revenues - Marketable By-Products		0	0	0
TOTAL		0	-5,516	5,516

Future Liability	Ref.	Year Expected	Cost (Curr.-Alt.)
(Year expected =1,2,3,etc.)			

PROJECT TITLE:
Municipal Water Conservation Project - Public Health Center
Date: 1/1/95

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CASH FLOW ANALYSIS

Operating Year		0	1	2	3	4	5
Escalation Factor		1.000	1.050	1.103	1.158	1.216	1.276
REVENUES ($)							
Revenue - Sale of Product			0	0	0	0	0
Revenue - By-products			0	0	0	0	0
Annual Revenue			0	0	0	0	0
OPERATING COSTS ($)							
Direct Materials			0	0	0	0	0
Waste Management			0	0	0	0	0
Utilities			5,792	6,081	6,385	6,705	7,040
Direct Labor			0	0	0	0	0
Other			0	0	0	0	0
Regulatory Compliance			0	0	0	0	0
Insurance			0	0	0	0	0
Maintenance			0	0	0	0	0
Overhead			0	0	0	0	0
Labor Burden			0	0	0	0	0
Liability			0	0	0	0	0
Total Operating Costs			5,792	6,081	6,385	6,705	7,040
CAPITAL COSTS ($)							
Depreciable Capital		21,360					
Book Value		21,360	15,326	10,996	7,890	5,977	4,065
Tax Depreciation (by SL)			3,017	3,017	3,017	3,017	3,017
Tax Depreciation (by DDB)			6,034	4,330	3,106	2,229	1,689
Tax Depreciation (by DDB /SL)			6,034	4,330	3,106	1,912	1,912
Debt Balance		0	0	0	0	0	0
Interest Payment at :	12.0%		0	0	0	0	0
Principal Repayment			0	0	0	0	0
CASH FLOWS($)							
Revenues			0	0	0	0	0
+ Operating (Costs)/Savings			5,792	6,081	6,385	6,705	7,040
Operating Cash Flow (BIT)			5,792	6,081	6,385	6,705	7,040
-Depreciation (DDB/SL)			6,034	4,330	3,106	1,912	1,912
- Interest on Debt			0	0	0	0	0
Taxable Income			-242	1,752	3,279	4,792	5,128
- Income Tax at:	39.0%		-95	683	1,279	1,869	2,000
Net Income			-148	1,069	2,000	2,923	3,128
+ Depreciation (DDB/SL)			6,034	4,330	3,106	1,912	1,912
-Debt Principal Repayment			0	0	0	0	0
-Investment (Less Debt)		21,360	0	0	0	0	0
+ Final Year Working Capital			0	0	0	0	0
+ Final Year Salvage Value			0	0	0	0	0
After-Tax Cash Flow		-21,360	5,886	5,398	5,107	4,836	5,040
Cumulative Cash Flow		-21,360	-15,474	-10,075	-4,969	-133	4,907
Discounted Cash Flow		-21,360	5,119	4,082	3,358	2,765	2,506

PROJECT TITLE:
Municipal Water Conservation Project
Date: 1/1/95

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CASH FLOW ANALYSIS

Operating Year		6	7	8	9	10
Escalation Factor		1.340	1.407	1.477	1.551	1.629
REVENUES ($)						
Revenue - Sale of Product		0	0	0	0	0
Revenue - By-products		0	0	0	0	0
Annual Revenue		0	0	0	0	0
OPERATING COSTS ($)						
Direct Materials		0	0	0	0	0
Waste Management		0	0	0	0	0
Utilities		7,392	7,762	8,150	8,557	8,985
Direct Labor		0	0	0	0	0
Other		0	0	0	0	0
Regulatory Compliance		0	0	0	0	0
Insurance		0	0	0	0	0
Maintenance		0	0	0	0	0
Overhead		0	0	0	0	0
Labor Burden		0	0	0	0	0
Liability		0	0	0	0	0
Total Operating Costs		7,392	7,762	8,150	8,557	8,985
CAPITAL COSTS ($)						
Depreciable Capital						
Book Value		2,152	240	0	0	0
Tax Depreciation (by SL)		3,017	3,017	0	0	0
Tax Depreciation (by DDB)		1,148	608	0	0	0
Tax Depreciation (by DDB /SL)		1,912	1,912	0	0	0
Debt Balance		0	0	0	0	0
Interest Payment at :	12.0%	0	0	0	0	0
Principal Repayment		0	0	0	0	0
CASH FLOWS($)						
Revenues		0	0	0	0	0
+ Operating (Costs)/Savings		7,392	7,762	8,150	8,557	8,985
Operating Cash Flow (BIT)		7,392	7,762	8,150	8,557	8,985
-Depreciation (DDB/SL)		1,912	1,912	0	0	0
- Interest on Debt		0	0	0	0	0
Taxable Income		5,480	5,849	8,150	8,557	8,985
- Income Tax at:	39.0%	2,137	2,281	3,178	3,337	3,504
Net Income		3,343	3,568	4,971	5,220	5,481
+ Depreciation (DDB/SL)		1,912	1,912	0	0	0
-Debt Principal Repayment		0	0	0	0	0
-Investment (Less Debt)		0	0	0	0	0
+ Final Year Working Capital		0	0	0	0	0
+ Final Year Salvage Value		0	240	0	0	0
After-Tax Cash Flow		5,255	5,720	4,971	5,220	5,481
Cumulative Cash Flow		10,162	15,882	20,854	26,074	31,554
Discounted Cash Flow		2,272	2,151	1,625	1,484	1,355

PROJECT TITLE:
Municipal Water Conservation Project
Date: 1/1/95

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CASH FLOW ANALYSIS

Operating Year		11	12	13	14	15
Escalation Factor		1.710	1.796	1.886	1.980	2.079
REVENUES ($)						
Revenue - Sale of Product		0	0	0	0	0
Revenue - By-products		0	0	0	0	0
Annual Revenue		0	0	0	0	0
OPERATING COSTS ($)						
Direct Materials		0	0	0	0	0
Waste Management		0	0	0	0	0
Utilities		9,434	9,906	10,401	10,921	11,467
Direct Labor		0	0	0	0	0
Other		0	0	0	0	0
Regulatory Compliance		0	0	0	0	0
Insurance		0	0	0	0	0
Maintenance		0	0	0	0	0
Overhead		0	0	0	0	0
Labor Burden		0	0	0	0	0
Liability		0	0	0	0	0
Total Operating Costs		9,434	9,906	10,401	10,921	11,467
CAPITAL COSTS ($)						
Depreciable Capital						
Book Value		0	0	0	0	0
Tax Depreciation (by SL)		0	0	0	0	0
Tax Depreciation (by DDB)		0	0	0	0	0
Tax Depreciation (by DDB /SL)		0	0	0	0	0
Debt Balance		0	0	0	0	0
Interest Payment at :	12.0%	0	0	0	0	0
Principal Repayment		0	0	0	0	0
CASH FLOWS($)						
Revenues		0	0	0	0	0
+ Operating (Costs)/Savings		9,434	9,906	10,401	10,921	11,467
Operating Cash Flow (BIT)		9,434	9,906	10,401	10,921	11,467
-Depreciation (DDB/SL)		0	0	0	0	0
- Interest on Debt		0	0	0	0	0
Taxable Income		9,434	9,906	10,401	10,921	11,467
- Income Tax at:	39.0%	3,679	3,863	4,056	4,259	4,472
Net Income		5,755	6,043	6,345	6,662	6,995
+ Depreciation (DDB/SL)		0	0	0	0	0
-Debt Principal Repayment		0	0	0	0	0
-Investment (Less Debt)		0	0	0	0	0
+ Final Year Working Capital		0	0	0	0	0
+ Final Year Salvage Value		0	0	0	0	0
After-Tax Cash Flow		5,755	6,043	6,345	6,662	6,995
Cumulative Cash Flow		37,309	43,352	49,697	56,359	63,354
Discounted Cash Flow		1,237	1,129	1,031	942	860

Municipal Water Conservation Project - Public Health Center

PROFITABILITY ANALYSIS SUMMARY

	Years 1-5	Years 1-10	Years 1-15
Net Present Value ($)	-3,531	5,355	10,554
Internal Rate of Return	8%	21%	24%
Payback (years)	3.9		

	Year 1-Year of Choice
Year of Choice =	7
Net Present Value ($)	891
Internal Rate of Return	16%

Draft Comments 4/25/97

Metropolitan Council Comments on Minneapolis Water Works
Water Supply, Emergency and Conservation Plan (December 1995)

INTRODUCTION

The Minneapolis Water Works plan was submitted under the 1993 legislation (Chapter 186) requiring Metropolitan Area communities to amend their local comprehensive plans to include a water supply element if the community has a municipal water supply system. The Minneapolis Water Works serves the city of Minneapolis and several surrounding suburbs.

The plan submittal was reviewed according to the "Metropolitan Area Community Water Supply Plan Content Guidelines" adopted jointly by the Metropolitan Council and the Minnesota Department of Natural Resources (DNR) in January 1994. The Council also reviewed the submittal as a local comprehensive plan amendment, and applied the authorities contained in Minnesota Statutes, Chapter 473 in so doing.

Comments on the required conservation and emergency response plans will be submitted to the DNR for its consideration in review of these plans according to Minnesota Statutes, §103G.291, subd.3. Minneapolis does not have any municipal wells, and will not be required to prepare a wellhead protection plan for the Minnesota Department of Health (MDH) according to Minnesota Statutes, §103I.101.

GENERAL COMMENTS

The Minneapolis Water Works (MWW) plan is a well done plan that presents details of a very complex water distribution system. The MWW has a single source water supply, the Mississippi River. The MWW uses water from the Mississippi River to supply the cities of Minneapolis, Golden Valley, Crystal, New Hope, Columbia Heights, and Hilltop, as well as parts of Bloomington and Edina. Water use has decreased from 27.3 to 23.1 billion gallons per year (BGY) from 1989 to 1993. Population growth and water use is expected to remain fairly constant.

The emergency preparedness plan is very thorough. A comprehensive set of emergency procedures is contained in the document and its appendices.

LOCAL AND COUNTY REVIEW COMMENTS

No comments regarding the water supply plan were received from communities adjacent to the city of Minneapolis, nor from Hennepin County.

TECHNICAL COMMENTS BASED ON CONTENT GUIDELINES

Part I - Water Supply System Description and Evaluation (Sventek, EPE)

MWW serves the city of Minneapolis and several surrounding suburban communities. In 1993, MWW served 367,924 Minneapolis customers (102,000 connections); wholesale service was offered to approximately 113,592 suburban customers (41,000 connections) in Golden Valley, Crystal, New Hope, Columbia Heights, and Hilltop as well as parts of Bloomington and Edina Morningside. The total population served was approximately 480,592 in 1995 compared to 477,953 in 1985.

The population numbers contained in the plan are slightly different than the Metropolitan Council's population numbers found in the *Regional Blueprint* amendment dated October, 1996. The following tables identify the differences. Any discrepancies will need to be resolved with the Council before future comprehensive plans are approved that allow development based on these differences.

Table 1

YEAR	COUNCIL FORECAST	CITY OF BLOOMINGTON	COUNCIL FORECAST	CITY OF COL HTS
1990	86,335	86,335	18,910	18,910
2000	-	91,500	-	19,600
2010	91,000	97,500	19,500	19,600
2020	94,000	102,000	19,700	19,600

Table 2

YEAR	COUNCIL FORECAST	CITY OF CRYSTAL	COUNCIL FORECAST	CITY OF EDINA
1990	23,788	23,788	46,070	46,070
2000	-	23,800	-	47,000
2010	24,000	24,300	49,500	48,000
2020	25,000	24,300	49,500	48,500

Table 3

YEAR	COUNCIL FORECAST	CITY OF GOLDEN VALLEY	COUNCIL FORECAST	CITY OF HILLTOP
1990	20,971	20,971	749	749
2000	-	21,200	-	750
2010	22,700	21,500	750	750
2020	23,000	21,500	750	750

Table 4

YEAR	COUNCIL FORECAST	CITY OF NEW HOPE	COUNCIL FORECAST	CITY OF MINNEAPOLIS
1990	21,853	21,853	368,383	368,383
2000	-	23,300	-	370,500
2010	22,000	24,200	383,500	373,000
2020	24,000	24,500	388,500	375,000

Total water withdrawn for the MWW system for 1993 was 23,125 MGY or 63.3 million gallons per day (MGD) compared to 61.3 MGD in 1984. The water use average for the last ten years of reported data (1984-1993) was 68.3 MGD. The highest year of use was 1988 when 81.3 MGD of water was withdrawn from the system. The plan includes some information on maximum day demands for the months of January and July. The plan states that the highest maximum day demand occurred on June 6, 1988 when 160 MGD of water was withdrawn from the system. The plan also states that the maximum day-to-average day demand number has been stable at a ratio of 2.0:1 since the 1988 drought, but does not include specific maximum day and average day demand numbers to verify this. The American Water Works Association (AWWA) recommends that the maximum day-to-average day demand ratio be below 3.0:1. It is important for the city to continue to record average day and maximum day demand in the future to assist the city in evaluating peak use and overall water use, and to continue to track the maximum day-to-average day demand ratio.

Approximately 22% of the water produced over the last ten years went to the wholesale communities. Each of the wholesale communities is reviewed separately by the Metropolitan Council under Chapter 186 because they do their own distribution, billings, and operations.

Minneapolis' total per capita water use ranged from 135.5 gallons per capita per day (gpcd) to 170.8 gpcd (1984-1993). The residential only per capita use ranged from 62.8 gpcd to 82.7 gpcd (1984-1993). The population and water use of the wholesale communities were not included in any per capita use calculations in the plan. The recommended residential per capita water use is between 50-80 gpcd. Per capita water use should maintain or reduce the current per capita water use levels, since Legislative intent in requiring a conservation plan was to curtail increasing per capita use. Focusing efforts on implementing water use efficiency measures for residential, and commercial and industrial use will help maintain or further reduce the overall per capita water use.

It is unclear why the MWW has estimated water use data for the past several years in many of the tables. Real numbers should be available by now for 1990-1994.

The plan does not contain projections for future average day and maximum day demand use, total per capita use, and residential per capita use. Total population in the entire service area is projected to increase from 481,516 (1993) to 616,500 (2020).

The plan reports water use by customer category for 1994. In 1994, 28% of the water use was for residential water use, 35% was for non-residential use, 25% was for suburban wholesale use, and 12% was un-metered. In 1994 for Minneapolis only, water use was 38% residential use, 46% non-residential, and 16% un-metered. Unaccounted-for water use has ranged from 3.5% to 12.5% (1984-1993). Although this range exceeds the recommended AWWA limit for unaccounted-for water use of 10%, it is typical of older systems. Since the MWW does not currently report its water use by the typical

customer use categories, data on monthly water use by customer category is not included in the plan. The newly instituted (1996) billing system should allow the MWW to break down the non-residential use into commercial and industrial water use. This is very important because continued collection of water use data by customer category will help to provide an understanding of demand characteristics and problems that need to be addressed when developing allocation procedures and conservation programs.

The city has two large volume customers that use more than 5% of the total water production. The Joint Water Commission used 10% of the total water produced, and the city of Bloomington used 7% of the total water produced in 1993. No customers within the city use more that 5% of the total water produced.

Chart 17 has an error. It states that the historical peak day demand occurred on June 6, 1986. Several other places in the plan state that this peak demand occurred in June 6, 1988. This discrepancy should be corrected.

The treatment and storage capacity discussion does an excellent job of describing the MWW facilities. The MWW has a single supply source, the Mississippi River, with two intake systems in the Fridley area. The main intake, Pump Station (P.S.) #5 has eight pumps with a design capacity of 200 MGD. The actual capacity is 180 MGD, with a firm capacity of 150 MGD. The second intake, P.S. #4, is used during severely lowered elevations of the river. This system has four pumps with a design capacity of 100 MGD, actual capacity of 80 MGD, and a firm capacity of 50 MGD.

The MWW uses lime softening prior to filtration. The total filtration capacity of the two filter plants is 215 MGD, while the softening capacity of the softening plant is 150 MGD. A detailed map of the water utility's facilities is included in the plan.

The MWW has an in-ground storage structure for softened water storage with a useable capacity of 60 million gallons (MG). The MWW also has 55 MG of finished water storage in Columbia Heights, 32 MG in Fridley, 40 MG in Hilltop, and 1.5 MG at the Washburn Tower. For its wholesale customers, the MWW has 9 MG of in-ground finished water storage capacity in Golden Valley, 19 MG in Crystal, and a total of 27 MG in Bloomington. The MWW has elevated tank capacity for its wholesale users as well, totaling 6.75 MG.

The MWW water supply source is limited by flow of the Mississippi River. The Corps of Engineers determined that an emergency would occur if the National Weather Service's 30-day outlook predicted that the Mississippi River discharges at Anoka would drop below 554 cubic feet per second (cfs). River flows have never dropped to a point where withdrawal was threatened. The possibility of contamination in the river poses a potentially more serious impact to the MWW water source.

The plan states that the MWW system is adequate to meet all existing and foreseen future demands, based on population projections. The MWW has plans to build new finished water reservoirs for added capacity in case of plant outages, source emergencies, and to improve the ability for maintenance and repair. The city has a usable capacity of one day of finished water and is considering increasing this to a three day capacity. The MWW needs to include projections for increased water use associated with these population projections that includes future annual use, average day demand, maximum day demand, and per capita use increases. Until that is completed, it is not clear if the system will be adequate for future use demands.

The MWW has a 10-year plan for potential expansions and modifications of the water system due to expected future state and federal mandates, need for upgrade or replace aging facilities and equipment, and the need to increase treatment dependability while decreasing the likelihood of emergencies. Major upgrades in treatment areas will be prioritized this year.

Comments on the capital improvement program are made in Part IV of the review.

Part II - Emergency Planning (Sventek, EPE)

The plan has a good emergency telephone list that includes a complete list of phone contacts, with numbers for each of the wholesale communities as well. The list includes key city staff and outside personnel to be contacted in the event of an emergency -- some cities have adopted an emergency reporting form as well. A copy of one of these forms from the city of Andover is included.

The MWW has no non-system interconnections. The MWW has one-way interconnections with its suburban customers. Interconnections with adjacent cities have been investigated. Supply size, pressure and water quality differences prohibit potential interconnection with all adjacent communities except St. Paul. The Metropolitan Council encourages the MWW in its investigation of the possibility of interconnection with St. Paul. Metropolitan Council staff offers its assistance in any role the two utilities think it can play in these discussions. The Council will also keep alert to any possible funding assistance possibilities that might arise.

In 1990 a study was completed to examine the effects of groundwater withdrawals on flow in the groundwater system and the Mississippi River near the treatment plant. The study concluded that contaminated water from areas of known contamination could move towards depressions in the potentiometric surfaces of the confined-drift, St. Peter Aquifer, and Prairie du Chien Aquifer if additional groundwater were withdrawn near the MWW. There are no high capacity wells that could be hooked up to the MWW in the event of a water emergency. The existing air conditioning wells which are scheduled to be phased out in the next 15 years could potentially be used to provide an emergency supply or augment the existing source in case of a supply shortage. This option would require the DNR to allow the air conditioning wells to remain active and the MDH to grant approval for reuse of the water. This option would be extremely complicated to implement.

A major concern of the MWW system is that it uses a single source, the Mississippi River, to supply water to a large number of people. A five-year study was completed in response to the 1988 drought to determine alternative sources of water. Ten potential options were studied. The MWW narrowed the ten options to three; create additional finished water reservoir capacity, interconnect the Minneapolis and St. Paul water systems, and pump water from the river to store in the Minneapolis Chain of Lakes. The Metropolitan Council supports the MWW in its continuing effort to develop a viable alternative water source in case of an emergency or severe drought.

The discussion on demand reduction potential focuses on proposed reduction measures for residential customers even though residential use is a small percentage of the total water use. The plan contains five stages of procedures ranging from voluntary actions to a total water ban. Enforcing the Minnesota plumbing code and encouraging education on water conservation would also help reduce per capita water use.

The city will allocate water based on the state's priority allocation system contained in Minnesota Statutes, §103G.261. Severe water shortages would require water allocation in accordance with these priorities.

Trigger levels for MWW demand reductions are based on flow for the Mississippi River. A voluntary conservation program will be enacted at 1200 cfs. At 1000 cfs, sprinkling restrictions will be enacted. A mandatory conservation program will be instituted at 750 cfs, and at 554 cfs, water will need to be released by the Corps of Engineers. The city has an ordinance that allows the city engineer to declare an emergency during critical water deficiencies. Customers will be given one warning for a violation, with any subsequent violations resulting in the water being turned off and a $25 fine.

Appendix C of the plan includes information on several programs that the MWW is actively involved in as a continuous effort to protect its valuable water source. The MWW is involved with the River Defense Network, a U.S. EPA Minneapolis/St. Paul Sub-Area Contingency Plan, the U.S.G.S. Upper Mississippi River Basin National Water Quality Assessment (NAWQA), and a Fridley Community Awareness and Emergency Response (CAER) Program.

The plan contains a section on emergency procedures for source contamination. The MWW maintains its own repair equipment and staff repair crews for emergency line breaks.

The plan contains a list of spills that have occurred in the past. The duration of the spills ranged from six hours to five days. The MWW is aware of what is needed to deal with such potential disasters. The work of the River Defense Network will also aid in early detection of spills to minimize the impacts.

The MWW maintain records of flows at Anoka and water levels at intakes, as well as daily, monthly, and annual withdrawals.

Part III - Water Conservation Plan (Sventek, EPE)

The role of water conservation in the system operated by the MWW differs somewhat from communities supplied by groundwater. The volume of flow in the Mississippi River as it passes through the Metropolitan Area far surpasses the demand placed on it for water supply. As such, communities using the source have historically not seen volume limitations as necessary. Even in the 1988 drought, flow in the river never reached critical flow, although some misunderstandings and media attention led to a Governor's request for Headwater Reservoir release of stored water.

In spite of this perceived abundance of water, the MWW must act responsibly as a steward of Minnesota's water resource. The role of short-term water conservation measures is to reduce water demands when supplies are limited. The role of long-term water conservation measures is to help satisfy the ever-increasing demands being placed on water resources. The MWW's conservation plans are intended to meet three goals; reduce unnecessary demand for water, improve the efficiency in use, and minimize losses due to leaks. The Metropolitan Council urges the MWW to continue its efforts to use water wisely even though the source is plentiful.

The MWW system experiences approximately 26 main breaks a year, which is a fairly low number for a system of that size. The MWW had 9.6% unaccounted-for water use in 1993. The MWW's unaccounted-for water use has averaged 8.5% (1984-1993), which is below the 10% limit recommended by the AWWA, but still is a significant volume. The MWW loses 100 MGY from the softening

process, 300 MGY in the finished water process, and 50 MGY for municipal uses. Other losses occur from meters that are under registered or un-authorized, and from un-metered and un-billed uses, and watermain breaks. The city is in the process of a 30-year watermain and lead service line replacement program.

The residential sector used 28% of the total water pumped in 1994. Residential water use could be reduced by implementing efficient outdoor water practices, mandatory rain sensors for sprinkling systems, a retrofit program, and an education program.

The MWW meters all of its customers, including public facilities. Large volume accounts are read and billed each month. Residential meters have been read quarterly, but will begin to be read monthly as automatic meter readers are installed. The city is finishing up a five-year water meter replacement program that should result in more accurate water consumption figures and provide more timely detection of any excessive use or potential leaks.

The MWW has a uniform rate system. The MWW charges its city customers $1.23/100 cubic feet (cf) (the equivalent of $1.64/1,000 gallons) and its suburban customers $1.38/100 cf ($1.84/1,000 gallons). Wholesale rates to other municipalities and public water suppliers vary by contract. Conservation options could include an increasing block, or seasonal block, for all users to better achieve the conservation goal and reduce overall per capita demand.

Regulation occurs through state and federal plumbing codes and City Water Ordinance, Chapter 509, which allows the MWW to restrict water use when a shortage of water supply threatens.

Implementing an active education and information program is an easy means to move toward MWW water reduction goals. The MWW periodically inserts fliers on conservation into its billing material. The MWW provides information regarding general conservation practices upon request. The MWW has a "water-off" program that monitors water bills of elderly and lower income water consumers. Water audits are used to determine if customers have leaking fixtures that need to be repaired.

A retrofit program for a system as old as the MWW's would lead to substantial water savings because of the large number of high water using plumbing fixtures in older homes. Each Spring several entities sponsor and donate time and materials to retrofit old fixtures. This service is available for the needy and elderly consumers. The MWW should consider further efforts to remove high water consuming fixtures (such as very large volume toilets) via an incentive or replacement program.

The key to a successful conservation program will be aggressive implementation of the elements recommended in the plan.

Part IV. Metropolitan Area Plan Elements (Sventek, EPE)

Elements addressing this section of the plan guidelines are generally contained elsewhere throughout the plan. It is the policy of the MWW to extend an affordable, cost effective system to ensure that quality water is available to meet the requirements of Minneapolis' citizens and other customers, while preserving our environment.

The MWW has no two-way interconnections with any of its suburban customers. An interconnection with the St. Paul Water Utility has been explored, but not yet fully studied. The Metropolitan Council is highly supportive of the need to jointly develop and share the resource.

The MWW identifies official controls related to water supply management through City Ordinance Chapter 509. The MWW follows the state building code as well. The MWW could consider adopting new ordinances to promote a more proactive conservation program that includes a permanent odd/even sprinkling ban, an increasing or seasonal block rate structure, or a retrofit program.

The plan contains a ten year capital improvement program (CIP) for 1996-2005. Only coagulation expansion at the Fridley Filtration Plant, replacing filters at the Columbia Heights Filtration Plant, and increasing Finished Water Storage are currently funded projects. Additional funding will be required for the rest of the CIP projects. A plan supplement included a more detailed MWW 5-Year Plan that identifies over $226 million in total capital expenditures by the year 2004. Major facilities are bonded, but the rest of the projects are paid for as approved.

The city is near fully developed. Adoption of the plan is not anticipated to impact the existing comprehensive plan.

SUMMARY

Technical comments were prepared by Metropolitan Council staff according to plan content guidelines prepared by the Council and the DNR. The plan is a very well prepared assessment of an older supply system that has been consistently upgraded and well maintained.

Some attention is suggested for the conservation element of the plan relative to rate structure and the need to continue an aggressive conservation approach. The Council also urges the MWW to continue discussion with the St. Paul Water Utility on interconnecting. It is important for the MWW to continue its efforts at developing a viable alternative water supply to supplement or replace the Mississippi River in times of drought or emergency.

The city has done a very good job in keeping its unaccounted-for water loss around 10% and in keeping its maximum day-to-average day demand ratio under 3.0:1. The plan does not include average day and maximum day demand numbers, which should be included in future plan revisions. The city needs to work on its customer use categories and report water use by the traditional customer use categories. Residential and total per capita water use could be reduced by promoting wise water use through education, instituting conservation-oriented water rates, and initiating sprinkling bans during peak demand times.

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December 31, 1997

Mr. Gary L. Oberts
Sr. Environmental Planner
Metropolitan Council
Environmental Services
230 East 5th Street
St. Paul, MN 55101-1633

Dear Mr. Oberts:

RE: Minneapolis Water Works' Water Supply, Emergency and Conservation Plan, Referral File No. 15775-4

The Minneapolis Water Works (MWW) has reviewed your draft comments on our Water Supply, Emergency and Conservation Plan. We request you consider the following comments in your final review:

- Page 3, Paragraph 3

Real water use data for 1990-94 numbers are now available and the charts and tables can been revised.

- Page 3, Paragraph 5

Data on monthly water use by customer category can only be estimated prior to 1996 due to the transition of the City's utility billing system.

- Page 3, Paragraph 7

The correct peak demand date is June 6, 1988. This discrepancy has been corrected.

AFFIRMATIVE ACTION EMPLOYER

Recycled paper 30% post consumer waste

- Page 3, Paragraph 8

The design capacity of the main intakes at P.S. #5 is 200 million gallons per day (MGD), the firm capacity is 170 MGD. The design capacity of the softening plant is 180 MGD, short term, firm capacity is 150 MGD.

- Page 3, Paragraph 9

The in-ground storage structure has a useable capacity of 75 million gallons (MG). Our suburban customers own their own reservoirs, a list of which is detailed on page 11 of the Minneapolis Plan.

- Page 4, Paragraph 2

The City of Minneapolis is in the process of increasing the finished water capacity from 1½ days to 2 days plus 1 day with 75 MG softened water storage, utilized in Columbia Heights (1998 project).

- Page 4, Paragraph 6

The Minneapolis City Council has approved an Interconnection Study with the City of St. Paul on which our staff has begun working. The St. Paul Water Board has not yet approved this study.

- Page 4, Paragraph 7

The use of existing air conditioning wells as an emergency supply is not a feasible solution. The MWW is pursuing an alternative water source. A copy of alternative water supplies report's conclusions is included in the Plan at the end of Appendix B.

- Page 4, Paragraph 8

The MWW is aggressively pursuing the construction of a wing dam with all the private agencies in order to improve protection against contamination.

- Page 5, Paragraph 9

The MWW system experiences approximately 52 (not 26) watermain breaks a year. Lead service lines have been replaced following the City paving program (City ordinance requires that lead service lines cannot be repaired, and must be replaced). Other City efforts to minimize unaccounted for water include large meters replacement project and lining the 75 MG softened water reservoir in Columbia Heights.

- Page 6, Paragraph 10

Due to the largely non-consumptive nature of its water demand the MWW is not promoting a permanent sprinkling (odd/even) ban.

- Page 6, Paragraph 11

The MWW 5-Year Plan identifies over $181 million (not $226 billion) in total capital expenditures by the year 2004. The latest CIP totals $65 million by the year 2002.

- Page 7, Paragraph 3

Seasonal rate structure and/or retrofit programs may be considered by the City Council for conservation measures.

I hope these comments will be of help in your attempt to finalize the review. I, again, apologize for the delay and any inconvenience this may have caused.

Sincerely,

Yasser M. AbouAish, P.E.
Superintendent, Water Plant Operations

YMA:vao
cc Adam Kramer, MWW
Judy Sventek, Metropolitan Council

yasser\wtrplan.doc

Chapter 4

Technical Appendix for the Sewer Plan

Adopted by City Council and Mayor: March 2000

City of Minneapolis
Sewer Plan
1999

Prepared by:
City of Minneapolis
Public Works
Division of Engineering Services
Sewer Design Section

June 1999

TABLE OF CONTENTS

Table of Contents ____ 1

Minneapolis Sanitary Sewer System ____ 3

- Background ____ 3
- Capacity ____ 4
- Sewer Availability ____ 4
- Sanitary Pumping Stations ____ 4
- Odors ____ 4

CSO Program ____ 5

- Development of 10-year CSO Program ____ 5
- Goals and Results ____ 6
- Ongoing Construction ____ 7
- Environmental Improvements ____ 7
- NPDES Permit for CSO Discharges ____ 8

Flood Mitigation Program ____ 9

- Stormwater Flooding in Minneapolis ____ 9
- 1997 Flood Report ____ 9
- Storm Drain Design Standards ____ 10
- 1998 – 2006 Flood Mitigation Program ____ 10

Interceptor System Service Areas ____ 13

- Sanitary Flows from Outside of Minneapolis ____ 14
- Projection of Wastewater Flows ____ 15
- Introduction ____ 15
- Methodology ____ 15
- Results ____ 16

TABLE OF CONTENTS

Infiltration Inflow ____ 17

Infiltration/Inflow 17
History of Infiltration/Inflow 17
Estimate of 1998 Infiltration/Inflow 18
Reduction of Extraneous Flows 20

NPDES CSO Permit No. MN0046744 ..... Appendix A
CSO Cooperative Agreement ..... Appendix B
1998 – 2006 Flood Mitigation Program ..... Appendix C
Sanitary Service Area Characteristics ..... Appendix D
Fort Snelling Area Sanitary Sewer Accounts ..... Appendix E
Outside Minneapolis Sewer Accounts ..... Appendix F
Sewage Flow Projection Methodology ..... Appendix G
20-year Sewage Projections ..... Appendix H
1998 Infiltration/Inflow Analysis ..... Appendix I
Acknowledgements ..... Appendix J

MINNEAPOLIS SANITARY SEWER SYSTEM

Background

Under Minneapolis streets are 830 miles of sanitary sewers. The oldest on record was constructed in 1870, along Washington Avenue through downtown. Sanitary sewers were constructed as the City expanded, since the City is fully developed new sanitary sewer construction is rare.

The oldest sewers are brick or non-reinforced cement construction. Brick was used for larger sewers, usually 24" to 96" in diameter and were usually egg shaped with the smaller section at the bottom to convey sanitary flows. The larger section, at the top, was reserve capacity for the larger flows experienced during rainstorms. The cement sewers were generally smaller than the brick sewers, 12" to 24" in diameter, and oval in shape. The oval shape served the same purpose as the egg shape. The brick and cement sewers are still in operation today.

Approximately 1896 the Minneapolis Sewer Department abandoned the use of cement pipe construction and started using clay pipe for all new sanitary sewers. Clay is still the preferred material in 1999. Brick construction was abandoned approximately 1930 and replaced with concrete. In total the following materials exist in the Minneapolis sanitary sewer system:

Material	Range in Size	Year of Construction	% of System
Clay	8" to 36"	1880 to 1996	80
Brick	24" to 96"	1870 to 1930	10
Cement	12" to 24"	1882 to 1884	3
Concrete	12" to 102"	1927 to 1996	4
Others	6" to 30"	1931 to 1996	3

MINNEAPOLIS SANITARY SEWER SYSTEM

In 1922 the Sewer Department began construction of a storm drain system which was separate from the sanitary sewers in the developing areas of the city. The older sanitary sewers continued to serve as combined sewers until 1960, when the City began actively constructing storm drains in areas served by combined sewers. As of 1996, less than 1%, by area, of the City is still served by a combined sanitary/stormwater sewer.

Capacity

Most sanitary sewers were constructed with the extra capacity needed to convey both sewage and stormwater. Removal of the stormwater from the sanitary sewers has created extra capacity in the sanitary system that is available for growth. However, there are a small number of sanitary sewers that are in need of reconstruction to increase the flow capacity.

Sewer Availability

The South East Minneapolis Industrial (SEMI) area is the only major area of Minneapolis that was never served with sanitary sewers. Construction of a sanitary collection system is part of the proposed master plan for the area.

Sanitary Pumping Stations

Only 9 sanitary pumping stations exist within the City. The majority of the wastewater flows by gravity to the MCES interceptors.

Odors

Separation of the stormwater from the sanitary sewers has created an unexpected odor problem. The catch basins that served as vents have been disconnected from the sanitary sewers and connected to the new storm drains. The result is fewer areas available for venting, and stronger odors from those remaining vents.

CSO PROGRAM

Development of 10-year CSO Program

Planning for the current CSO program began in 1977, when it was determined that a regional solution was needed to solve the ongoing water quality problems in the Mississippi River. The frequency of overflows of combined sewage and stormwater were increasing as the developed area tributary to the interceptors increased. The (then) Metropolitan Waste Control Commission (originally the Minneapolis-St. Paul Sanitary District, now the Metropolitan Council Environmental Services) prepared a facilities plan[1] for mitigating the adverse effects of CSOs in Minneapolis, as well as in St. Paul and South St. Paul. Six alternatives were considered, which included various combinations of separation, storage, and small treatment facilities. This study looked beyond the primary objective of improvements to the Mississippi River, and considered the effects of dry weather flow capacity, excessive infiltration/inflow, system reliability, and local community concerns. The final recommendation included construction of a new interceptor to improve capacity of the sanitary system, and the continued separation of storm and sanitary sewers. At this stage Minneapolis expected to have a fully separate system by 2005.

During the early 1980's Wisconsin pressured Minnesota to eliminate all CSOs. In 1984, the Minnesota-Wisconsin Boundary Area Commission and the governors of both states agreed to complete CSO separation by 1995. In 1985, the Minnesota Legislature adopted this accelerated plan and established State funding and a statutory deadline of December 31, 1995. The Minnesota Pollution Control Agency then issued NPDES permits to Minneapolis, St. Paul, and South St. Paul, with the Metropolitan Waste Control Commission as co-permittee. The general conditions of these permits include a schedule for construction of new storm sewers, a program to separate roof rain leaders from the sanitary sewers, monitoring of overflows, and reporting.

[1] Combined Sewer Overflow Study, Final Report, June 1980, prepared for the Metropolitan Waste Control Commission, Minneapolis – St. Paul Twin Cities Area, by Ganoram (a joint venture of Gannett Flemming Corddry and Carpenter, Orr-Schelen-Mayeron, and American Consulting Services, Inc.

CSO PROGRAM

Goals and Results

Minneapolis began this final phase of sewer separation in 1986 with the following conditions:

- 4550.5 acres served by combined sewers
- 87% of acreage of City separated
- 34 overflow structures from sanitary sewers to Mississippi River
- 82 regulators/emergency overflows which allow storm water to overflow from sanitary sewers to storm drains
- 4880 residential properties with rainleaders that connected rooftop runoff directly to the sanitary sewer
- 900 million gallons of annual overflows (estimated)

and the following ten-year goals:

- Construct new storm drains for 458 individual areas draining directly to the sanitary sewer from the streets
- Eliminate 50% of residential rainleader connections
- Eliminate 34 overflow structures
- Eliminate 82 regulators

At the end of 1995, the 10-year program was complete, the goals established in 1985 were met. In total:

- 288 acres served by combined sewers
- 94% of City area is served by separated sewers
- 15 overflow structures in operation
- 16 regulators in operation
- 2583 residential buildings with rainleader connections disconnected

CSO PROGRAM

Ongoing Construction

Since 1995, Minneapolis has continued to construct storm drains to further eliminate stormwater flows to the sanitary sewer. As of the end of 1998, the following has been accomplished:

- 151 acres served by combined sewers
- 99% of City area is served by separated sewers
- 8 overflow structures in operation
- 9 regulators in operation
- 2583 residential buildings with rainleader connections disconnected

The 1999 storm drain construction program will separate an additional 83.5 acres from draining into the sanitary sewers, and allow closure of 3 regulators. Additional monitoring is needed to determine the feasibilty of closing the final 6 regulators.

A total of 67.5 acres will continue to drain stormwater runoff to the sanitary sewers after 1999. These areas are generally costly projects that are nearly impossible to drain through the existing storm drain network. Therefore, these areas will be addressed in the City's Flood Mitigation Program.

Environmental Improvements

In Minneapolis the number of acres disconnected from the combined system measures the success of the program. For the larger Twin Cities area the success of this program is measured in the frequency and quantity of overflows (measured in number of events) and quality (measured in fecal coliform levels) of the Mississippi River. This information is still being developed and not available for this report. However, the following non-measurable results have transpired in Minneapolis:

- Hatches of pollution sensitive mayflies (absent for decades)
- American Scholarship Bass Tournament was held on the segment of the Mississippi between St. Anthony Falls (in Minneapolis) and the city of Red Wing in 1989
- Annual Minneapolis Aquatennial boat races now held on the River above St. Anthony Falls
- Federal designation of the upper Mississippi River as a "National River and Recreation Area"

- Development of parks along the river including Boom Island Park with a busy boat landing and extension of the Great River Road adjacent to downtown
- Opening of the James J Hill Stone Arch Bridge to pedestrian and bicycle traffic
- Construction of public trails through the East River Flats area below the Franklin Ave bridge
- Ongoing redevelopment of downtown riverfront

NPDES Permit for CSO Discharges

The Minnesota Pollution Control Agency has issued to the City of Minneapolis and the Metropolitan Council a joint Combined Sewer Overflow National Pollutant Discharge Elimination System (NPDES) permit no. MN 0046744 (Appendix A). The current permit was issued on February 26, 1997 and will expire on June 30, 2001. It requires the City and MCES to maintain a street cleaning program, phase out remaining sanitary overflows by June 30, 2001, and to continue to eliminate rainleader connections to the sanitary sewers. Other provisions of the permit detail reporting requirements, and procedures to follow in the event of an overflow from the sanitary system. A separate interagency agreement between the City and 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 (Appendix B).

FLOOD MITIGATION PROGRAM

Stormwater Flooding in Minneapolis

The City of Minneapolis has developed a flood mitigation program to solve the street and property flooding that became apparent during the severe rainstorms of 1997. The goal of this program is to upgrade the weaker segments of the City's storm drainage system to the current design standards. Although this is an improvement to the storm drainage system, there is a secondary benefit to the sanitary system since much of the excess water in flooded intersections and structures finds a route to the sanitary sewers as inflow.

Beginning on July 1, 1997 the City of Minneapolis experienced a series of rainstorms that overburdened the City's stormwater drainage system, causing back-ups from the sanitary sewage system, saturation of the soils, and overfilling of lakes and streams. The unusual feature of this storm was that it hit the entire City. The July 1st storm was followed by severe storms on July 11, July 13, July 17, July 22, August 30 and September 16. Many homes and businesses in the City were subjected to repeated water damage. In July 1997, the Minneapolis/St. Paul International Airport recorded a monthly total precipitation of 12.5 inches, second only to the 17.9 inches that fell in July 1987. The 18 days of measurable precipitation in July 1997 set a rainfall frequency record.

1997 Flood Report

The Department of Public Works documented the problems encountered in the summer of 1997 as well as the recommended improvements in a report titled Flood '97[2]. Complaints were compiled in a database, and mapped according to common drainage systems. A total of 39 areas were identified for further study. The location of the flooding and complaints were highlighted on storm drainage maps, and the capacity of the existing system was studied and compared to the current design standard of a 10-year, one-hour rain event (2.29 inches per hour). Alternatives studied for areas of substandard storm drains included detention basins, increased inlet capacity, and increased pipe

[2] Flood '97, Flood Report, October 22, 1997, prepared by the City of Minneapolis Department of Public Works, Engineering Design.

capacity. Recommended alternatives, summary of complaints, and alternative studied for each flood area were included in the report.

Storm Drain Design Standards

Capacity design standards for storm drains have increased since the first Minneapolis storm drain was constructed in 1926. This trend reflected the changing needs of the City as it became more developed, and design methods became more sophisticated. The following table shows past and present design standards:

Dates	Design Standard	Rainfall Intensity
Up to 1945	2-year storm	1.4 inches/hr
1945 to 1960	5-year storm	1.8 inches/hr
1960 to 1982	10-year storm	2.1 inches/hr
1982 to present	10-year storm *	2.3 inches/hr

*Time of concentration added to formula in 1982

1998 – 2006 Flood Mitigation Program

Currently, Minneapolis is in the second year of a nine-year program to correct the flooding identified in 1997. It is estimated that the cost of these improvements will be $61,000,000 (in 1999 dollars). The program includes construction of dry detention basins, stormwater ponds, and increased capacity of substandard storm drains in flood areas. Appendix C summarizes the projects in this program.

Flood Control Ponds and Basins

Six of the project area recommendations are for the construction of flood detention areas. Three will be combination water quality and flood control ponds, and three are planned as dry detention basins. These ponds/basins are designed to fill with storm runoff during heavy rains, and empty out slowly. This stabilizes the peak flow, allowing the water to drain out over a longer period of time. They are typically in low-lying areas that cannot be easily drained to a receiving lake or stream.

FLOOD MITIGATION PROGRAM

Storm Drains

In many of the project areas, storm drains that are undersized have caused recurring flooding by current standards. Flood mitigation for these areas entails replacement of existing storm drains with larger and/or additional ones.

Other Structural Improvements

Other recommended flood mitigation measures include replacing or upgrading catch basins and catch basin grates, installing additional pumps, and construction of future Combined Sewer Overflow projects.

Backwater Valve Reimbursement to Prevent Sewage Backups into Basements

In 1989, the Sewer Maintenance budget was used to reimburse the cost of sewer backwater valves to homeowners in sensitive areas. At that time, $100,000 was established, and a maximum of $1,000 was reimbursed per eligible homeowner. The Minneapolis City Council reestablished this program in 1998 and 1999 at $150,000, with individual reimbursement of $1,200. To date 15 property owners have taken advantage of this program.

Flood Insurance Information

Many residents and homeowner insurance providers are not aware that flood insurance can be purchased for Minneapolis properties which are not in a National Flood Insurance Program designated 500-year floodplain. Callers on the Minneapolis flood hotline and attendees of the citywide flood meeting were informed of the National Flood Insurance Program, and provided with a phone number to call for more information.

Flood Prevention

The Federal Emergency Management Agency (FEMA) has published educational materials for homeowners describing flood protection measures such as landscaping techniques which can reduce a property's vulnerability to flooding. An informational handout from FEMA with a publication list of educational materials was distributed at the citywide flood meeting, and to callers on the Minneapolis flood hotline.

FLOOD MITIGATION PROGRAM

Storm Drain Maintenance

Storm drains that are known to collect large amounts of sand and debris are inspected and cleaned to allow for the greatest conveyance of stormwater runoff. Outlets are also inspected and cleared of sand bars that restrict flows.

Catch Basin Cleaning

Flood prone areas are inspected regularly by Street Maintenance and Sewer Maintenance crews to ensure that catch basins are kept clear of debris and able to drain street runoff at its greatest capacity.

INTERCEPTOR SYSTEM SERVICE AREAS

Twenty-four separate interceptor service areas serve Minneapolis. These areas range in size from the smallest, area MN-305 at 3.4 acres, serving three residential and four commercial properties, to the largest, area MN-344 at 5113 acres, serving over 16,000 single family homes in addition to multi-family and commercial properties.

The characteristics of the service areas were defined by tracing the sanitary sewers from their uppermost connection to the first point of connection with Metropolitan Council interceptors. Additional information was provided by Metropolitan Council Environmental Services. Using the Minneapolis GIS database, the updated area map was used to extract area, land use and census information. Appendix D contains detailed information of each of the 24 service areas:

Service Area	Population (1990)	Area (sq.mi.)
MN-300	17,060	3.81
MN-301	3,075	0.82
MN-302	6400	2.22
MN-303	3863	0.96
MN-305	9	0.01
MN-306	1027	0.38
MN-310	55,338	6.79
MN-311	1190	0.37
MN-312	4407	0.66
MN-313	1971	0.17
MN-314	912	0.14
MN-315	4162	0.92
MN-316	8106	1.17
MN-320	36,067	5.42
MN-330	45,555	4.71
MN-340	15,772	3.44
MN-341	67,055	7.39
MN-342	601	0.07
MN-343	2803	0.36
MN-344	50,971	7.98
MN-345	7893	1.16
MN-346	10,123	1.48
8255	29,428	3.81
8754	614	0.11

INTERCEPTOR SYSTEM SERVICE AREAS

Sanitary Flows from Outside of Minneapolis

In addition to the sanitary flows from properties within the City limits, there are a number of connections from outside the City. These can be categorized into two groups: 1) government properties in the Fort Snelling area; and 2) individual properties connecting to a sanitary sewer in a border street.

Eleven agencies in the Fort Snelling area have agreements with Minneapolis for water and sewer service. The primary contributor of wastewater is the Metropolitan Airports Commission, with 55,431,200 cubic feet of wastewater in 1996. This equates to approximately 80% of sanitary flows from the area. The second largest contributor is the Veteran's Medical Center with 10,917,800 cubic feet in 1996 (16%). A complete list of agencies and 1996 flow contributions is contained in Appendix E. Copies of the interagency water/sewer agreements are available from the Minneapolis Water Works.

A total of 141 properties outside Minneapolis have connections to the Minneapolis sewer system. These properties received permits from the City of Minneapolis for these connections and are sent monthly water/sewer bills from Minneapolis Utility Billing. There are no inter-City agreements that oversee these connections.

City	# of Accounts
Brooklyn Center	16
Edina	61
Golden Valley	20
Robbinsdale	4
St. Anthony	23
St. Louis Park	12
St. Paul	5

A complete list of properties is contained in Appendix F.

PROJECTION OF WASTEWATER FLOWS

Introduction

The analysis presented below has been completed in partial fulfillment of the sewer portion of the comprehensive planning requirements of the Minnesota Metropolitan Land Planning Act. Estimates of 1996 annual volume of sewage generated within the City of Minneapolis are projected out to year 2020 based on the population and employment projections completed for the Minneapolis Comprehensive Plan. It does so for each of the 24 Interceptor Service Areas located in the City. Described below is the basic methodology used to complete the analysis and the results. A detailed analysis of the techniques used is contained in Appendix G.

Methodology

Sewage flow in Minneapolis is not metered at source, but is based on water consumption; billing data provides the most accurate and accessible source of sewage flow estimates available. In the present data environment of the City it is not possible to provide reliable water and sewer billing data by Interceptor Service Area. To overcome this hurdle the Interceptor Service Area totals were derived through an apportionment process. Apportionment on the basis of simplified land use characteristics assumed a uniform distribution of all sub-types of land use throughout the city (single family residential, apartment, different types of commercial and industrial uses, etc.). This is unavoidable given the nature of available growth projections.

Base year sewage flow estimates (1996) for the City of Minneapolis were derived from customer billings for sewer service from the Minneapolis Billing Department. These in turn are based on metered water consumption. The data are grouped into two broad categories, residential and commercial, with the latter category including all non-residential customers. It is assumed that annual water use equals annual sewage flow for commercial users and winter quarter water use times 4 equals annual sewage flow for residential users.

Base year sewage flow estimates (1996) for the 24 individual Interceptor Service Areas in the city were then extrapolated from city totals on the basis of the land use characteristics of each Service Area. The acreage of land devoted to residential and commercial uses

(with the latter deemed to include all non-residential, non-park and non-transportation related land uses) in a given Service Area is divided by the total acreage of the city devoted to these uses. The resulting number is then multiplied with the city total to determine the volumes attributed to each Service Area. (i.e. If a given Service Area contains 5% of the total residential land use area of the city, 5% of total residential sewage flow is attributed to this Service Area.)

Projections of change in sewage flow by interceptor service area to year 2020 were calculated on the basis of population and employment projections provided by the City Planning Department and based on the TAZ[3] unit of analysis. For purposes of the analysis per capita sewage generation is assumed to remain constant; thus, changes in population are assumed to equate to changes in residential sewage flow on a one to one basis (i.e. a 1% increase in population for a given interceptor service area is assumed to equal a 1% increase in residential sewage flow for that area). Similarly, changes in employment are assumed to equate to changes in commercial sewage flow on a one to one basis (i.e. a 1% increase in employment in a given interceptor service area is assumed to equate to a 1% increase in commercial sewage flows for that area).

Results

Excluding flows from the Metropolitan Airports Commission and the Veterans Administration Hospital, the total sewage billed to Minneapolis customers was 15.321 billion gallons in 1996. Using the techniques described above, it is projected that this will increase by 10.80% in 2020, to an estimated sewage volume of 16.975 billion gallons. Appendix H contains a table that estimates total sewage flow for each sanitary service area for the years 2000, 2010 and 2020. These figures are the base wastewater flow and do not include estimates of inflow or infiltration.

[3] Traffic Analysis Zone (TAZ) is the base unit of analysis for comprehensive planning population and employment projections. There are 138 TAZs in the City of Minneapolis.

INFILTRATION/INFLOW

Infiltration/Inflow

In Minneapolis an overloaded sanitary sewer system causes overflow of untreated sewage to the Mississippi River, creates peak flows at the Metropolitan Wastewater Treatment Plant, and in extreme events, will backup raw sewage into basements. Often an overburdened system contains excess amounts of extraneous water, termed infiltration/inflow (I/I). Infiltration is water that seeps into the system from the ground, usually from high groundwater and/or foundation drains. Infiltration is usually a constant flow that does not change from day to day, but can vary over seasons. Inflow is a direct connection, usually from a street, parking lot or roof drain. Rainfall is the primary source of inflows that creates peak flows during and after storms, as well as when snow is melting. Historically, the problem in Minneapolis has been inflow.

History of Infiltration/Inflow

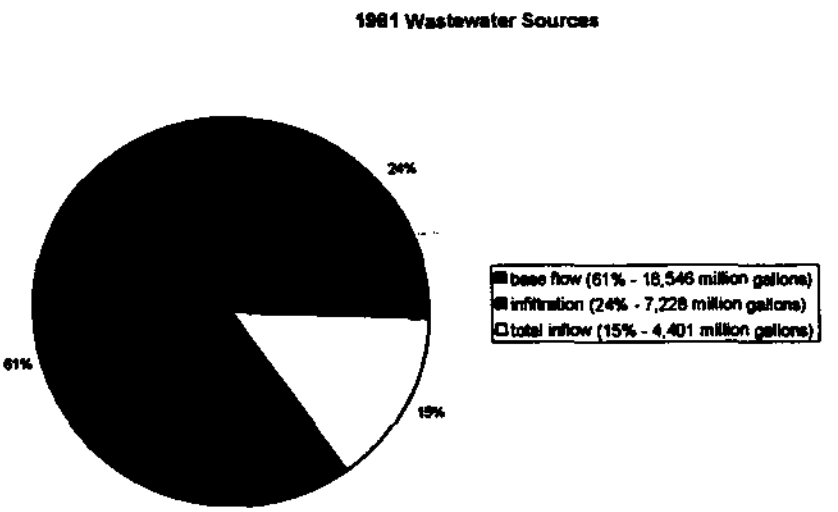
In 1981 a comprehensive study of infiltration and inflow to the Minneapolis sanitary sewer system[4] was undertaken as a background study to the Combined Sewer Overflow program. The conclusion of this report was that the most cost effective techniques to remove extraneous water was to eliminate the inflow from street connections. It was therefore concluded that a Sewer System Evaluation Study (SSES) to investigate sources of infiltration was not needed.

Construction of a separate stormwater drainage system in the Minneapolis Combined Sewer Overflow (CSO) program was intended to significantly reduce inflow. The 1981 I/I study concluded that the following quantities of water were flowing in the sanitary sewer system:

Base wastewater flow	18,546 million gallons per year
Infiltration	7,226 million gallons per year
Inflow	4,401 million gallons per year

[4] Minneapolis Infiltration Inflow Analysis, November 16, 1982, Donohue & Assoc.

INFILTRATION/INFLOW



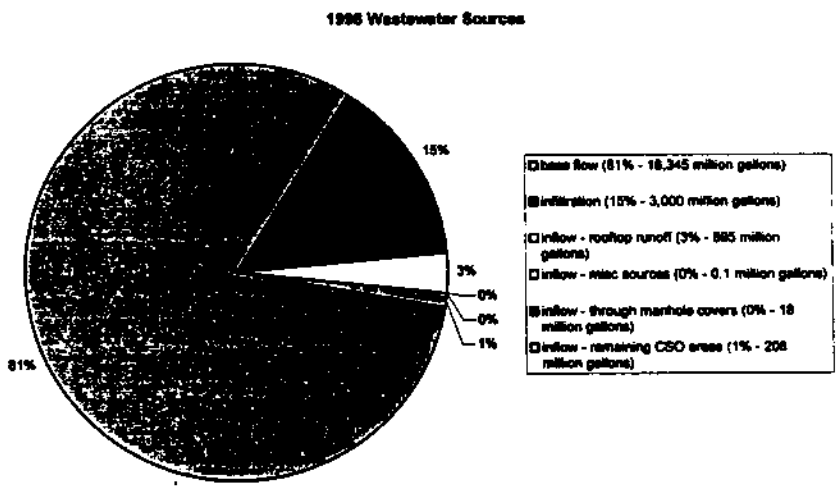
Estimate of 1998 Infiltration/Inflow

In 1997 the Metropolitan Council began to compare wet weather flows against dry weather flows for random storms to understand the current effects of inflow. Although overall the number of overflows to the Mississippi River had decreased since the beginning of the CSO program, there still are overflows during intense rain events. For example, the very intensive storms of 1997 resulted in 27 overflow events. This compares with only 5 events in 1998. Since 1997 was an extreme year with respect to street flooding and other water problems, the analysis of probable infiltration and inflow is based on 1998, a high rainfall year with more frequent and less intense storms.

INFILTRATION/INFLOW

For purposes of estimating annual infiltration and inflow, it was assumed that the sanitary flow could be attributed to base wastewater flow, base infiltration, and inflow from streets, rooftops, manhole covers, and direct overflows from storm drains. A mini I/I study for 1998 concluded that the following quantities of water were flowing in the sanitary sewer system:

Base wastewater flow	16,345 million gallons per year
Infiltration	3,000 million gallons per year
Inflow	822 million gallons per year



Appendix I contains the analysis of how these figures were calculated.

Reduction of Extraneous Flows

The Minneapolis CSO program successfully eliminated approximately 3.5 billion gallons per year of stormwater from the sanitary sewers. The remaining 822 million gallons per year can still cause overflow of raw sewage to the Mississippi River in Minneapolis and add to peak operating problems at the Metropolitan Wastewater Treatment Plant.

However, additional study is needed before an estimate of the cost of further inflow reduction can be made. Both short term and long term actions are needed to continue Minneapolis' efforts to reduce inflow. The following technical and policy questions remain to be resolved:

- What is the overall goal for reduction? In a city the size and age of Minneapolis, a goal of 0% inflow is unrealistic.
- Which region of Minneapolis contributes the greatest quantities of inflow? A program that aims at the worst areas of the city would be the most cost effective.
- If the primary source of inflow is from private properties (rooftops and/or parking lot connections), then who should pay? Is it realistic to expect the City as a whole to fund solutions that benefit private property owners?
- Should the City adopt a policy that provides incentives for property owners to disconnect rooftop connections? Or should an ordinance be adopted that mandates removal of roof leader connections to sanitary sewers whenever a building being remodeled
- What overall benefits would an aggressive program to reduce infiltration accomplish?

The following schedule will accomplish both the short term fixes while allowing time for policy discussions on long term solutions:

Ongoing

- Continue funding of flood mitigation program
- Fund an additional year of CSO construction projects.
- Eliminate undocumented cross connections between storm drains and sanitary sewers as discovered.
- Continue to line sanitary sewer segments that are found to have significant groundwater infiltration.

1999 – 2000

- Work with MCES to isolate the worst areas of inflow in Minneapolis and identify the source(s), including inspection of the MCES interceptors along Bassett Creek and Minnehaha Creek.
- Aggressively investigate undocumented street and alley drain connections to the sanitary sewer and connect to storm drain as discovered.
- Replace seven hole sanitary manhole covers with solid covers in flood prone intersections.

2000 – 2001

- Develop alternatives and costs to eliminate inflow.
- Identify funding sources, including public and private funding.
- Begin policy dicussion relating to disconnection of rooftop drains from sanitary sewers.
- Draft ordinances resulting from policy discussions.

2002 & beyond

- Implement

APPENDIX A
NPDES CSO PERMIT NO. MN0046744

Minnesota Pollution Control Agency

February 26, 1997

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Sharon Sayles Belton
Mayor, City of Minneapolis
350 South Fifth Street
Minneapolis, Minnesota 55415

RE: Reissued NPDES Permit No. MN 0046744
Minneapolis Combined Sewer Overflow Permit

Dear Mayor Belton:

Enclosed is a copy of the reissued final National Pollutant Discharge Elimination System (NPDES) Permit covering your facilities at the above-referenced location, which supersedes an earlier NPDES permit that was issued on January 3, 1991. All comments submitted in writing during the public notice comment period have been considered in the formulation of final determinations and recommendations on the NPDES Permit.

If you have any questions regarding this permit, please contact Dave Sahli of my staff at (612) 296-8722.

Sincerely,

Russell C. Felt

Russell C. Felt, Supervisor
Point Source Compliance Section
Water Quality Division

RCF:ls

Enclosure: Final Permit

cc: Jodi Polzin, Minneapolis Department of Public Works, Minneapolis

STATE OF MINNESOTA

Minnesota Pollution Control Agency

WATER QUALITY DIVISION

National Pollutant Discharge Elimination System (NPDES) and State Disposal System (SDS) Permit MN 0046744

PERMITTEE: City of Minneapolis and the Metropolitan Council , Hereinafter "Joint Permittees"

FACILITY NAME: Combined Sewer System

RECEIVING WATER: Mississippi River

CITY OR TOWNSHIP: City of Minneapolis **COUNTY: Hennepin**

REISSUANCE DATE: February 26, 1997 **EXPIRATION DATE: June 30, 2001**

The State of Minnesota, on behalf of its citizens through the Minnesota Pollution Control Agency (MPCA), authorizes the Joint Permittees to operate a combined sewer system and to discharge from the bypass points identified herein, to the receiving water named above, in accordance with the requirements of this permit.

The goal of this permit is to protect water quality in accordance with Minnesota and U.S. statutes and rules, including Minn. Stat. chs. 115 and 116, Minn. R. chs. 7001, 7050, and the U.S. Clean Water Act.

This permit is a reissuance of an existing permit which was issued on January 3, 1991. This reissued permit is effective on the issuance date identified above and supersedes the previous permit issued for this facility.

This permit and the authorization to discharge shall expire June 30, 2001. The Joint Permittees are not authorized to discharge after the above date of expiration. In order to receive authorization to discharge beyond the above date of expiration, the Joint Permittees shall submit such information and forms as are required by the MPCA no later than 180 days prior to the above date of expiration pursuant to Minn. R. 7001.0040.

Signature: _____

Marvin E. Hora, Manager
Point Source Compliance Section
Water Quality Division

for

Peder A. Larson
Acting Commissioner
Minnesota Pollution Control Agency

If you have questions on this permit, including the specific permit requirements, permit reporting or permit compliance status, please contact:

Minnesota Pollution Control Agency
Water Quality Division, Point Source Compliance Section
520 Lafayette Road North
St. Paul, MN 55155-4194
Telephone: (612) 296-6300
Fax: (612) 297-8683
Telephone Device for Deaf (TTY): (612) 282-5332

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TABLE OF CONTENTS

PAGE

PART I

Cover Page - Receiving Water, Issuance and Expiration Dates 1
Table of Contents 2
Combined Sewer Bypass and Overflow Point Identification 3
Discharge Conditions 4
Reporting and Monitoring Requirements for Discharge Events 5
Operation of Combined Sewer System 10
Schedule of Compliance 11
Definitions 12

PART II

General Terms and Conditions 14-19

REPORT SUBMITTAL SUMMARY

Telemetered Site Monitoring Reports due by the 21st of the month. (Part I, C.1.)
Agreement Between Joint Permittees within 180 days of permit final issuance. (Part II, A.2.)
Annual Report submitted before April 30 of each year. (Part II, A.3.)

PART I

A. COMBINED SEWER BYPASS AND OVERFLOW POINT IDENTIFICATION

Serial No.	Discharge Identification (Name/Location)
001	Minnehaha Tunnel Outfall
002	East 38th ST Outfall
003	East Lake ST Outfall
004	Southwest Interceptor Outfall
005	Northwest Interceptor Outfall
006	Eastside Interceptor Outfall
007	East 26th ST Outfall
008	Cecil ST Outfall
009	Southeast Franklin AV Outfall
010	East Franklin AV Outfall
014	14th AV S & E 18th ST Storm Outfall
020	Chicago AV S & N MPLS Tunnel Outfall
025	Bassetts Creek Outfall
029	26th AV N Outfall
030	22nd AV NE Outfall

B. DISCHARGE CONDITIONS

During the period beginning on the effective date of this permit and lasting until the expiration date, the Joint Permittees are authorized to discharge combined sewage from the bypass/overflow point(s) identified under Paragraph A of this PART, until the sanitary sewer connection(s) are removed, in accordance with the conditions in this permit.

1. The discharge from any combined sewer system bypass/overflow point by the Joint Permittees is prohibited except:

   a. During periods of hydraulic overload caused by rainfall or snowmelt conditions which exceed the design hydraulic capacity of the conveyance system, only after the maximum amount of flow has been conveyed to the wastewater treatment facility; or

   b. During emergency conditions to include the following:

      i. The bypass is unavoidable to prevent loss of life, endangerment of human health, personal injury, or severe property damage. Endangerment of human health includes basement backups. "Severe property damage" means substantial damage to property of the Joint Permittees' or of others, damage that may cause the combined sewer system to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. "Severe property damage" does not mean economic loss as a result of a delay in production.

      ii. There is no feasible alternative to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or performance of maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance.

2. If a regulator listed in Attachment A with a removal status of A or B continues to bypass sewage following completion of the separation program and scheduled removal dates such bypass is not authorized by this permit notwithstanding PART I, B.1 and may be subject to enforcement action until eliminated. The provisions of PART I, B.1.b. may be raised as an affirmative defense to such enforcement action. The Joint Permittees shall, **within five days of detection**, notify the MPCA in writing of such a bypass and **within 30 days** recommend the additional corrective actions necessary to eliminate future bypasses from the regulator before it is closed. The MPCA shall review the recommendations, and may approve a schedule of compliance to implement the necessary corrective actions. Agency approval of such a schedule does not constitute an authorization under this permit to discharge from that regulator.

3. A regulator listed in Attachment A with a removal status of C or D must be equipped with an overflow monitoring device and such bypass is authorized in accordance with PART I,B.1. For the regulators not eliminated after the area tributary to it is separated, the Joint Permittees shall include a regulator monitoring plan in the annual report required by PART II, A.3., describing the overflow monitoring device, the frequency of inspection, a schedule of actions necessary to be taken before final removal, and an estimated date of final removal.

   The monitoring shall be used to determine the likelihood of sewage being bypassed from separated areas. If it appears probable that a bypass may occur under design conditions the Joint Permittees shall recommend and, upon approval by the MPCA, implement additional measures that may be taken to eliminate the potential for bypassing. A summary of the monitoring results and, if necessary, recommendations for further infiltration and inflow removal and/or capacity increases shall be included in the annual report required by PART II, A.3.

   If it appears probable that it may be necessary to retain a regulator in the separated sewer system as an emergency bypass structure, the Joint Permittees shall include in the annual report required by PART II, A.3. an estimate of the conditions and frequency under which a bypass may occur and measures that will be taken to reduce the probability of a bypass of wastewater from the sewer system. Any discharge from a regulator retained as an emergency bypass structure in the separated collection system shall be reported to the Duty Officer, 1-800-422-0798 or 612-649-5451 within one hour of the discovery of the incident.

C. REPORTING AND MONITORING REQUIREMENTS FOR DISCHARGE EVENTS

1. Telemetered Site Monitoring Requirements

The Metropolitan Council shall submit a monthly report to the MPCA summarizing precipitation, regulator overflow duration, and regulator overflow volume data collected through its remote telemetry system. Precipitation data shall be summarized from the Council's existing rain gauge network. Precipitation monitoring may be discontinued at all gauge locations during winter months to protect the measurement equipment from the cold weather. Overflow duration and overflow volume shall be reported for each regulator identified by an asterisk on Attachment A. If data is not available an explanation of the reasons why the data is not available, and a discussion of measures to be taken to ensure that the data will be available in the future shall be included with the report.

Each monthly report shall be submitted to the MPCA at the following address and shall be postmarked **no later than the 21st day following the month during which the monitoring was completed:**

Point Source Compliance Section
Water Quality Division
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, Minnesota 55155-4194

4. Monitoring Requirements in the Event a Bypass is Needed to Conduct Maintenance or Repairs

In the event a discharge from the remaining combined sewer system outfalls results from activities necessary to maintain or repair the combined sewer system a monitoring program as outlined in PART I, C.8. shall be conducted, and a report as required in PART I, C.6. shall be submitted.

A monitoring program that is not in accordance with PART I, C.8. will be accepted if site conditions do not provide for a safely accessible monitoring location.

5. Monitoring Procedures and Reporting Results

a. Samples and measurements required by this permit shall be representative of the monitored activity and shall be analyzed by a laboratory appropriately certified by the Minnesota Department of Health, in accordance with Minn. R. 4740.2040.

b. Test procedures for the analysis of pollutants shall conform to 40 CFR Part 136.

c. All monitoring and analytical instruments used to monitor as required by this permit shall be calibrated and maintained at a frequency necessary to ensure accuracy. The Joint Permittees shall maintain written records of all calibrations and maintenance.

d. The following information shall be recorded for each measurement taken or sample collected:

i. The exact place, date, and time of the sampling or measurement.
ii. The dates the analyses were performed.
iii. The person who performed the analyses. measurement, sample collection or calculation.
iv. The analytical techniques, procedures and methods used.
v. The results of the analyses.

e. If a pollutant is monitored more frequently than required by this permit, the results and the frequency of monitoring shall be included in the calculation and reporting of values submitted in the report required by PART I. C.6.

f. All records required by this permit shall be retained by the Joint Permittees for three years. including any calculations or any original recordings from automatic monitoring instrumentation. These retention periods shall be automatically extended during the course of any legal or administrative proceedings or upon request by the MPCA.

2. Bypass Notification

a. Preliminary bypass notification shall be given immediately to the MPCA (Attn: Point Source Compliance Section, Water Quality Division) when the Joint Permittees believe, based on the information then available, that a bypass to waters of the state from any segment of the combined sewer system may be necessary pursuant to conditions outlined in PART I, B.1.b. Authorized bypasses which result from hydraulic overloading in the combined sewer system are exempt from this notification requirement. The notice shall include, to the extent then available, the reasons therefore, timetables, and appropriate alternatives that may be available to minimize or abate the bypass. Any changes in the foregoing shall be immediately reported to the MPCA. The Joint Permittees shall immediately after giving of said notice implement the planning for appropriate alternatives to minimize or abate the possible bypass. Thereafter, the Joint Permittees shall implement the appropriate, reasonable alternative(s) if any, to minimize or abate the bypass. Appropriate alternatives shall include but not be limited to those alternatives described in paragraph 3 hereinafter following. The failure of the Joint Permittees to properly evaluate or interpret the information available shall not void the Joint Permittees' responsibility to comply with this section.

b. With the exception of a discharge pursuant to PART I, B.1.a., any bypass which is caused by an emergency shall be reported to the Duty Officer, 1-800-422-0798 or 612-649-5451 **within one hour of the discovery of the incident**. The Joint Permittees shall refer to the MPCA "Emergency Notification Guidance for Wastewater Treatment Facilities," dated April 1996, for information to be provided to the Duty Officer.

3. Request for Permission to Bypass for Maintenance or Repair

Scheduled bypasses due to construction and/or normal maintenance are prohibited unless authorized by the MPCA in writing. Existing or temporary collection system facilities shall be used to the maximum extent practical to ensure compliance with permit conditions. The Joint Permittees shall submit a written request for the bypass at least ten days **before the date of the bypass** or as soon as possible under the circumstances. The request shall specify the following:

a. Proposed date and estimated duration of the bypass;

b. Alternatives to bypassing: and

c. Measures to mitigate environmental harm caused by the bypass.

g. Monitoring results shall be reported in the units specified in this permit. A report shall be submitted even if no discharge occurred during the reporting period. The Joint Permittees shall report any substantial changes in operational procedures; activities which alter the nature or frequency of the discharge; material factors affecting compliance with the conditions of this permit; and additional information requested by the MPCA.

h. Except for data determined to be confidential, all reports required by this permit shall be available for public inspection at the MPCA St. Paul office. Effluent data shall not be considered confidential. Confidential material shall be submitted according to Minn. R. 7000.1300.

i. All documents and reports submitted to the MPCA by the Joint Permittees, shall be signed by the Joint Permittees or duly authorized representative of the Joint Permittees.

j. Any person knowingly making any false statement on any report, or tampering with any monitoring device or method, is subject to the imposition of criminal and civil penalties.

6. Reporting on a Discharge Event Caused by Maintenance or Repair of the Combined Sewer System

a. In order to maintain an accurate record of a discharge event, its effect upon the receiving waters and the condition of or changes in the combined sewer system pursuant to PART I,C.3., a report shall be submitted to the Agency if a discharge event takes place. The report shall be submitted to the MPCA (Attn: Point Source Compliance Section, Water Quality Division) **no later than sixty (60) days following the cessation** of such a discharge and shall contain at a minimum the following information:

i. results of the sampling and monitoring required in PART I, C.8. These results shall be reported in the units specified in the permit;

ii. a summary of the impact of the discharge(s) upon the receiving waters. This summary shall be based upon water quality, flow volume, and other essential facts which may be documented from past and ongoing monitoring and/or studies, in addition to new data compiled from the sampling and monitoring program required by this permit;

iii. in the event of repairs or construction, the report shall contain a complete description of all repairs or construction completed, including any modifications in the combined sewer system, any substantial changes in the operational or maintenance procedures, and any other significant activities which will alter the nature or frequency of discharges; and

iv. any other material factors affecting compliance with the conditions of this permit and such information as the Agency may reasonably require of the Joint Permittees pursuant to Minn. R. 7001.1090, subp. 1 and Minn. Stat. chs. 115 and 116 as amended.

7. Except for data determined to be confidential under Section 308 of the Act, and Minn. Stat. § 116.075, subd. 2, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the MPCA. Procedures for submitting such confidential material shall be pursuant to Minn. R. 7000.1300. As required by the Act, effluent data shall not be considered confidential. Knowingly making any false statement on any such report, confidential or otherwise, is subject to the imposition of criminal penalties as provided for in Section 309 of the Act and Minn. Stat. § 115.071, subd. 2 (b).

8. Monitoring Requirements

Each sample collected pursuant to PART I, C.4. above shall be analyzed for the following:

Determination	Units	Frequency	Sample Type	Notes
Discharge Flow	gal	Daily	Volume and Duration	(1)
River Flow	cfs	Daily	Volume	
Biochemical Oxygen Demand	mg/l	Daily	Composite	(1)
Chemical Oxygen Demand	mg/l	Daily	Composite	(1)
Suspended Solids	mg/l	Daily	Composite	(1)
Ammonia Nitrogen	mg/l	Daily	Composite	(1)
Kjeldahl Nitrogen	mg/l	Daily	Composite	(1)
Nitrate Nitrogen	mg/l	Daily	Composite	(1)
Total Phosphorus	mg/l	Daily	Composite	(1)
Total Cadmium	ug/l	Daily	Composite	(1)
Total Chromium	ug/l	Daily	Composite	(1)
Total Copper	ug/l	Daily	Composite	(1)
Total Cyanide	ug/l	Daily	Composite	(1)
Total Iron	ug/l	Daily	Composite	(1)
Total Lead	ug/l	Daily	Composite	(1)
Total Mercury	ug/l	Daily	Composite	(1)
Total Nickel	ug/l	Daily	Composite	(1)
Total Phenols	ug/l	Daily	Composite	(1)
Total Zinc	ug/l	Daily	Composite	(1)

Notes: (1) Representative composite sample to be collected at the discharge point.

Additional monitoring of the discharge or receiving waters may be required at the request of the Agency.

D. OPERATION OF THE COMBINED SEWER SYSTEM

General operation of the combined sewer system shall be in compliance with the following terms and conditions and the operational plan approved on May 11, 1987, and any amendments thereto.

1. Operation of the System for Control of Combined Sewer Losses

The Joint Permittees shall operate the system for control of combined sewer losses (including regulator devices, structures, systems, and programs) as efficiently as possible in order to utilize the system capacity to the maximum extent possible in order to minimize discharges from the combined sewer system.

2. Maintenance of Facilities and Systems

The Joint Permittees shall at all times maintain in good working order and operate as efficiently as possible all facilities or systems of control installed or used in the combined sewer system and shall conduct a regulator elimination program in conformance with the schedule in Attachment A.

3. System Reliability

The Joint Permittees are responsible for maintaining adequate safeguards to minimize the discharge of untreated or inadequately treated wastes at all times. The Joint Permittees are responsible for insuring system reliability.

4. Scheduling of Discharges from the Combined Sewer System for Maintenance or Repairs

Any maintenance or repair of the combined sewer system shall be scheduled as much as possible during periods of high river flow and shall be carried out in a manner approved by the MPCA as outlined in PART I, C.3.

5. Providing an Adequate Maintenance Staff

The Joint Permittees shall provide an adequate staff to carry out the operation. maintenance, repair and testing functions required to insure compliance with the conditions of this permit.

6. Removed Substances

The Joint Permittees shall not deposit sludge or other removed substances from other treatment facilities or any other source into the interceptor system at a time or in a manner that would allow these substances to enter the receiving water as a result of a discharge from bypass/overflow points(s) authorized herein. The Joint Permittees shall dispose of solids, sludges, or other pollutants removed from or resulting from treatment or control of discharges in accordance with all applicable air, water and solid waste Statutes and Rules. When requested by the MPCA, the Joint Permittees shall submit for approval an acceptable plan for such disposal and shall be responsible for obtaining MPCA approval and/or permit of such disposal plans.

7. Storm Water Inflow

No new sources of storm water inflow shall be directly connected to any portion of the sewer system that is designed to carry only sanitary sewage.

E. SCHEDULE OF COMPLIANCE

1. CSO Construction Program

The Joint Permittees shall proceed with elimination of combined sewer bypass/overflows in accordance with the schedule and requirements outlined below. Upon completion of the approved CSO control program there shall be no discharges of sanitary sewage from the separated sewer system.

2. Project Schedules

The Joint Permittees shall proceed with the elimination of regulator structures in accordance with the schedule identified in Attachment A and the provisions of Part I, B. 2, and 3..

3. Elimination of Rainleader Connections

Consistent with Minnesota Statues 116.162, Subp. 7 the city shall continue with an effective rainleader elimination program. A summary of the progress of this program shall be included in the annual report required by PART II, A.3.

4. Operational Plan

The Joint Permittees shall continue implementation of the operational plan approved on May 11, 1987, and any approved amendments thereto that provides for maximum conveyance of wet weather flows to the treatment plant during the implementation phase of the CSO control program.

F. DEFINITIONS

1. "Act" means the Clean Water Act.

2. "Bypass" means an intentional diversion of a waste stream from any portion of the treatment facility.

3. The "City" means the City of Minneapolis.

4. "Combined Sewer" means a sewer that is designed and intended to serve as a sanitary sewer and a storm sewer, or as an industrial sewer and a storm sewer. For the purposes of this permit, the combined sewer system shall include combined sewers and all portions of the separated sewer system which have a connection between the separate sanitary sewer and the separate storm sewer system via a regulator or overflow structure that will allow sanitary sewage to be discharged from the storm sewer.

5. "Combined Sewer Overflow" means a discharge of a combination of storm and sanitary wastewater or storm and industrial wastewater directly or indirectly into the waters of the state, occurring when the volume of wastewater flow exceeds the conveyance or storage capacity of a combined sewer system.

6. "Completion of Separation." For the purposes of interpreting the requirements of Part I, E. of this permit, completion of separation or similar references shall mean completion of construction of all sewer work required for separation, including punch list items followed by an inspection period to identify and correct miscellaneous sources of infiltration and inflow.

7. "Composite Sample" means: a) a series of grab samples collected at least once per hour at equally spaced intervals and proportioned according to flow; or b) grab samples of equal volume each collected after a predetermined volume of flow has passed.

8. "Duty Officer" means the Minnesota Duty Officer, Department of Public Safety, Division of Emergency Management.

9. "Emergency Incident" means all emergency bypasses, spills, or any other environmental emergency as described in the MPCA "Emergency Notification Guidance for Wastewater Treatment Facilities."

10. "Grab Sample" means an individual sample.

11. "Infiltration" means water other than wastewater that enters a sewerage system (including sewer service connections) from the ground through such means as defective pipes, pipe joints, connections, or manholes. Infiltration does not include, and is distinguished from, inflow.

12. "Inflow" means water other than wastewater that enters a sewerage system (including sewer service connections) from sources such as roof leaders, cellar drains, yard drains, area drains, foundation drains, drains from springs and swampy areas, manhole covers, cross connections between storm sewers and sanitary sewers, catch basins, cooling towers, storm waters, surface runoff, street wash waters, or drainage. Inflow does not include, and is distinguished from, infiltration.

13. "MPCA" means the Minnesota Pollution Control Agency as described in Minn. Stat. § 116.02.

PART II

A. MANAGEMENT REQUIREMENTS

1. Street and Collection System Cleaning Program

a. The Joint Permittees shall conduct a collection system cleaning program to reduce the amount of pollutants contributed to the river by CSO and storm water discharges.

b. The city shall conduct a street cleaning program to reduce the amount of pollutants contributed to the river by CSO and storm water discharges.

c. New storm sewer systems shall be designed and constructed to provide for reliable and efficient capture of floatables and other runoff debris, consistent with reliable and efficient conveyance of storm water.

d. A summary of the cleaning program activities shall be included in the annual report required by PART II, A.3.

2. Agreement Between the Joint Permittees Defining Responsibilities to Meet Requirements of the Permit

The Joint Permittees shall either modify the existing Agreement which expired December 31, 1995, or enter into a new Agreement to define the individual responsibilities for meeting the requirements and conditions of this permit. As a part of the above mentioned Agreement the Joint Permittees shall define individual responsibilities to assure that the regulator elimination program as outlined in Attachment A and all other maintenance and operational procedures are properly conducted. The Agreement shall include but is not limited to the following items:

a. A delineation of responsibility to assure that all studies and programs are completed and submitted to the Agency according to the schedules contained in this permit.

b. A delineation of responsibility for the maintenance and repair of the conveyance structure contained in the combined sewer system

c. A delineation of responsibility for the inspection, maintenance and elimination of all regulators, the regulator structure(s) and outfall structures(s) in the event such coordination is needed to carry out the maintenance and elimination program as outlined in Attachment A or any other maintenance or repair.

d. A condition outlining the coordination procedure between the Joint Permittees for the maintenance and elimination of the combined sewer system, regulator(s), regulator structures(s) and outfall structure(s) in the event such coordination is needed to carry out the elimination program as outlined in Attachment A or any other maintenance or repair.

e. A delineation of responsibilities for submittal of the comprehensive report required by PART II,A.3.

f. A delineation of responsibilities for conducting post-separation overflow monitoring in accordance with Part I,B.3.

g. A delineation of responsibilities for implementing the operational plan outlined in PART I, E.4.

A copy of the Agreement shall be submitted to the MPCA **within one hundred eighty (180) days** of the date of issuance of this permit.

3. Annual Report on the Combined Sewer System

The Joint Permittees shall submit an annual report to the MPCA regarding the combined sewer system, the street and collection system cleaning program, the sewer separation program, implementation of the approved operational plan, and the regulator elimination and maintenance program outlined in Attachment A. At a minimum this report shall contain information on progress accomplished pursuant to permit requirements, problems encountered in the system and locations thereof, impact of the problem upon the system, date or dates the problem occurred, past problems of a similar nature, steps taken to correct the problem areas, recommendations for permanent solutions to the problems encountered and any pertinent information that would aid in understanding these problems and the action taken to correct them. This report shall be submitted to the MPCA **before April 30 each year** and shall cover the previous calendar year.

4. Construction

This permit authorizes construction to attain compliance with the limitations and conditions of this permit.

5. Outfall Identification

The Joint Permittees shall maintain identification signs on all authorized outfalls. Such signs shall conform with the specifications outlined in the previously issued permit dated September 25, 1984. Upon elimination of the CSO discharge to an outfall, the Permittee shall remove the identification sign to the outfall and note this activity in the annual report required by PART II, A.3.

B. GENERAL TERMS AND CONDITIONS

The Joint Permittees shall comply with all requirements of 40 CFR 122.41 and 122.42, Minn. R. ch. 7040, and Minn. R. 7001.0150, subp. 3 and 7001.1090, subp. 1, including, but not limited to, the terms and conditions contained in this part.

1. Changes in Discharges from the Combined Sewer System

a. All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any wastewater not consistent with the terms and conditions herein shall constitute a violation of this permit. Such a violation may result in the imposition of civil or criminal penalties as provided for in Section 309 of the Act and Minn. Stat. § 115.071.

b. Combined sewer system modifications, additions, and/or expansions that increase the system capacity shall be reported to the MPCA (Attn: Point Source Compliance Section, Water Quality Division) prior to the changes taking place and this permit may then be modified or reissued to reflect such changes.

c. In no case are any system modifications or significant changes in system operation including regulator adjustments permitted that will cause an increase in volume or duration of overflow events.

C. PERMIT MODIFICATIONS

1. Joint Permittee Initiated

The following changes may require a permit modification and shall be reported to the MPCA for approval prior to the change:

a. anticipated changes in the combined sewer system discharge, including new significant industrial discharges or significant changes in existing industrial discharges to the sanitary sewer system.

b. the permit is not transferable to any person without the express written approval of the MPCA. The new owner must submit a permit application no later than 90 days before the scheduled change in ownership or control.

2. MPCA Initiated

After notice and opportunity for a hearing, this permit may be modified, suspended, or revoked for causes including, but not limited to, the following:

a. Violation of any terms or conditions of this permit.

b. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts.

c. A change in any condition that requires a change in discharge.

d. The establishment of toxic effluent standards or prohibitions more stringent than any limitations in this permit.

e. Minn. R. 7001.0170 and 7001.0190.

D. INSPECTION AND ENTRY

1. The Joint Permittees shall allow of the MPCA to:

a. Enter the premises where the facility is located or activity conducted.

b. Have access to and copy any records that are required under the conditions of this permit.

c. Inspect any facilities, equipment, practices or operations regulated or required under this permit.

d. Sample or monitor for the purposes of assuring compliance.

2. The Joint Permittees shall furnish to the MPCA, within a reasonable time, any information requested to determine compliance with this permit.

E. LIABILITY EXEMPTION

1. In issuing this permit the state and the MPCA assume no responsibility for damage to persons, property, or the environment caused by the activities of the Joint Permittees in the conduct of actions, including those activities authorized, directed, or undertaken to achieve compliance with this permit. To the extent the state and MPCA may be liable for the activities of its employees, that liability is explicitly limited to that provided in the Tort Claims Act, Minn. Stat. § 3.736.

2. The MPCA's issuance of this permit does not obligate the MPCA to enforce local laws, rules or plans beyond what is authorized by Minnesota statutes.

F. LIABILITIES

1. The MPCA's issuance of this permit does not release the Joint Permittees from any liability, penalty, or duty imposed by Minnesota or federal statutes or rules or local ordinances, except the obligation to obtain the permit.

2. Nothing in this permit shall be construed to preclude the institution of any legal or administrative proceedings or relieve the Joint Permittees from any responsibilities, liabilities, or penalties for violation of effluent and water quality limitations, or other federal regulation or state rules, not included in this permit.

3. The issuance of a permit does not prevent the future adoption of the MPCA of pollution control rules, standards, or orders more stringent than those now in existence and does not prevent the enforcement of these rules, standards, or orders against the Joint Permittees.

4. Noncompliance with the terms and conditions of this permit subjects the Joint Permittees to penalties provided by federal and state law, including monetary penalties, imprisonment or both.

G. PROPERTY RIGHTS

The issuance to this permit does not convey a property right or exclusive privilege, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations.

H. SEVERABILITY

The provisions of this permit are severable, and if any provisions of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby.

I. PROHIBITED WASTES

The Joint Permittees shall prohibit the discharge to its combined sewer system of the following specific prohibited pollutants:

1) pollutants which create a fire or explosion hazard, including any discharge with a flash point less than 60 degrees C (140 degrees F),

2) pollutants which will cause corrosive structural damage, but in no case less than pH 5.0,

3) solid or viscous pollutants which will cause obstruction to flow,

4) pollutants which result in the presence of toxic gases, vapors, or fumes that may cause acute worker health and safety problems,

J. COOLING WATER

New discharges into the sanitary or combined sewer system of noncontact cooling water is prohibited, unless there are no cost-effective alternatives.

Existing discharges of non-contact cooling water to the Joint Permittees' combined sewer system shall be eliminated, where elimination is cost-effective, or where an infiltration/inflow analysis and sewer system evaluation survey indicates the need for such removal.

ATTACHMENT A

Regulator Removal Schedule

NPDES Outfall No.	Regulator Code	Name and/or Location	Responsible Party	Removal Status
001		**Minnehaha Tunnel Outfall**		
	1-37 *	Minnehaha Pkwy & 39th AV S	MCES	B
002		**East 38th ST Outfall**		
	2-35	East 38th ST & 26th AV S	MCES	C
004		**Southwest Interceptor Outfall**		
	4-34 *	Southwest Meters Bypass	MCES	D
005		**Northwest Interceptor Outfall**		
	5-34 *	Northwest Meters Bypass	MCES	D
006		**Eastside Interceptor Outfall**		
	6-48 *	East Meters Bypass	MCES	D
007		**East 26th ST Outfall**		
	7-33 *	East 26th ST & Seabury AV	MCES	D
008		**Cecil ST Outfall**		
	8-31A	East River RD & Cecil ST on E River RD	MCES	B
	8-31B	East River RD & Cecil ST on Cecil ST	MCES	B
009		**Southeast Franklin AV Outfall**		
	9-30A	E River RD & Franklin AV SE on Franklin	MCES	B
	9-30B	E River RD & Franklin AV SE on 27th AV	MCES	B
010		**East Franklin AV Outfall**		
	10-32	E Franklin AV & W River RD	MCES	B
014		**14th AV S & E 18th ST Storm Outfall**		
	14-22½h	E 26th ST & 18th AV S	MCES	B
020		**Chicago AV S & N MPLS Tunnel Outfall**		
	20-17 *	Portland AV S & Washington	MCES	D
025		**Bassetts Creek Outfall**		
	25A-13	Bassetts Creek at 5th ST N	City	B
029		**26th AV N Outfall**		
	29-8	26th AV N & Emerson AV N	MCES	B
030		**22nd AV NE Outfall**		
	30-Q	22nd AV NE at 5th ST NE from N	City	B
	30-R	22nd AV NE at 5th ST NE from S	City	B

* Indicates regulator monitored telemetrically by MCES.

Removal Status for Combined Sewer Overflow Regulators

A: To be eliminated in 1996
B: To be eliminated in 1997
C: Monitoring is required before elimination can be scheduled
D: Additional monitoring is required. May be necessary to remain as an emergency bypass.

APPENDIX B
CSO COOPERATIVE AGREEMENT

AMENDED CITY AGREEMENT NO. 6296
AMENDED METROPOLITAN COUNCIL CONTRACT NO. 2256

This Agreement, made and entered into the 3rd day of June 1986, and amended the 8th day of March, of 1991, and again this 30th day of March, 1998 by and between the City of Minneapolis, a municipal corporation of the State of Minnesota (hereinafter the "City"), the Metropolitan Council, a political subdivision of the State of Minnesota (hereinafter the "Council").

Witnesseth That, in the joint and mutual exercise of their powers and in consideration of the mutual convenants herein contained, the parties to recite and agree as follows:

Section 1. Recitals.

1.01. The City owns and operates a sewer system located inside the boundaries, comprising various lateral, sub-trunk and trunk sewers; pumping stations; flow regulating devices; and other equipment and appurtenances.

1.02. The Council owns and operates a sewer system located inside and outside the City, comprising interceptor sewers, pumping stations, flow regulating devices, treatment works, and other equipment and appurtenances.

1.03. Sanitary sewage and surface water is received by the City sewer system and is conveyed to the Council sewer system. During periods of snowmelt and/or rainfall, sewage and surface water is conveyed in such amounts that the design hydraulic conveyance capacity of portions of the City or Council sewer system can be exceeded, resulting in the overflow of such combined sewage into the Mississippi River.

1.04. The City and the Council have for many years been engaged in a program to provide facilities designed to minimize the number and volume of combined sewer overflows into the Mississippi River or to eliminate them altogether.

1.05. The overflows of combined sewage into the Mississippi River are regulated through the permits issued by the Minnesota Pollution Control Agency (Agency). Accordingly, the Agency has issued its NPDES Permit No. MN 0046744 to the City and the Council (the Permit) authorizing the continuation of such combined sewer overflows until June 30, 2001.

1.06. The Permit requires the City and the Council as joint permittees, to undertake certain actions and programs hereinafter described toward efficient operation and maintenance of the combined sewer system and toward implantation of the combined sewer overflow (CSO) abatement plan. The CSO abatement plan implementation schedule is described in the Permit

1.07. The purpose of this agreement is to define the responsibilities of the City and the Council according to Part II.A.2. of the Permit.

Section 2. Operation and Maintenance of Sewer Systems

2.01. City System. The City agrees to operate and maintain its combined sewer system in accordance with Parts I.B.1., I.C.2., I.C.3., I.D.1-7., and II.A.1. of the Permit. The City also agrees to operate and maintain the regulators, regulator structures, and outfall structures, for which the City is listed as the responsible party in Attachment A of the Permit in accordance with Parts I.B.1., I.C.2., I.C.3., I.D.1-7., and II.A.1. of the Permit. The City also agrees to operate and maintain the outfall structures for which contributing regulators involve both the City and the Met Council, in accordance with the above Parts of the Permit. The City also agrees to maintain outfall identification signs, in accordance with Part II.A.5. of the Permit.

2.02. Council System. The Council agrees to operate and maintain its interceptor system in accordance with Parts I.B.1., I.C.2., I.C.3., I.D.1-7., and II.A.1. of the Permit. The Council also agrees to operate and maintain the regulators, regulator structures, and outfall structures, for which the Council is listed as the responsible party in Attachment A of the Permit, in accordance with the Parts I.B.1., I.C.2., I.C.3., I.D.1-7., and II.A.1. of the Permit.

2.03. Coordination Procedure. In the event that maintenance or repair of the combined sewer system, interceptor system, regulators, regulator structures, and/or outfall structures is required under circumstances involving both the City and the Council and in a manner requiring coordination of activities, the Council shall assume the responsibility for coordination with the Agency, other affected parties, and the City. The City and the Council shall be responsible for the maintenance or repair of their sewer systems in accordance with Paragraphs 2.01 and 2.02. If the City and the Council decide to use one contractor to perform the maintenance or repair of their system, the Council shall engage the contractor on behalf of the City and the Council.

2.04. It is understood and agreed by the parties that delineation of responsibility for the maintenance and repair of regulators, regulator structures, and outfall structures, as per Attachment A of the permit and Sections 2.01 and 2.02 of this agreement, is based on personnel, equipment, materials, geography, and other resources available to the City and the Council. The delineation of responsibility herein does not explicitly nor implicitly define ownership of these facilities.

Section 3. Monitoring.

3.01 City Function. The City agrees to assist the Council with bypass monitoring in accordance with Part I.C.4. of the Permit during those bypass events caused by

maintenance or repair of portions of the sewer system for which the City has responsibility under Section 2.01.

3.02. Council Functions. The Council agrees to provide telemetered regulator site monitoring and reporting in accordance with Part I.C.1. of the Permit. The Council also agrees to provide regulator monitoring in accordance with Parts I.C.5-8. The Council also agrees to provide bypass monitoring in accordance with Part I.C.4. of the Permit during bypass events caused by maintenance or repair of the sewer system. For bypass events caused by maintenance or repair of portions of the sewer system for which the City has responsibility under Section 2.01, the Council shall report the bypass monitoring results to the City within 40 days following the cessation of the bypass.

Section 4. Schedule of Compliance

4.01. City Responsibilities. The City agrees to do the following:

a. Implement its sewer separation program in accordance with Part I.E.4. and Attachment A of the Permit.
b. Operate remainder of CSO System in accordance with Part I.D.1-7.
c. Notify the Council within 30 days when separation has been completed in an area tributary to a Council maintained regulator.
d. If a regulator remains in service after the last separation project has been constructed in its drainage area, it will be equipped with a simple overflow device by March 31 of the following year.
e. A plan for regulators which remain in service after the specific drainage area is separated should be submitted to the MPCA in accordance with Part I.B.2. and I.B.3. of the Permit. This overflow monitoring plan will include a description of an overflow monitoring device and the proposed frequency for inspection. Implement the elimination of regulator structures. Explain the need for maintaining the regulator in a report to the Agency within 180 days after the overflow monitoring plan has been submitted as indicated by Paragraph 4.01.i.
f. Maintain and inspect regulators which are not eliminated immediately upon completion of sewer separation in the regulator drainage area, and which are the City's responsibility as listed in Attachment A of the Permit.
g. Explain the need for maintaining the regulators noted in Paragraph 4.01.f. in a report to the Council within 120 days after the specific drainage area has been separated.
h. Report bypasses from regulators noted in Paragraph 4.01.f. to the Agency, in accordance with Part I.B.2. of the Permit.
i. Recommend additional corrective actions to eliminate future bypasses from any regulator that bypasses sewage following completion of sewer separation in a report to the Agency within 30 days following detection of a bypass, in accordance with Part I.B.2. of the Permit.

j. Implement the necessary corrective actions recommended in Paragraph 4.01.i. in accordance with a schedule of compliance approved by the Agency.
k. Implement the approved operational plan for that part of the system noted in Paragraph 2.01, in accordance with Part I.E.4 of the Permit.
l. Continue with its rainleader elimination program and report thereon, in accordance with Part I.E.3. of the Permit.

4.02. Met Council Responsibilities. The Council agrees to the following:

a. Operate remainder of CSO System in accordance with Part I.D.1-7. of the permit.

b. Recommend additional measures to eliminate the potential for bypassing in the annual report to the Agency, in accordance with Part II.A.3.of the Permit.
c. Submit to the Agency the reports required by Part I.C. of the Permit.
d. If a regulator remains in service after the last separation project has been constructed in its drainage area, it will be equipped with a simple overflow device by March 31 of the following year.
e. A plan for regulators which remain in service after the specific drainage area is separated should be submitted to the MPCA in accordance with Part I.B.2. of the Permit. This overflow monitoring plan will include a description of an overflow monitoring device and the proposed frequency for inspection.
f. Implement the final overflow monitoring plan as required in Paragraph 4.02.e. when approved by the Agency. Explain the need for maintaining the regulator in a report to the Agency within 180 days after the overflow monitoring plan has been submitted as indicated by Paragraph 4.02.f.
g. Maintain and inspect the regulators which are not eliminated immediately upon completion of sewer separation in the regulator drainage area, and which are the Council's responsibility as listed in Attachment A of the Permit.
h. Report bypasses from regulators noted in Paragraph 4.02.g. to the Agency, in accordance with Part I.B.2. and I.B.3. of the Permit.
i. Submit recommended additional corrective actions to the Agency, in accordance with Part I.B.2. and I.B.3. of the Permit.
j. Prepare and submit to the Agency an operational plan, in accordance with Part I.E.4. of the Permit.
k. Implement the approved operational plan for that part of the system noted in Paragraph 2.02 in accordance with Part I.E.4. of the Permit.
l Develope and approve a Capital Improvement Program to meet its obligations under Part I.E.1., I.E.2., and I.E.4. of the Permit.

Section 5. Annual Report

5.01. City Responsibility. The City agrees to prepare and submit to the Council by March 31 of each year, the City's portion of the annual report on the combined sewer system for the preceding calendar year. The City's annual report shall contain information regarding the combined sewer system, street and collection system cleaning program, sewer separation program, rainleader elimination program, post-separation sanitary flow monitoring summary of abandoned diversions and regulators, operational plan, and the regulator and outfall maintenance program for which the City is responsible under Attachment A of the Permit, in accordance with Part II.A.3. of the Permit.

5.02. Council Responsibility. The Council agrees to prepare one overall annual report, incorporating the City's portion as described in Section 5.01, and to submit the overall annual report to the Agency, the City, and the Council by April 30 each year for the preceding calendar year, in accordance with Part II.A.3. of the Permit.

Section 6. Administrative Provisions

6.01. Compliance with Standard Provisions. The City and the Council shall each comply with Parts II.B.-J. of the Permit in carrying out their responsibility under this agreement.

6.02. Bypass Notification. The City and the Council shall each have the obligation to notify the other joint permittee immediately following notification to the Agency in accordance with Part I.C.2. of the Permit.

6.03. Communications. Written communication and/or reporting to the Agency by any of the joint permittees in accordance with the Permit requirements or regarding Permit conditions and provisions shall include copies to the other joint permittees.

6.04. Costs. Each of the parties agrees to provide funds for and pay the cost of performing its obligations under this agreement, subject to the following provisions:

(1) The City agrees to reimburse the Council for the cost of work performed on the City's sewer system under Section 2.03.

(2) The City agrees to reimburse the Council for costs on a time and materials basis for providing bypass monitoring during maintenance or repair of portions of the sewer system which the City has responsibility under Section 2.01, as per Section 3.02.

(3) The City agrees to pay one-half of any permit fee levied by the Agency, by reimbursing the Council. The Council agrees to submit all required permit fees to the Agency on behalf of the joint permittees.

When feasible, the Council agrees to credit costs due from the City pursuant to this agreement against the costs due to the City under the annual sewer maintenance agreement between the City and the Council. Each party shall be responsible for keeping accurate and complete records of all costs incurred during the performance of it duties under this agreement. The above allocation of cost does not preclude the designated responsible part from recovering costs from another party, after the action(s) required by the Permit and this agreement have been completed by the designated responsible party.

6.05. Amendments. This agreement may be modified only by written amendment executed by the City, and the Council.

6.06. Effectiveness. This agreement shall be effective upon its execution by the City, and the Council.

6.07. Termination. This agreement shall terminate on June 30, 2001, or upon completion of the separation program whichever is later, unless extended by amendment, per Section 6.05.

6.08. Severability. The provisions of this agreement are severable, and the invalidity or impossibility of performance of any of them shall not invalidate or render ineffective any other provision.

6.09. The City, and the Council agree that the provisions of all applicable federal, state and local laws and regulations pertaining to affirmative action and discrimination shall be considered a part of this agreement as of more fully set forth herein.

6.10. The City, and the Council agree to comply with state laws pertaining to workers' compensation insurance or self-insurance coverage.

IN WITNESS WHEREOF, the parties have executed this agreement by authority of their respective governing bodies as of the day and year first above-written -- and amended as of the day indicated.

Date: 2-2-98

CITY OF MINNEAPOLIS

By _____
Mayor

By _____
Minneapolis Finance Officer

Approved as to Form:

By _____
Assistant City Attorney

Attest _____
Assistant City Clerk

In the Presence of:

METROPOLITAN COUNCIL

By _____
Regional Administrator

By _____
General Manager - Wastewater Services

Approved as to Form:

By _____
General Counsel

9-12-97

T&PW – Your Committee recommends that the proper City Officers be authorized to execute an amended agreement with the Metropolitan Council to define the responsibilities of the requirements contained in Reissued NPDES Permit No MN 0046744, Minneapolis Combined Sewer Overflow Permit.

Adopted. Yeas, 13; Nays none.

Passed September 12, 1997.

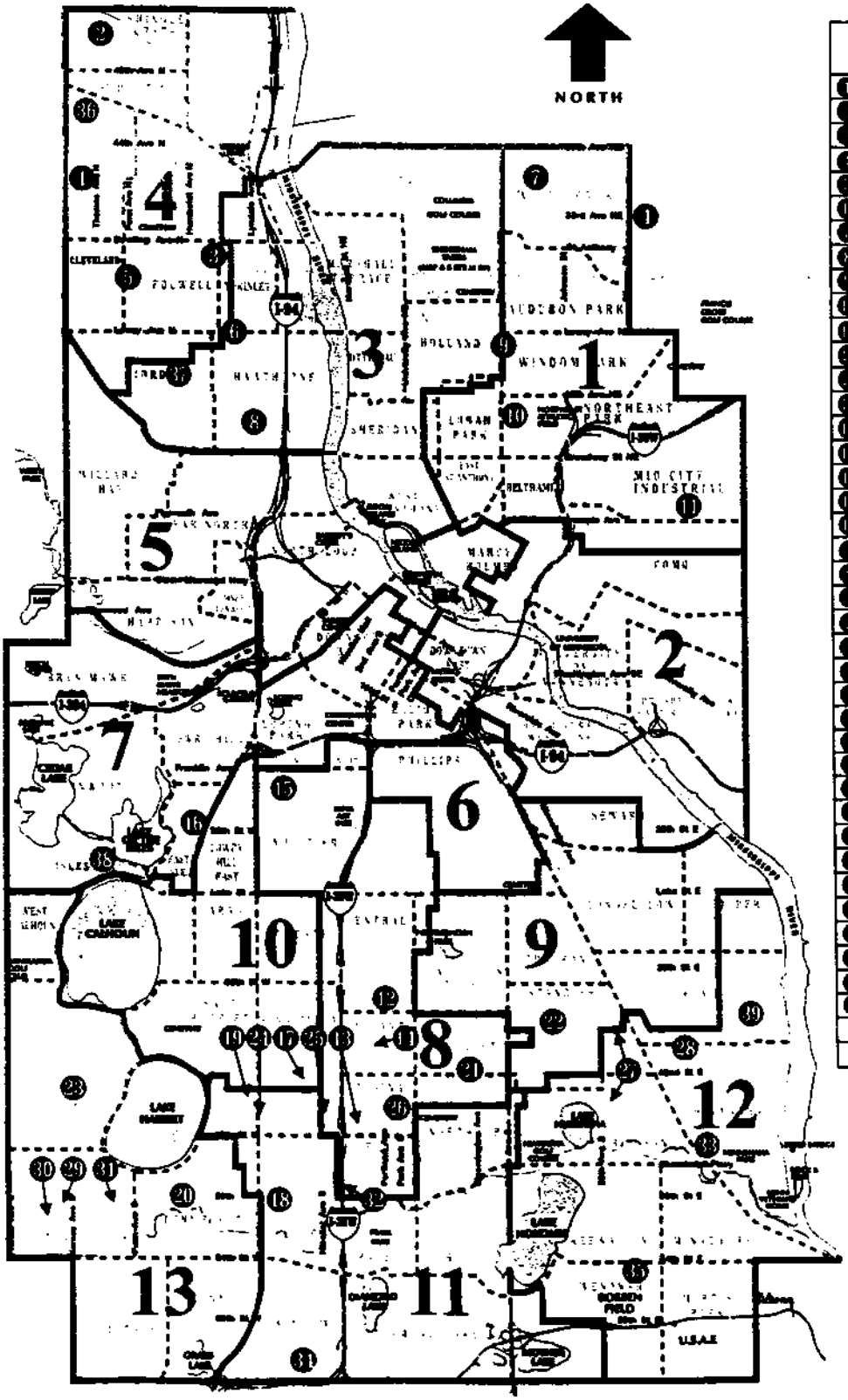
Approved September 18, 1997.

S. Sayles Belton, Mayor.

Attest: M. Keefe, City Clerk.

APPENDIX C
1998 – 2006 FLOOD MITIGATION PROGRAM

1997 PROBLEM FLOODING AREAS



Recommended Area:		Water Outfall:
1	42ND AVE N @ RUSSELL AVE N	20-210B
2	51ST AVE N @ VINCENT AVE N	20-010
3	57TH @ HUMBOLDT AVE N	10-110
4	55RD @ BENJAMIN NE	10-100
5	35TH AVE N TO DOWLING AVE WASHBURN - MORGAN AVES N	63-010
6	30TH AVE N TO 33RD AVE N DUPONT TO IRVING AVES N	10-110
7	36TH AVE @ POLK ST NE	10-100
8	3RD ST N AT 32ND AVE N	10-230
9	HUDSON HIGH SCHOOL AREA	10-180
10	18TH @ QUINCY NE	10-180
11	TALMAGE @ HOOVER NE	10-4608 (10-4608)
12	3700 BLOCK OF COLUMBUS S	76-010
13	CLINTON AVE S FROM 46TH TO 46TH STS E	70-330
14	40TH ST E FROM 4TH TO 5TH AVE S	10-450K
15	32ND ST W @ GARFIELD AVE S	10-450J
16	26TH ST W @ EMERSON AVE S	63-180
17	43RD ST W @ WENTWORTH AVE S	10-450J
18	30TH @ WENTWORTH AVE S	70-235
19	44TH ST W @ ALDRICH AVE S	57-020
20	MINNEHAHA CREEK - HUMBOLDT TO HENNEPIN AVES S	70-110, 180, 190, 140
21	BLOOMINGTON HOLDING POND AREA	76-010
22	SIBLEY FIELD	76-010
23	42ND ST W @ ABBOTT AVE S	54-030A/B/C
24	46TH ST W @ LYNDALE AVE S	10-450U
25	48TH ST W - HUCKLEBY TO 1ST AVE S	10-450U
26	1 43RD ST TO MINNEHAHA CREEK POINT LAND TO CHICAGO AVE S	70-350
27	30TH AVE S @ E 44TH ST. 30TH AVE S @ E 36TH ST.	70-470
28	E 40TH ST @ SHELLING AVE	10-550
29	30TH TO 31ST STS - ZENITH TO YORK AVES	57-100A/B
30	31ST ST W @ ABBOTT AVE S	57-100A/BC
31	30TH TO 31ST STS W @ SHERIDAN AVE S	57-070
32	40TH ST E @ STEVENS AVE S	70-330
33	MINNEHAHA CREEK - 34TH AVE S TO 36TH AVE S	70-535, 540, 555
34	50TH ST E - HUMBOLDT TO STEVENS AVES	71-070
35	54TH ST E @ 26TH AVE S	10-780F
36	VICTORY MEMORIAL PARKWAY @ JOHNSON AVE N	63-010
37	ENGLEWOOD AVE N 57TH - 58TH AVES N	40-010
38	DEAN PARKWAY	54-180
39	46TH AVE S 36TH TO 37TH STS E	10-670

MINNEAPOLIS
OCTOBER 15, 1997
ENGINEERING DESIGN

MINNEAPOLIS FLOOD MITIGATION PROGRAM

1998 through 2006

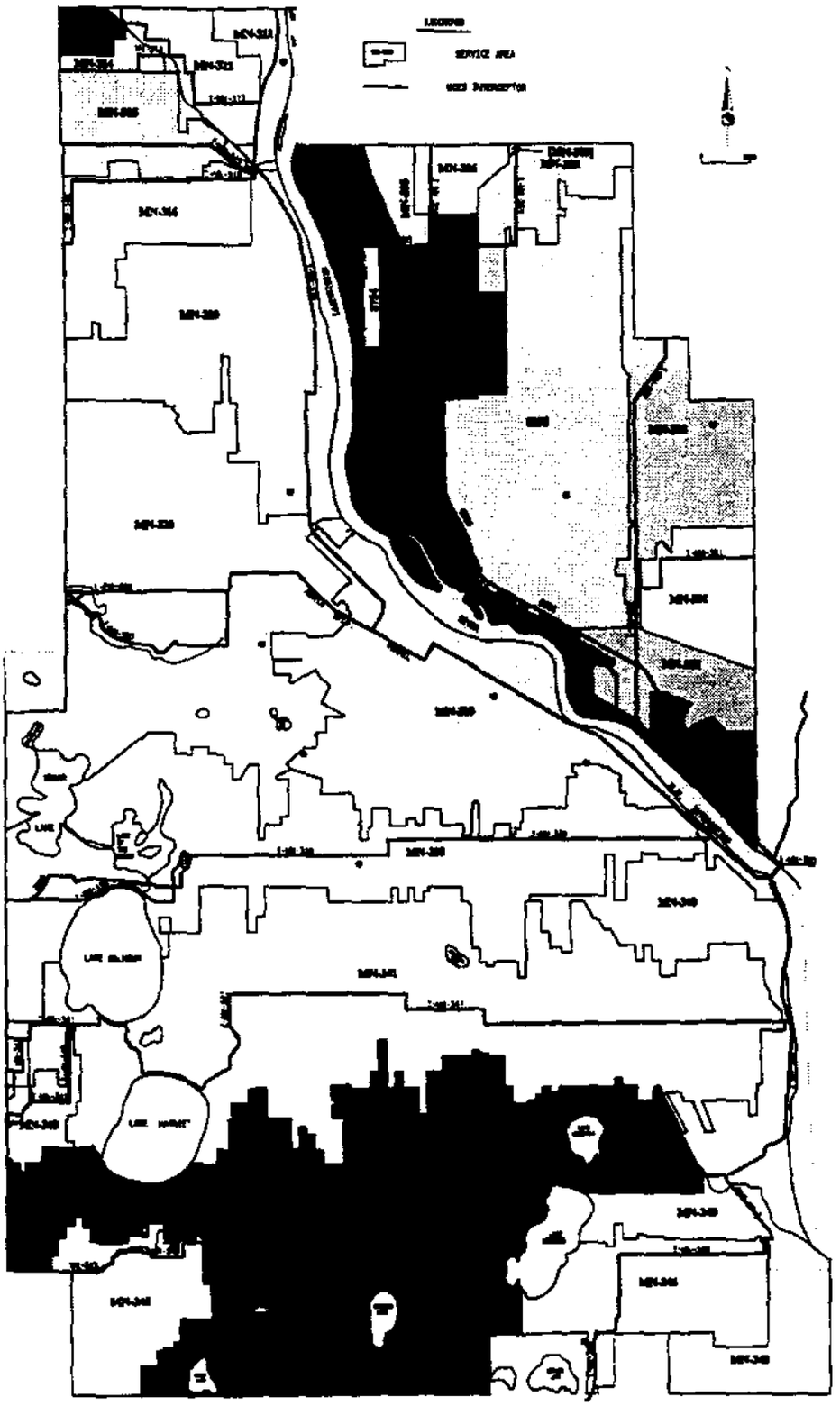
23-Apr-99

project name	project number	total cost	construction year(s)
Property Acquisition for Flood Basins and Ponds	Areas 9, 12, 26, 34, 37	***	1998/1999
Misc Catch Basin Improvements	Areas 13**, 11, 17, 23, 28, 31, 32, 35	$110,000	1998
Excelsior Blvd Storm Drain	PS09	$600,000	1998
Jefferson Elementary School Storm Drain	Area 16**	$825,000	1999
Holland Flood Basin (Edison High School)	Area 9**	$5,600,000	1999
51st and Zenith Aves S Relief Storm Drain	Area 29**, 30	$2,250,000	1999
Lyndale Ave Relief Storm Drain	PS10	$1,650,000	1999
33rd Ave N Storm Drain	Area 6**	$4,500,000	1999/2000
60th and 1st Ave S Flood Pond*	Area 34	$9,300,000	1999/2000
43rd and Park Flood Basin*	Area 26	$8,550,000	2000
29th and Logan Aves N Flood Pond	Area 37	$5,250,000	2001
42nd and Russell Aves N Storm Drain	Area 1	$525,000	2001
Misc Storm Drains	Areas 8, 14, 19	$1,350,000	2001
45th St @ Lyndale Storm Drain	Areas 24, 25	$390,000	2002
Misc Storm Drains	Areas 33, 38, 39	$850,000	2002
NW Lake Hiawatha Flood Pond	Area 12, 21, 22	$9,550,000	2002, 2003
35th and Washburn Aves N Storm Drain	Area 5	$3,500,000	2003, 2004
NE Lake Hiawatha Storm Drain	Area 27	$4,500,000	2001, 2004, 2005
45th St @ 35W Storm Drain	Area 18	$2,635,000	2004, 2005, 2006
total		**$61,935,000**	

* project that received DNR flood mitigation grant ** designates school within flooding area *** included in construction cost for each project

APPENDIX D
SANITARY SERVICE AREA CHARACTERISTICS

CITY OF MINNEAPOLIS
METROPOLITAN COUNCIL
SANITARY INTERCEPTORS AND SERVICE AREAS



INTERCEPTOR SERVICE AREA
MN-300

POPULATION

1990 CENSUS	HOUSEHOLDS
17,060	7215

AREA

(INCLUDES PUBLIC R.O.W.)

ACRES	SQUARE FT.	SQ.MILES
2,436.60	106,138,296	3.81

LAND USE

(EXCLUSIVE OF PUBLIC R.O.W.)

TYPE	AREAS (SQUARE FT.)	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Single Family	14,756,554	18.6%	2272	48.6%
Two Family	7,192,405	9.1%	1171	25.0%
Multi Family	2,878,618	3.6%	330	7.1%
Group Quarters	938,070	1.2%	14	0.3%
Public Facilities	2,415,535	3.0%	22	0.5%
Cultural, Entertainment, Recreational, Health Care	3,075,216	3.9%	28	0.6%
Parks & Open Spaces	5,566,395	7.0%	28	0.6%
Undeveloped & Unused Land	5,065,856	6.4%	156	3.3%
Transportation, Communications, Utilities	19,236,819	24.3%	322	6.9%
Service - Comm	4,110,517	5.2%	120	2.6%
Retail - Comm	1,961,139	2.5%	130	2.8%
Wholesale - Comm	0	0.0%	0	0.0%
Light Industrial	11,463,773	14.5%	79	1.7%
General Industrial	644,846	0.8%	7	0.1%
TOTALS	79,305,743	100%	4679	100%

INTERCEPTOR SERVICE AREA
MN-301

POPULATION

1990 CENSUS	HOUSEHOLDS
3075	1236

AREA

(INCLUDES PUBLIC R.O.W.)

ACRES	SQUARE FT.	SQ.MILES
529	23,082,296	0.82

LAND USE

(EXCLUSIVE OF PUBLIC R.O.W.)

TYPE	AREAS (SQUARE FT.)	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Single Family	2,745,060	14.0%	500	66.1%
Two Family	778,327	4.0%	139	18.4%
Multi Family	137,247	0.7%	7	0.9%
Group Quarters	92,442	0.5%	1	0.1%
Public Facilities	748,334	3.8%	2	0.3%
Cultural, Entertainment, Recreational, Health Care	0	0.0%	0	0.0%
Parks & Open Spaces	0	0.0%	0	0.0%
Undeveloped & Unused Land	1,486,191	7.6%	17	2.2%
Transportation, Communications, Utilities	4,672,212	23.9%	29	3.8%
Service - Comm	662,855	3.4%	12	1.6%
Retail - Comm	63,639	0.3%	7	0.9%
Wholesale - Comm	0	0.0%	0	0.0%
Light Industrial	8,031,477	41.1%	39	0.8%
General Industrial	121,207	0.6%	2	0.0%
TOTALS	19,538,991	100%	757	100%

INTERCEPTOR SERVICE AREA
MN-302

POPULATION

1990 CENSUS	HOUSEHOLDS
6400	1702

AREA

(INCLUDES PUBLIC R.O.W.)

ACRES	SQUARE FT.	SQ.MILES
1422.5	61,964,100	2.22

LAND USE

(EXCLUSIVE OF PUBLIC R.O.W.)

TYPE	AREAS (SQUARE FT.)	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Single Family	4,964,124	11.5%	796	56.9%
Two Family	671,980	1.6%	106	7.6%
Multi Family	807,645	1.9%	73	5.2%
Group Quarters	842,402	2.0%	33	2.4%
Public Facilities	642,021	1.5%	12	0.9%
Cultural, Entertainment, Recreational, Health Care	5,860,941	13.6%	8	0.6%
Parks & Open Spaces	273,060	0.6%	2	0.1%
Undeveloped & Unused Land	2,121,408	4.9%	52	3.7%
Transportation, Communications, Utilities	9,736,798	22.6%	161	11.5%
Service - Comm 8,628,162	16.67	0.0%	7	0.5%
Retail - Comm	922,083	2.1%	49	3.5%
Wholesale - Comm	0	0.0%	0	0.0%
Light Industrial	15,311,888	35.5%	93	6.6%
General Industrial	983,802	2.3%	8	0.2%
TOTALS	43,138,169	100%	1400	100%

INTERCEPTOR SERVICE AREA
MN-303

POPULATION

1990 CENSUS	HOUSEHOLDS
3863	1572

AREA

(INCLUDES PUBLIC R.O.W.)

ACRES	SQUARE FT.	SQ.MILES
615	26,789,400	0.96

LAND USE

(EXCLUSIVE OF PUBLIC R.O.W.)

TYPE	AREAS (SQUARE FT.)	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Single Family	9,120,184	44.1%	1421	92.0%
Two Family	259,940	1.3%	37	0.8%
Multi Family	138,278	0.7%	9	0.2%
Group Quarters	18,816	0.1%	1	0.02%
Public Facilities	274,428	1.3%	1	0.02%
Cultural, Entertainment, Recreational, Health Care	2,821,217	13.7%	4	0.1%
Parks & Open Spaces	328,354	1.6%	2	0.04%
Undeveloped & Unused Land	446,795	2.2%	12	0.3%
Transportation, Communications, Utilities	6,533,688	31.6%	43	0.9%
Service - Comm	23,370	0.1%	4	0.1%
Retail - Comm	85,765	0.4%	6	0.1%
Wholesale - Comm	0	0.0%	0	0.0%
Light Industrial	616,111	3.0%	4	0.1%
General Industrial	0	0.0%	0	0.0%
TOTALS	20,666,946	100%	1544	100%

INTERCEPTOR SERVICE AREA
MN-305

POPULATION

1990 CENSUS	HOUSEHOLDS
9	3

AREA

(INCLUDES PUBLIC R.O.W.)

ACRES	SQUARE FT.	SQ.MILES
3.4	147,324	0.005

LAND USE

(EXCLUSIVE OF PUBLIC R.O.W.)

TYPE	AREAS (SQUARE FT.)	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Single Family	13,460	16.8%	3	33.3%
Two Family	0	0.0%	0	0.0%
Multi Family	0	0.0%	0	0.0%
Group Quarters	0	0.0%	0	0.0%
Public Facilities	0	0.0%	0	0.0%
Cultural, Entertainment, Recreational, Health Care	0	0.0%	0	0.0%
Parks & Open Spaces	0	0.0%	0	0.0%
Undeveloped & Unused Land	3,828	4.8%	1	11.1%
Transportation, Communications, Utilities	7,590	9.5%	1	11.1%
Service - Comm	55,071	68.9%	4	44.4%
Retail - Comm	0	0.0%	0	0.0%
Wholesale - Comm	0	0.0%	0	0.0%
Light Industrial	0	0.0%	0	0.0%
General Industrial	0	0.0%	0	0.0%
TOTALS	79,949	100%	9	100%

INTERCEPTOR SERVICE AREA
MN-306

POPULATION

1990 CENSUS	HOUSEHOLDS
1027	402

AREA

(INCLUDES PUBLIC R.O.W.)

ACRES	SQUARE FT.	SQ.MILES
215.9	9,404,604	0.38

LAND USE

(EXCLUSIVE OF PUBLIC R.O.W.)

TYPE	AREAS (SQUARE FT.)	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Single Family	2,570,055	34.0%	325	80.4%
Two Family	353,996	4.7%	40	9.9%
Multi Family	0	0.0%	0	0.0%
Group Quarters	0	0.0%	0	0.0%
Public Facilities	0	0.0%	0	0.0%
Cultural, Entertainment, Recreational, Health Care	1,971,090	26.0%	1	0.2%
Parks & Open Spaces	15,200	0.2%	1	0.2%
Undeveloped & Unused Land	301,528	4.0%	11	2.7%
Transportation, Communications, Utilities	1,344,193	17.8%	17	4.2%
Service - Comm	10,908	0.1%	2	0.5%
Retail - Comm	34,535	0.5%	3	0.7%
Wholesale - Comm	0	0.0%	0	0.0%
Light Industrial	967,680	12.8%	4	1.0%
General Industrial	0	0.0%	0	0.0%
TOTALS	7,569,185	100%	404	100%

INTERCEPTOR SERVICE AREA
MN-310

POPULATION

1990 CENSUS	HOUSEHOLDS
55,338	25,294

AREA

(INCLUDES PUBLIC R.O.W.)

ACRES	SQUARE FT.	SQ.MILES
4346.7	189,342,252	6.79

LAND USE

(EXCLUSIVE OF PUBLIC R.O.W.)

TYPE	AREAS (SQUARE FT)	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Single Family	32,445,829	25.7%	5721	52.2%
Two Family	7,138,096	5.7%	1270	11.6%
Multi Family	10,374,400	8.2%	953	8.7%
Group Quarters	1,158,930	0.9%	61	0.6%
Public Facilities	5,771,498	4.6%	54	0.5%
Cultural, Entertainment, Recreational, Health Care	4,805,012	3.8%	112	1.0%
Parks & Open Spaces	6,659,420	5.3%	38	0.3%
Undeveloped & Unused Land	9,841,549	7.8%	709	6.5%
Transportation, Communications, Utilities	19,844,694	15.7%	985	9.0%
Service - Comm	12,644,694	10.0%	493	4.5%
Retail - Comm	4,446,834	3.5%	361	3.3%
Wholesale - Comm	0	0.0%	0	0.0%
Light Industrial	10,350,499	8.2%	187	1.7%
General Industrial	842,759	0.7%	9	0.1%
TOTALS	126,324,214	100%	10953	100%

INTERCEPTOR SERVICE AREA
MN-311

POPULATION

1990 CENSUS	HOUSEHOLDS
1190	432

AREA

(INCLUDES PUBLIC R.O.W.)

ACRES	SQUARE FT.	SQ.MILES
242.1	10,546,886	0.37

LAND USE

(EXCLUSIVE OF PUBLIC R.O.W.)

TYPE	AREAS (SQUARE FT.)	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Single Family	2,610,511	37.4%	411	76.5%
Two Family	130,902	1.9%	20	3.7%
Multi Family	0	0.0%	0	0.0%
Group Quarters	80,784	1.2%	1	0.2%
Public Facilities	0	0.0%	0	0.0%
Cultural, Entertainment, Recreational, Health Care	55,017	0.8%	2	0.4%
Parks & Open Spaces	1,288,632	18.5%	18	3.4%
Undeveloped & Unused Land	945,024	13.5%	31	5.8%
Transportation, Communications, Utilities	892,207	12.8%	32	6.0%
Service - Comm	105,240	1.5%	5	0.9%
Retail - Comm	238,863	3.4%	12	2.2%
Wholesale - Comm	0	0.0%	0	0.0%
Light Industrial	628,412	9.0%	5	0.9%
General Industrial	0	0.0%	0	0.0%
TOTALS	6,975,592	100%	537	100.0%

INTERCEPTOR SERVICE AREA
MN-312

POPULATION

1990 CENSUS	HOUSEHOLDS
4407	1321

AREA

(INCLUDES PUBLIC R.O.W.)

ACRES	SQUARE FT.	SQ.MILES
424.8	18,506,383	0.66

LAND USE

(EXCLUSIVE OF PUBLIC R.O.W.)

TYPE	AREAS (SQUARE FT.)	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Single Family	9,023,097	68.7%	1569	89.9%
Two Family	444,868	3.4%	65	3.7%
Multi Family	107,486	0.8%	10	0.6%
Group Quarters	97,215	0.7%	3	0.2%
Public Facilities	732,289	5.6%	3	0.2%
Cultural, Entertainment, Recreational, Health Care	23,129	0.2%	2	0.1%
Parks & Open Spaces	1,743,141	13.3%	16	0.9%
Undeveloped & Unused Land	170,298	1.3%	23	1.3%
Transportation, Communications, Utilities	223,220	1.7%	28	1.6%
Service - Comm	123,561	0.9%	9	0.5%
Retail - Comm	202,608	1.5%	13	0.7%
Wholesale - Comm	0	0.0%	0	0.0%
Light Industrial	240,944	1.8%	4	0.2%
General Industrial		0.0%		0.0%
TOTALS	13,131,856	100%	1745	100%

INTERCEPTOR SERVICE AREA
MN-313

POPULATION

1990 CENSUS	HOUSEHOLDS
1971	428

AREA

(INCLUDES PUBLIC R.O.W.)

ACRES	SQUARE FT.	SQ.MILES
110.78	4,825,577	0.173

LAND USE

(EXCLUSIVE OF PUBLIC R.O.W.)

TYPE	AREA (SQUARE FT)	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Single Family	2,492,721	74.4%	411	93.8%
Two Family	92,537	2.8%	12	2.7%
Multi Family	0	0.0%	0	0.0%
Group Quarters	0	0.0%	0	0.0%
Public Facilities	0	0.0%	0	0.0%
Cultural, Entertainment, Recreational, Health Care	0	0.0%	0	0.0%
Parks & Open Spaces	630,391	18.8%	5	1.1%
ndeveloped Land & Unused land	21,505	0.6%	4	0.9%
Transportation, Communications, Utilities	112,830	3.4%	6	1.4%
Service - Comm	0	0.0%	0	0.0%
Retail - Comm	0	0.0%	0	0.0%
Wholesale - Comm	0	0.0%	0	0.0%
Light Industrial	0	0.0%	0	0.0%
General Industrial	0	0.0%	0	0.0%
TOTALS	3,349,984	100%	438	100%

INTERCEPTOR SERVICE AREA
MN-314

POPULATION

1990 CENSUS	HOUSEHOLDS
912	341

AREA
(INCLUDES PUBLIC R.O.W.)

ACRES	SQUARE FT.	SQ.MILES
93.8	4,085,048	0.14

LAND USE
(EXCLUSIVE OF PUBLIC R.O.W.)

TYPE	AREAS (SQUARE FT.)	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Single Family	2,201,906	68.5%	326	94.5%
Two Family	48,995	1.5%	6	1.7%
Multi Family	15,774	0.5%	2	0.6%
Group Quarters	0	0.0%	0	0.0%
Public Facilities	166,422	5.2%	1	0.3%
Cultural, Entertainment, Recreational, Health Care	0	0.0%	0	0.0%
Parks & Open Spaces	623,298	19.4%	3	0.9%
Undeveloped & Unused Land	3,140	0.1%	1	0.3%
Transportation, Communications, Utilities	144,360	4.5%	5	1.4%
Service - Comm	0	0.0%	0	0.0%
Retail - Comm	9,404	0.3%	1	0.3%
Wholesale - Comm	0	0.0%	0	0.0%
Light Industrial	0	0.0%	0	0.0%
General Industrial	0	0.0%	0	0.0%
TOTALS	3,213,299	100%	345	100%

INTERCEPTOR SERVICE AREA
MN-315

POPULATION

1990 CENSUS	HOUSEHOLDS
4162	1877

AREA

(INCLUDES PUBLIC R.O.W.)

ACRES	SQUARE FT.	SQ.MILES
589.2	25,664,724	0.92

LAND USE

(EXCLUSIVE OF PUBLIC R.O.W.)

TYPE	AREAS (SQUARE FT.)	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Single Family	8,283,458	45.7%	1410	87.9%
Two Family	320,211	1.8%	52	3.2%
Multi Family	295,842	1.6%	21	1.3%
Group Quarters	12,758	0.1%	2	0.1%
Public Facilities	385,912	2.1%	2	0.1%
Cultural, Entertainment, Recreational, Health Care	107,852	0.6%	5	0.3%
Parks & Open Spaces	62,017	0.3%	4	0.2%
Undeveloped & Unused Land	691,662	3.8%	15	0.9%
Transportation, Communications, Utilities	4,904,777	27.1%	59	3.7%
Service - Comm	1,357,613	7.5%	16	1.0%
Retail - Comm	219,922	1.2%	11	0.7%
Wholesale - Comm	0	0.0%	0	0.0%
Light Industrial	1,198,305	6.6%	7	0.4%
General Industrial	282,704	1.6%	1	0.1%
TOTALS	18,123,033	100%	1605	100%

INTERCEPTOR SERVICE AREA
MN-316

POPULATION

1990 CENSUS	HOUSEHOLDS
8109	2343

AREA

(INCLUDES PUBLIC R.O.W.)

ACRES	SQUARE FT.	SQ MILES
753.4	32,818,413	1.17

LAND USE

(EXCLUSIVE OF PUBLIC R.O.W.)

TYPE	AREAS (SQUARE FT.)	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Single Family	15,796,513	64.3%	2863	90.4%
Two Family	1,046,947	4.3%	166	5.2%
Multi Family	232,227	0.9%	28	0.9%
Group Quarters	20,547	0.1%	2	0.1%
Public Facilities	388,193	1.6%	4	0.1%
Cultural, Entertainment, Recreational, Health Care	6,131,938	24.9%	7	0.2%
Parks & Open Spaces	94,789	0.4%	1	0.03%
Undeveloped & Unused Land	116,090	0.5%	23	0.7%
Transportation, Communications, Utilities	403,024	1.6%	34	1.1%
Service - Comm	149,986	0.6%	15	0.5%
Retail - Comm	197,342	0.8%	25	0.8%
Wholesale - Comm	0	0.0%	0	0.0%
Light Industrial	0	0.0%	0	0.0%
General Industrial	0	0.0%	0	0.0%
TOTALS	24,577,596	100%	3168	100%

INTERCEPTOR SERVICE AREA
MN-320

POPULATION

1990 CENSUS	HOUSEHOLDS
36,067	15,420

AREA

(INCLUDES PUBLIC R.O.W.)

ACRES	SQUARE FT.	SQ.MILES
3469.3	151,100,928	5.42

LAND USE

(EXCLUSIVE OF PUBLIC R.O.W.)

TYPE	AREAS (SQUARE FT.)	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Single Family	30,538,559	29.1%	4669	56.4%
Two Family	6,898,746	6.6%	1105	13.4%
Multi Family	8,015,396	7.6%	668	8.1%
Group Quarters	718,326	0.7%	29	0.4%
Public Facilities	6,890,597	6.6%	35	0.4%
Cultural, Entertainment, Recreational, Health Care	2,625,260	2.5%	67	0.8%
Parks & Open Spaces	8,893,996	8.5%	67	0.8%
Undeveloped & Unused Land	7,324,253	7.0%	762	9.2%
Transportation, Communications, Utilities	13,942,768	13.3%	393	4.7%
Service - Comm	9,046,838	8.6%	198	2.4%
Retail - Comm	2,199,235	2.1%	150	1.8%
Wholesale - Comm	0	0.0%	0	0.0%
Light Industrial	7,291,167	6.9%	127	1.5%
General Industrial	708,755	0.7%	4	0.05%
TOTALS	105,093,896	100%	8274	100%

INTERCEPTOR SERVICE AREA
MN-330

POPULATION

1990 CENSUS	HOUSEHOLDS
45,555	22,089

AREA

(INCLUDES PUBLIC R.O.W.)

ACRES	SQUARE FT.	SQ.MILES
3019	131,307,264	4.71

LAND USE

(EXCLUSIVE OF PUBLIC R.O.W.)

TYPE	AREAS (SQUARE FT.)	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Single Family	25,450,856	26.9%	3880	43.8%
Two Family	9,061,753	9.6%	1614	18.2%
Multi Family	13,114,597	13.9%	1677	18.9%
Group Quarters	772,983	0.8%	50	0.6%
Public Facilities	1,132,462	1.2%	18	0.2%
Cultural, Entertainment, Recreational, Health Care	9,092,740	9.6%	65	0.7%
Parks & Open Spaces	9,157,661	9.7%	45	0.5%
Undeveloped & Unused Land	4,080,237	4.3%	360	4.1%
Transportation, Communications, Utilities	7,390,851	7.8%	438	4.9%
Service - Comm	6,292,767	6.7%	301	3.4%
Retail - Comm	4,821,709	5.1%	330	3.7%
Wholesale - Comm	0	0.0%	0	0.0%
Light Industrial	4,042,010	4.3%	70	0.8%
General Industrial	86,548	0.1%	2	0.02%
TOTALS	94,497,174	100%	8850	100%

INTERCEPTOR SERVICE AREA
MN-340

POPULATION

1990 CENSUS	HOUSEHOLDS
15,772	6883

AREA

(INCLUDES PUBLIC R.O.W.)

ACRES	SQUARE FT.	SQ.MILES
2023.2	95,901,696	3.44

LAND USE

(EXCLUSIVE OF PUBLIC R.O.W.)

TYPE	AREAS (SQUARE FT.)	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Single Family	27,032,132	46.4%	4566	78.4%
Two Family	2,831,427	4.9%	454	7.8%
Multi Family	1,627,585	2.8%	380	6.5%
Group Quarters	1,989,745	3.4%	10	0.2%
Public Facilities	2,533,505	4.3%	11	0.2%
Cultural, Entertainment, Recreational, Health Care	730,373	1.3%	22	0.4%
Parks & Open Spaces	8,473,298	14.5%	28	0.5%
Undeveloped & Unused Land	343,596	0.6%	45	0.8%
Transportation, Communications, Utilities	4,855,433	8.3%	99	1.7%
Service - Comm	5,297,538	9.1%	77	1.3%
Retail - Comm	1,397,242	2.4%	119	2.0%
Wholesale - Comm	0	0.0%	0	0.0%
Light Industrial	1,171,228	2.0%	11	0.2%
General Industrial	0	0.0%	0	0.0%
TOTALS	58,283,102	100%	5822	100%

INTERCEPTOR SERVICE AREA
MN-341

POPULATION

1990 CENSUS	HOUSEHOLDS
67,055	29,018

AREA

(INCLUDES PUBLIC R.O.W.)

ACRES	SQUARE FT.	SQ.MILES
4730.9	206,078,004	7.39

LAND USE

(EXCLUSIVE OF PUBLIC R.O.W.)

TYPE	AREAS (SQUARE FT.)	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Single Family	78,339,415	53.8%	14137	72.4%
Two Family	13,883,686	9.5%	2507	12.8%
Multi Family	9,487,053	6.5%	1329	6.8%
Group Quarters	695,942	0.5%	41	0.2%
Public Facilities	6,118,908	4.2%	40	0.2%
Cultural, Entertainment, Recreational, Health Care	11,922,364	8.2%	85	0.4%
Parks & Open Spaces	7,798,567	5.4%	24	0.1%
Undeveloped & Unused Land	2,396,497	1.6%	314	1.6%
Transportation, Communications, Utilities	4,552,070	3.1%	362	1.9%
Service - Comm	4,042,744	2.8%	248	1.3%
Retail - Comm	4,458,774	3.1%	398	2.0%
Wholesale - Comm	0	0.0%	0	0.0%
Light Industrial	1,428,183	1.0%	43	0.2%
General Industrial	493,141	0.3%	5	0.03%
TOTALS	145,617,344	100%	19,533	100%

INTERCEPTOR SERVICE AREA
MN-342

POPULATION

1990 CENSUS	HOUSEHOLDS
601	239

AREA

(INCLUDES PUBLIC R.O.W.)

ACRES	SQUARE FT.	SQ.MILES
46.6	2,031,455	0.07

LAND USE

(EXCLUSIVE OF PUBLIC R.O.W.)

TYPE	AREAS (SQUARE FT.)	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Single Family	1,207,256	80.3%	201	88.2%
Two Family	101,936	6.8%	16	7.0%
Multi Family	22,099	1.5%	8	3.5%
Group Quarters	0	0.0%	0	0.0%
Public Facilities	159,348	10.6%	1	0.4%
Cultural, Entertainment, Recreational, Health Care	0	0.0%	0	0.0%
Parks & Open Spaces	0	0.0%	0	0.0%
Undeveloped & Unused Land	0	0.0%	0	0.0%
Transportation, Communications, Utilities	12,428	0.8%	2	0.9%
Service - Comm	0	0.0%	0	0.0%
Retail - Comm	0	0.0%	0	0.0%
Wholesale - Comm	0	0.0%	0	0.0%
Light Industrial	0	0.0%	0	0.0%
General Industrial	0	0.0%	0	0.0%
TOTALS	1,503,067	100%	228	100%

INTERCEPTOR SERVICE AREA
MN-343

POPULATION

1990 CENSUS	HOUSEHOLDS
2803	1278

AREA

(INCLUDES PUBLIC R.O.W.)

ACRES	SQUARE FT.	SQ.MILES
229.7	10,003,776	0.36

LAND USE

(EXCLUSIVE OF PUBLIC R.O.W.)

TYPE	AREAS (SQUARE FT.)	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Single Family	5,004,243	69.0%	786	82.1%
Two Family	501,184	6.9%	76	7.9%
Multi Family	353,307	4.9%	40	4.2%
Group Quarters	22,000	0.3%	1	0.1%
Public Facilities	650,087	9.0%	2	0.2%
Cultural, Entertainment, Recreational, Health Care	113,204	1.6%	4	0.4%
Parks & Open Spaces	91,000	1.3%	1	0.1%
Undeveloped & Unused Land	80,857	1.1%	10	1.0%
Transportation, Communications, Utilities	101,773	1.4%	12	1.3%
Service - Comm	75,037	1.0%	9	0.9%
Retail - Comm	263,680	3.6%	16	1.7%
Wholesale - Comm	0	0.0%	0	0.0%
Light Industrial	0	0.0%	0	0.0%
General Industrial	0	0.0%	0	0.0%
TOTALS	7,256,372	100%	957	100%

INTERCEPTOR SERVICE AREA
MN-344

POPULATION

1990 CENSUS	HOUSEHOLDS
50,971	21,054

AREA

(INCLUDES PUBLIC R.O.W.)

ACRES	SQUARE FT.	SQ.MILES
5113.4	222,739,704	7.98

LAND USE

(EXCLUSIVE OF PUBLIC R.O.W.)

TYPE	AREAS (SQUARE FT.)	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Single Family	104,188,549	66.1%	16814	88.0%
Two Family	6,926,298	4.4%	1096	5.7%
Multi Family	2,719,995	1.7%	283	1.5%
Group Quarters	518,162	0.3%	28	0.1%
Public Facilities	3,081,374	2.0%	20	0.1%
Cultural, Entertainment, Recreational, Health Care	8,478,085	5.4%	56	0.3%
Parks & Open Spaces	16,889,081	10.7%	80	0.4%
Undeveloped & Unused Land	679,218	0.4%	101	0.5%
Transportation, Communications, Utilities	7,857,551	5.0%	347	1.8%
Service - Comm	1,506,759	1.0%	109	0.6%
Retail - Comm	2,899,495	1.8%	165	0.9%
Wholesale - Comm	0	0.0%	0	0.0%
Light Industrial	1,227,130	0.8%	17	0.1%
General Industrial	666,537	0.4%	1	0.01%
TOTALS	157,638,264	100%	19,117	100%

INTERCEPTOR SERVICE AREA
MN-345

POPULATION

1990 CENSUS	HOUSEHOLDS
7893	3306

AREA

(INCLUDES PUBLIC R.O.W.)

ACRES	SQUARE FT.	SQ.MILES
743.7	32,395,493	1.16

LAND USE

(EXCLUSIVE OF PUBLIC R.O.W.)

TYPE	AREAS (SQUARE FT.)	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Single Family	19,247,948	82.5%	3005	92.3%
Two Family	1,015,532	4.4%	148	4.5%
Multi Family	211,920	0.9%	28	0.9%
Group Quarters	8,190	0.0%	1	0.03%
Public Facilities	216,578	0.9%	1	0.03%
Cultural, Entertainment, Recreational, Health Care	166,877	0.7%	2	0.1%
Parks & Open Spaces	1,753,764	7.5%	14	0.4%
Undeveloped & Unused Land	77,028	0.3%	16	0.5%
Transportation, Communications, Utilities	82,729	0.4%	22	0.7%
Service - Comm	37,991	0.2%	6	0.2%
Retail - Comm	520,880	2.2%	14	0.4%
Wholesale - Comm	0	0.0%	0	0.0%
Light Industrial	0	0.0%	0	0.0%
General Industrial	0	0.0%	0	0.0%
TOTALS	23,339,437	100%	3257	100%

INTERCEPTOR SERVICE AREA
MN-346

POPULATION

1990 CENSUS	HOUSEHOLDS
10,123	4357

AREA

(INCLUDES PUBLIC R.O.W.)

ACRES	SQUARE FT.	SQ.MILES
952.6	41,497,242	1.48

LAND USE

(EXCLUSIVE OF PUBLIC R.O.W.)

TYPE	AREAS (SQUARE FT.)	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Single Family	21,097,827	76.1%	3729	94.2%
Two Family	577,543	2.1%	95	2.4%
Multi Family	802,034	2.9%	46	1.2%
Group Quarters	28,315	0.1%	5	0.1%
Public Facilities	507,022	1.8%	5	0.1%
Cultural, Entertainment, Recreational, Health Care	519,598	1.9%	7	0.2%
Parks & Open Spaces	3,808,101	13.7%	8	0.2%
Undeveloped & Unused Land	31,644	0.1%	18	0.5%
Transportation, Communications, Utilities	193,590	0.7%	23	0.6%
Service - Comm	31,069	0.1%	3	0.1%
Retail - Comm	141,044	0.5%	13	0.3%
Wholesale - Comm	0	0.0%	0	0.0%
Light Industrial	0	0.0%	0	0.0%
General Industrial	0	0.0%	0	0.0%
TOTALS	27,737,787	100%	3960	100%

INTERCEPTOR SERVICE AREA
8255

POPULATION

1990 CENSUS	HOUSEHOLDS
29,428	13,181

AREA

(INCLUDES PUBLIC R.O.W.)

ACRES	SQUARE FT.	SQ.MILES
2426.5	105,698,340	3.81

LAND USE

(EXCLUSIVE OF PUBLIC R.O.W.)

TYPE	AREAS (SQUARE FT.)	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Single Family	25,886,015	35.9%	4576	59.6%
Two Family	8,531,111	11.8%	1519	19.8%
Multi Family	5,204,673	7.2%	525	6.8%
Group Quarters	827,471	1.1%	81	1.1%
Public Facilities	1,552,485	2.2%	15	0.2%
Cultural, Entertainment, Recreational, Health Care	564,792	0.8%	29	0.4%
Parks & Open Spaces	4,415,853	6.1%	29	0.4%
Undeveloped & Unused Land	1,167,019	1.6%	164	2.1%
Transportation, Communications, Utilities	8,187,572	11.3%	340	4.4%
Service - Comm	4,441,937	6.2%	126	1.6%
Retail - Comm	2,308,278	3.2%	178	2.3%
Wholesale - Comm	0	0.0%	0	0.0%
Light Industrial	8,912,699	12.3%	98	1.3%
General Industrial	190,226	0.3%	2	0.03%
TOTALS	72,190,131	100%	7682	100%

INTERCEPTOR SERVICE AREA
8754

POPULATION

1990 CENSUS	HOUSEHOLDS
614	240

AREA

(INCLUDES PUBLIC R.O.W.)

ACRES	SQUARE FT.	SQ.MILES
66.5	2,899,510	0.11

LAND USE

(EXCLUSIVE OF PUBLIC R.O.W.)

TYPE	AREAS (SQUARE FT.)	PERCENT OF AREAS	NUMBER OF PARCELS	PERCENT OF PARCELS
Single Family	823,521	47.0%	140	62.2%
Two Family	348,806	19.9%	60	26.7%
Multi Family	26,097	1.5%	4	1.8%
Group Quarters	0	0.0%	0	0.0%
Public Facilities	0	0.0%	0	0.0%
Cultural, Entertainment, Recreational, Health Care	0	0.0%	0	0.0%
Parks & Open Spaces	0	0.0%	0	0.0%
Undeveloped & Unused Land	457,220	26.1%	8	3.6%
Transportation, Communications, Utilities	24,454	1.4%	5	2.2%
Service - Comm	32,399	1.8%	4	1.8%
Retail - Comm	2,975	0.2%	1	0.4%
Wholesale - Comm	0	0.0%	0	0.0%
Light Industrial	36,896	2.1%	3	1.3%
General Industrial	0	0.0%	0	0.0%
TOTALS	1,752,368	100%	225	100%

APPENDIX E
FORT SNELLING AREA SANITARY SEWER ACCOUNTS

FORT SNELLING AREA SANITARY SEWER ACCOUNTS

AGENCY	SEWAGE VOLUME	% OF TOTAL
Metropolitan Airport Commission	55,431,200 cf	79.93
Base Civil Engineer	0 cf	0.00
88th USARCOM (5881 46th Ave S)	480,000 cf	0.69
MnDOT	94,600 cf	0.14
MN Air National Guard	685,000 cf	0.99
88th USARCOM (Fort Snelling)	247,500 cf	0.36
US Bureau of Mines	0 cf	0.00
Naval Reserve Center	36,000 cf	0.05
Veterans Medical Center	10,917,800 cf	15.74
MN Historical Society	244,400 cf	0.35
Fort Snelling State Park	44,600 cf	0.06
Henry Whipple Building	1,166,300 cf	1.68
TOTAL	69,347,400 cf	100.00

APPENDIX F
OUTSIDE MINNEAPOLIS SEWER ACCOUNTS

OUTSIDE MINNEAPOLIS SEWER ACCOUNTS
June, 1999

AccountBase	StreetAddress	TownCode	StateCode	ZipCode
01042590	3001 51 AVE N	BROOKLYN CENTER	MN	554293454
01042640	4821 XERXES AVE N	BROOKLYN CENTER	MN	554303709
01042641	5101 -03 XERXES AVE N	BROOKLYN CENTER	MN	554303324
01042642	5109 XERXES AVE N	BROOKLYN CENTER	MN	554303324
01042643	5117 XERXES AVE N	BROOKLYN CENTER	MN	554303324
01042644	5123 XERXES AVE N	BROOKLYN CENTER	MN	554303324
01042645	5133 XERXES AVE N	BROOKLYN CENTER	MN	554303324
01042646	5139 XERXES AVE N	BROOKLYN CENTER	MN	554303324
01042647	5145 XERXES AVE N	BROOKLYN CENTER	MN	554303324
01042648	5201 XERXES AVE N	BROOKLYN CENTER	MN	554303326
01042649	5207 XERXES AVE N	BROOKLYN CENTER	MN	554300000
01042650	5209 XERXES AVE N	BROOKLYN CENTER	MN	554300000
01042651	5211 XERXES AVE N	BROOKLYN CENTER	MN	554300000
01042652	5223 XERXES AVE N	BROOKLYN CENTER	MN	554303326
01042653	5233 XERXES AVE N	BROOKLYN CENTER	MN	554303326
01042654	5243 XERXES AVE N	BROOKLYN CENTER	MN	554303326
01042545	4600 FRANCE AVE S	EDINA	MN	554101752
01042546	4602 FRANCE AVE S	EDINA	MN	554100000
01042547	4604 FRANCE AVE S	EDINA	MN	554101752
01042548	4606 FRANCE AVE S	EDINA	MN	554101752
01042549	4608 FRANCE AVE S	EDINA	MN	554101752
01042550	4610 FRANCE AVE S	EDINA	MN	554101752
01042551	4612 FRANCE AVE S	EDINA	MN	554101752
01042552	4620 FRANCE AVE S	EDINA	MN	554101752
01042553	4624 FRANCE AVE S	EDINA	MN	554100000
01042554	4630 FRANCE AVE S	EDINA	MN	554101752
01042555	4634 FRANCE AVE S	EDINA	MN	554101752
01042559	4650 FRANCE AVE S	EDINA	MN	554101752
01042573	4830 FRANCE AVE S	EDINA	MN	554101756
01042577	5026 FRANCE AVE S	EDINA	MN	554102090
01042581	5100 FRANCE AVE S	EDINA	MN	554100000
01108663	5120 -24 FRANCE AVE S	EDINA	MN	554102035
01042586	5232 FRANCE AVE S	EDINA	MN	554102037
01042587	5236 FRANCE AVE S	EDINA	MN	554100000
01042681	5600 XERXES AVE S	EDINA	MN	554102637
01042682	5604 XERXES AVE S	EDINA	MN	554102637
01042683	5608 XERXES AVE S	EDINA	MN	554102637
01042684	5612 XERXES AVE S	EDINA	MN	554102637
01042685	5620 XERXES AVE S	EDINA	MN	554100000
01042686	5624 XERXES AVE S	EDINA	MN	554102637
01042687	5628 XERXES AVE S	EDINA	MN	554102637
01042688	5700 XERXES AVE S	EDINA	MN	554102639
01042689	5704 XERXES AVE S	EDINA	MN	554102639
01042690	5712 XERXES AVE S	EDINA	MN	554102639
01042691	5716 XERXES AVE S	EDINA	MN	554102639
01042692	5720 XERXES AVE S	EDINA	MN	554102639
01042693	5724 XERXES AVE S	EDINA	MN	554102639
01042694	5728 XERXES AVE S	EDINA	MN	554102639

OUTSIDE MINNEAPOLIS SEWER ACCOUNTS
June, 1999

AccountBase	StreetAddress	TownCode	StateCode	ZipCode
01042695	5732 XERXES AVE S	EDINA	MN	554102639
01042696	5736 XERXES AVE S	EDINA	MN	554100000
01042697	5740 XERXES AVE S	EDINA	MN	554102639
01042698	5800 XERXES AVE S	EDINA	MN	554102817
01042704	5832 XERXES AVE S	EDINA	MN	554102817
01042705	5836 XERXES AVE S	EDINA	MN	554102817
01042706	5844 XERXES AVE S	EDINA	MN	554102817
01042707	5848 XERXES AVE S	EDINA	MN	554102817
01042708	5900 XERXES AVE S	EDINA	MN	554102819
01042709	5904 XERXES AVE S	EDINA	MN	554102819
01042710	5908 XERXES AVE S	EDINA	MN	554100000
01042711	5912 XERXES AVE S	EDINA	MN	554102819
01042712	5916 XERXES AVE S	EDINA	MN	554102819
01042713	5920 XERXES AVE S	EDINA	MN	554102819
01042716	5932 XERXES AVE S	EDINA	MN	554102819
01042718	6016 XERXES AVE S	EDINA	MN	554102821
01042719	6020 XERXES AVE S	EDINA	MN	554102821
01042720	6026 XERXES AVE S	EDINA	MN	554102821
01042721	6030 XERXES AVE S	EDINA	MN	554102821
01042722	6032 XERXES AVE S	EDINA	MN	554102821
01042723	6036 XERXES AVE S	EDINA	MN	554102821
01042724	6040 XERXES AVE S	EDINA	MN	554102821
01042725	6100 XERXES AVE S	EDINA	MN	554102823
01042726	6104 XERXES AVE S	EDINA	MN	554102823
01042727	6108 XERXES AVE S	EDINA	MN	554102823
01042728	6116 XERXES AVE S	EDINA	MN	554102823
01042729	6124 XERXES AVE S	EDINA	MN	554102823
01042730	6128 XERXES AVE S	EDINA	MN	554102823
01042731	6132 XERXES AVE S	EDINA	MN	554102823
01042615	1501 XERXES AVE N	GOLDEN VALLEY	MN	554112899
01042616	1511 XERXES AVE N	GOLDEN VALLEY	MN	554112851
01042617	1541 XERXES AVE N	GOLDEN VALLEY	MN	554112851
01042618	1617 XERXES AVE N	GOLDEN VALLEY	MN	554112853
01042619	1631 XERXES AVE N	GOLDEN VALLEY	MN	554112853
01042620	1633 XERXES AVE N	GOLDEN VALLEY	MN	554112853
01042621	1635 XERXES AVE N	GOLDEN VALLEY	MN	554112853
01042622	1639 XERXES AVE N	GOLDEN VALLEY	MN	554112853
01042623	1645 XERXES AVE N	GOLDEN VALLEY	MN	554112853
01042624	1701 XERXES AVE N	GOLDEN VALLEY	MN	554112821
01042626	1711 XERXES AVE N	GOLDEN VALLEY	MN	554112821
01042627	1715 XERXES AVE N	GOLDEN VALLEY	MN	554112821
01042628	1725 XERXES AVE N	GOLDEN VALLEY	MN	554112821
01042629	1911 XERXES AVE N	GOLDEN VALLEY	MN	554112332
01042630	1915 XERXES AVE N	GOLDEN VALLEY	MN	554112332
01042631	1917 XERXES AVE N	GOLDEN VALLEY	MN	554112332
01042632	1931 XERXES AVE N	GOLDEN VALLEY	MN	554112332
01042633	1933 XERXES AVE N	GOLDEN VALLEY	MN	554112332
01042634	1935 XERXES AVE N	GOLDEN VALLEY	MN	554112332
01042635	1949 XERXES AVE N	GOLDEN VALLEY	MN	554112332

OUTSIDE MINNEAPOLIS SEWER ACCOUNTS
June, 1999

AccountBase	StreetAddress	TownCode	StateCode	ZipCode
01042636	4615 XERXES AVE N	ROBBINSDALE	MN	554121061
01042637	4617 XERXES AVE N	ROBBINSDALE	MN	554121061
01042638	4623 XERXES AVE N	ROBBINSDALE	MN	554121061
01042639	4627 -31 XERXES AVE N	ROBBINSDALE	MN	554120000
01105889	2401 LOWRY AVE NE	ST ANTHONY	MN	554184031
01105892	2727 STINSON BLVD	ST ANTHONY	MN	554183124
01105893	3117 STINSON BLVD	ST ANTHONY	MN	554182337
01105894	3127 STINSON BLVD	ST ANTHONY	MN	554182337
01105895	3137 STINSON BLVD	ST ANTHONY	MN	554182337
01105896	3141 STINSON BLVD	ST ANTHONY	MN	554182337
01105897	3149 STINSON BLVD	ST ANTHONY	MN	554182337
01105899	3207 STINSON BLVD	ST ANTHONY	MN	554182339
01105900	3211 STINSON BLVD	ST ANTHONY	MN	554182339
01105901	3213 STINSON BLVD	ST ANTHONY	MN	554182339
01105902	3219 STINSON BLVD	ST ANTHONY	MN	554182339
01105903	3239 STINSON BLVD	ST ANTHONY	MN	554182339
01105904	3241 STINSON BLVD	ST ANTHONY	MN	554182339
01105905	3245 STINSON BLVD	ST ANTHONY	MN	554182339
01105906	3259 STINSON BLVD	ST ANTHONY	MN	554192339
01105909	3401 STINSON BLVD	ST ANTHONY	MN	554181516
01105911	3415 STINSON BLVD	ST ANTHONY	MN	554181516
01105912	3417 STINSON BLVD	ST ANTHONY	MN	554181516
01105913	3421 STINSON BLVD	ST ANTHONY	MN	554181516
01105914	3425 STINSON BLVD	ST ANTHONY	MN	554181516
01105915	3429 STINSON BLVD	ST ANTHONY	MN	554181516
01105916	3433 STINSON BLVD	ST ANTHONY	MN	554181516
01105918	3509 STINSON BLVD	ST ANTHONY	MN	554181518
01042526	3808 FRANCE AVE S	ST LOUIS PARK	MN	554164912
01042527	3810 FRANCE AVE S	ST LOUIS PARK	MN	554164912
01042528	3814 FRANCE AVE S	ST LOUIS PARK	MN	554164912
01042529	3818 FRANCE AVE S	ST LOUIS PARK	MN	554164912
01042530	3824 FRANCE AVE S	ST LOUIS PARK	MN	554164912
01042531	3828 FRANCE AVE S	ST LOUIS PARK	MN	554164912
01042532	3834 FRANCE AVE S	ST LOUIS PARK	MN	554164912
01042533	3838 FRANCE AVE S	ST LOUIS PARK	MN	554164912
01042534	3844 FRANCE AVE S	ST LOUIS PARK	MN	554164912
01042535	3910 FRANCE AVE S	ST LOUIS PARK	MN	554165014
01042536	3920 FRANCE AVE S	ST LOUIS PARK	MN	554165014
01042537	3930 FRANCE AVE S	ST LOUIS PARK	MN	554165014
01044255	2552 KASOTA AVE SE	ST PAUL	MN	55414
01105888	2565 KASOTA AVE SE	ST PAUL	MN	554210000
01108370	2578 KASOTA AVE SE	ST PAUL	MN	55414
01108054	3230 COMO AVE SE	ST PAUL	MN	554142808
01044047	5201 54 ST E	ST PAUL	MN	55417

APPENDIX G
SEWAGE FLOW PROJECTION METHODOLOGY

City of Minneapolis Sewage Flow Projections for years 2000, 2010, 2020 by Interceptor Service Area

Introduction

The analysis presented below has been completed in partial fulfillment of the sewers portion of the comprehensive planning requirements of the Minnesota Metropolitan Land Planning Act. The analysis takes 1996 estimates of the annual volume of sewage generated within the City of Minneapolis and projects them out to year 2020 based on population and employment projections completed for the Minneapolis Comprehensive Plan. It does so for each of the 24 Interceptor Service Areas located in the city (Chart 1, Maps 1, 2, 3). Described below is the basic methodology and process used to complete the analysis.

Methodology

Base year sewage flow estimates (1996) for the City of Minneapolis are derived from data provided by the Water Department based on annual customer billings for sewer service. These in turn are based on metered water consumption. The data are grouped into two broad categories, residential and commercial, with the latter category including all non-residential customers. It is assumed that annual water use equals annual sewage flow for commercial users and that winter quarter water use times 4 equals annual sewage flow for residential users.

Base year sewage flow estimates (1996) for the 24 individual Interceptor Service Areas in the city are extrapolated from city totals on the basis of the land use characteristics of each Service Area. The acreage of land devoted to residential and commercial uses (with the latter deemed to include all non-residential, non-park and non-transportation related land uses) in a given Service Area is divided by the total acreage of the city devoted to these uses. The resulting number is then multiplied with the city total to determine the volumes attributed to each Service Area. (i.e. If a given Service Area contains 5% of the total residential land use area of the city, 5% of total residential sewage flow is attributed to this Service Area.) (Chart 2).

Projections of change in sewage flow by interceptor service area to year 2020 are calculated on the basis of population and employment projections provided by the City Planning Department and based on the TAZ[1] unit of analysis. For purposes of the analysis per capita sewage generation is assumed to remain constant through the time series; thus, changes in population are assumed to equate to changes in residential sewage flow on a one to one basis (i.e. a 1% increase in population for a given interceptor service area is assumed to equal a 1% increase in residential sewage flow for that area). Similarly, changes in employment are assumed to equate to changes in commercial sewage flow on a

[1] Traffic Analysis Zone (TAZ) is the base unit of analysis for comprehensive planning population and employment projections. There are 138 TAZs in the City of Minneapolis.

one to one basis (i.e. a 1% increase in employment in a given interceptor service area is assumed to equate to a 1% increase in commercial sewage flows for that area).

Sewage flow is not metered at source; billing data provides the most accurate and accessible source of sewage flow estimates available. In the present data environment of the City it is not possible to provide reliable water and sewer billing data by Interceptor Service Area. It is to overcome this hurdle that Interceptor Service Area totals are derived through the apportionment process described above. Apportionment on the basis of a much simplified land use characteristics assumes, of necessity, a uniform distribution of all sub-types of land use throughout the city (single family residential, apartment, different types of commercial and industrial uses, etc.). This is unavoidable, however, given the nature of available growth projections.

The comprehensive planning process provides the only available growth projections for sub-areas of the City of Minneapolis. Estimates are generated by the Metropolitan Council and then modified by the City to reflect local expectations. Projections are completed at the level of TAZ only in terms of gross population and employment change. The use of two general growth projection categories determined the initial need to aggregate billing data into roughly comparable categories (residential and commercial) as well as the need to aggregate land use data into roughly similar residential and commercial categories. The absence of more refined growth indicators requires the adoption of a no-change assumption in the mix of land uses in each Service Area through the time series. Similarly, the absence of alternative scenarios regarding per capita sewage generation through the time series necessitates a no-change assumption for this variable as well.

Process Overview

Base Data:

- 1996 annual city-wide sewage flow volumes for residential and commercial customers (source: Public Works, Water Department)
- Interceptor Service area land use breakdown by type and acreage (source: Public Works, Sewer Design)
- Population and employment projections by TAZ for Minneapolis for years 1996, 2000, 2010, 2020 (source: City Planning Department)
- Polygon shape file of TAZ areas for metropolitan area (source: Metropolitan Council)
- Polygon shape file of sewer sheds for City of Minneapolis (source: Metropolitan Council)

Part One, Major Steps:

1. City-wide sewage flow totals for residential and commercial customers (1996) are apportioned to each interceptor service area on the basis of land use (see methodology above).
2. Population and employment projections are joined to the shape file of Minneapolis TAZ areas.
3. Sub-interceptor level polygons of the sewer shed shape file are dissolved to create a shape file of major Interceptor Service Areas.
4. The sewage flow data file created in step 1 is joined with the interceptor shape file created in step 3.

Part One, Results:

- A shape file of Minneapolis TAZ areas containing population and employment estimates to year 2020 (TAZ shape file, 138 polygons). Data attributes include TAZ area, TAZ identifier, and population and employment estimates per TAZ for years 1996, 2000, 2010, 2020.
- A Shape file for Minneapolis Interceptor Service Areas containing residential and commercial flow estimates for 1996 (Interceptor shape file, 24 polygons). Data attributes include area of interceptor service area, and annual residential and commercial sewage flows per interceptor area.

Part Two, Major Steps:

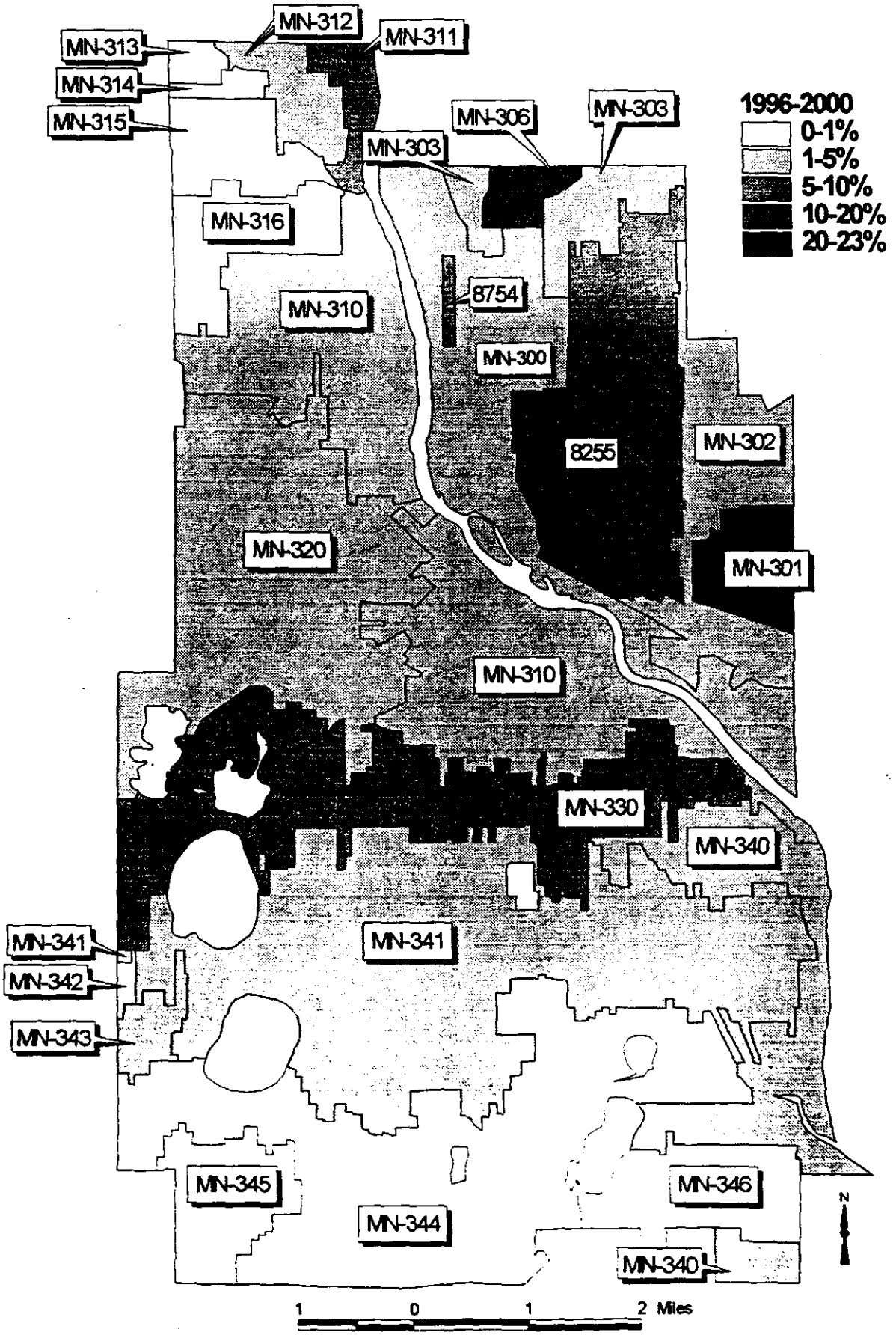
5. A new shape file is created combining the features and data attributes of both the TAZ and the Interceptor shape files Note: each new polygon contains the same data as the original files; data are not proportionally distributed, areas of new polygon are not calculated.
6. The areas of each new polygon is calculated and added to the shape file's attribute table.
7. Each new polygon has a data attribute indicating the TAZ to which it belongs. The area of each new polygon is divided by the area of the original TAZ polygon to determine the proportion of the TAZ that falls within each new polygon. The resulting figure, or multiplier, is added to the shape file's attribute table. (i.e. If the original area of an TAZ is 100, and the area of a new polygon derived from that TAZ is 10, then the multiplier is 0.1).
8. The multiplier is used to proportionally distribute the population and employment estimates from the TAZ database for each year in the time series to the new polygons (in the same way that city-wide sewage flows were attributed to interceptor areas in step 1). The result is estimated population and employment figures for each new polygon for each year of the time series.
9. Population and employment estimates (1996-2020) are aggregated to the level of Interceptor Service Area.
10. Changes in population and employment by Interceptor Service Area for each future year of the time series (2000, 2010, 2020) are calculated as a percentage of the 1996

value. The 1996 base year flows are then multiplied by this percentage value to arrive at projected flow volumes for the three future years in the time series.

Results of Second Stage

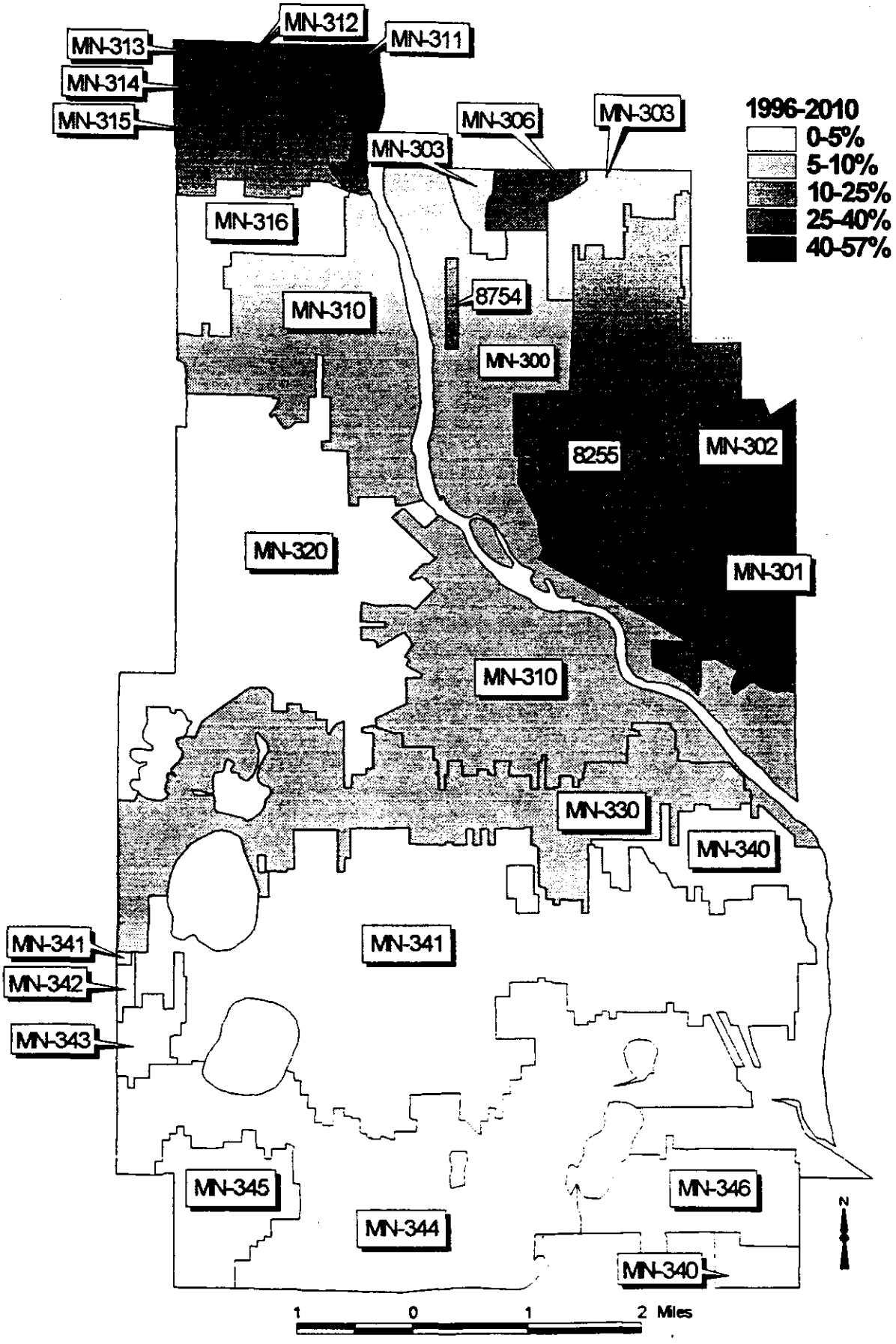
- Shape file and attribute table containing projections of sewage flow for years 2000, 2010 and 2020 by Interceptor Service Area.

Projected Increase in City of Minneapolis Snitary Sewer Flows by Interceptor Service Area, 1996-2000 (%)



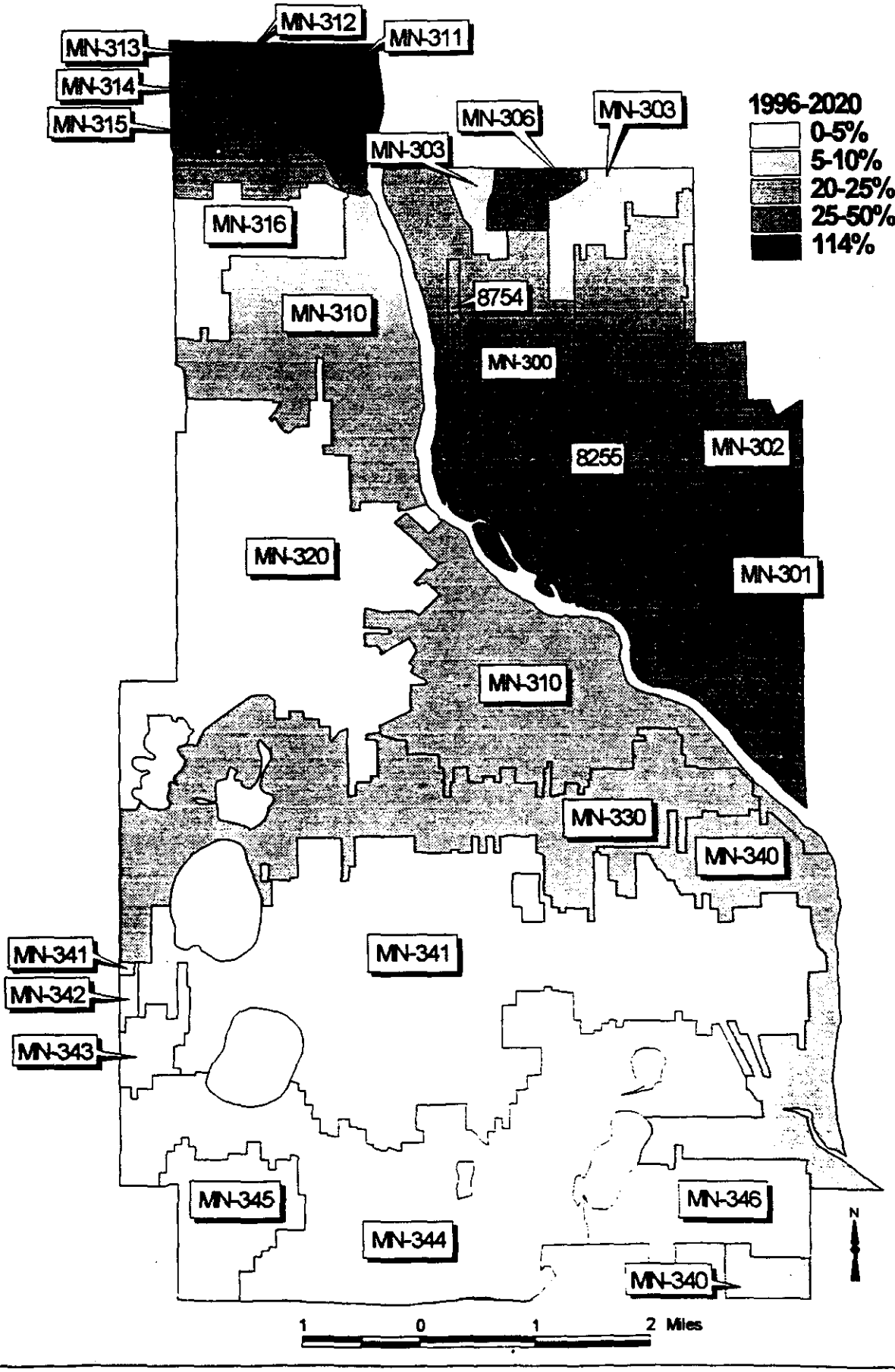
Map 1

Projected Increase in City of Minneapolis Sanitary Sewer Flows by Interceptor Service Area, 1996-2010 (%)



Map 2

Projected Increase in City of Minneapolis Sanitary Sewer Flows by Interceptor Service Area, 1996-2020 (%)



Map 3

APPENDIX H
20-YEAR SEWAGE PROJECTIONS

City of Minneapolis Total Sewage Flow Projections 1996, 2000, 2010, 2020
(gallons per year and percentage change)

Interceptor Service Area	1996 Total Sewage Flow (baseline)	2000 Total Sewage Flow (projected)	%Change 1996-2000	2010 Total Sewage Flow (projected)	%Change 1996-2010	2020 Total Sewage Flow (projected)	%Change 1996-2020
8255	1,069,373,154	1,163,281,317	8.78%	1,190,635,760	11.34%	1,203,103,174	12.51%
8754	28,121,636	30,384,413	8.05%	31,145,348	10.75%	31,726,332	12.82%
MN-300	1,136,091,075	1,190,513,596	4.79%	1,253,224,762	10.31%	1,265,766,409	11.41%
MN-301	350,723,331	425,016,315	21.18%	551,944,246	57.37%	747,665,680	113.18%
MN-302	818,244,075	850,525,760	3.95%	947,137,076	15.75%	982,694,916	20.10%
MN-303	224,441,531	232,965,025	3.80%	237,226,772	5.70%	242,462,632	8.03%
MN-305	1,768,161	2,173,367	22.92%	2,173,367	22.92%	2,173,367	22.92%
MN-306	122,426,762	142,499,851	16.40%	162,572,940	32.79%	182,374,771	48.97%
MN-310	2,090,917,408	2,192,787,938	4.87%	2,252,295,866	7.72%	2,298,316,135	9.92%
MN-311	86,513,485	92,672,557	7.12%	108,954,974	25.94%	120,199,518	38.94%
MN-312	150,352,689	154,136,508	2.52%	183,029,227	21.73%	190,643,579	26.80%
MN-313	28,890,713	28,890,714	0.00%	33,848,616	17.16%	33,879,389	17.27%
MN-314	24,725,372	24,725,372	0.00%	28,873,606	16.78%	28,878,099	16.80%
MN-315	219,458,862	220,838,690	0.63%	242,551,201	10.52%	245,933,783	12.06%
MN-316	383,507,205	386,280,323	0.72%	386,280,323	0.72%	386,877,725	0.88%
MN-320	1,643,182,083	1,706,602,087	3.86%	1,691,761,615	2.96%	1,723,829,582	4.91%
MN-330	1,573,087,920	1,696,526,112	7.85%	1,732,781,241	10.15%	1,735,927,417	10.35%
MN-340	742,174,006	760,773,198	2.51%	773,221,834	4.18%	788,020,471	6.18%
MN-341	2,138,965,330	2,201,805,805	2.94%	2,220,936,525	3.83%	2,229,372,418	4.23%
MN-342	19,323,950	19,323,950	0.00%	19,323,950	0.00%	19,323,950	0.00%
MN-343	103,142,740	105,329,562	2.12%	105,329,562	2.12%	105,329,562	2.12%
MN-344	1,815,560,736	1,821,535,659	0.33%	1,845,861,514	1.67%	1,847,077,807	1.74%
MN-345	255,917,895	255,917,896	0.00%	258,801,419	1.13%	258,801,419	1.13%
MN-346	293,972,882	293,972,882	0.00%	298,243,641	1.45%	305,124,308	3.79%
Total	15,320,883,001	15,999,478,896	4.43%	16,558,155,386	8.08%	16,975,502,443	10.80%

*MN-340 total exclude 623,082,750 gallons generated in 1996 by the Metropolitan Airports Commission.
They also exclude 78,163,500 gallons generated in 1996 by the Veterans Administration Hospital.
Relevant growth projections are unavailable for these two institutions.

APPENDIX I
1998 INFILTRATION/INFLOW ANALYSIS

1998 Infiltration/Inflow Computations

Base Data:

1998 rainfall = 33.4 inches

Metered MCES flows = 20,274,000,000 gallons

Base water flow = 16,345,000,000 gallons

Total extraneous water = 3,929,000,000 gallons

Estimate of Manhole Cover Inflow:

From "Inflow Through Sanitary Manhole Covers:"

average storm =	745,000	gallons
average/Large storm =	3,045,000	gallons

From National Weather Service:

8 average storms =	5,960,000	gallons
4 large storms =	12,180,000	gallons
total =	18,140,000	gallons

Estimate of Rooftop Inflow:

From "Inflow from Commercial/Industrial Rainleaders:"

median rooftop size =	5,105	square feet
# buildings constructed before 1960 =	9338	
probable % connected to sanitary sewer =	60%	

(33"/12)*(5105 s.f. per building)*(9338 buildings)*(0.60) = 595,480,693 gallons

Estimate of CSO contribution:

Runoff area draining to sanitary system = 230 acres

(230 acres)*(33.4/12)*(43,560 s.f./acre)*(7.48 gallons/c.f.) = 208,584,737 gallons

Estimate of infiltration:

September 15, 1998 vs. January 5, 1999 comparison = 15%

15% * 20,274,000,000 gallons = 3,041,100,000 gallons/year

Inflow through Sanitary Manhole Covers

Inflow through sanitary manhole covers had always been known as a source of inflow to sanitary treatment plants. Due to the extraordinary rainfall amounts and increased number of flooded intersections, sanitary inflow from flooded area undoubtedly contributed to more than its usual share of I/I.

Method of Calculation

Flow through the holes on the top of manhole covers was calculated using basic orifice flow calculations. Any flow through the edges of the manhole, although maybe not negligible, was disregarded in the scope of these calculations. The orifice flow equation is as follows:

$$Q = C_o A(2gH)^{0.5}$$

Where, C_o=0.6 for sharp edged orifices
A=0.0123ft^2 for 1.5" diameter holes
g=32.2ft^2/s (acceleration due to gravity)
H= head above the manhole cover, varies see assumptions

Assumptions

Several assumptions were needed to determine the amount of water entering the sanitary system. Alex Rosbo, Minneapolis Engineer with the Sewer Maintenance department, assisted in determining accurate numbers for the assumptions.

- Four holes per manhole cover were used for calculations. Older manhole covers had seven holes/cover. New manhole covers have one. Most of the covers are seven hole covers in Minneapolis, so four is a conservative estimate.
- Storms were designated as either small, average, average/large, or large storm events. The sizes of the events were generalized to simplify the calculations. Each storm event was assigned a "head" above the manhole cover and a length of time the water was present there.

Storm Event	Head above cover (feet)	Time to Drain (hours)
Small	0.2	1
Average	0.5	2
Average/Large	2	3
Large	3.5	4

Small storms were not analyzed at all. It was assumed that small storms did not result in area flooding. Events that resulted in high flows to the Metro plant or resulted in many flooding complaints to the Sewer Department were analyzed. Storm events were characterized based on rainfall intensity, amount of rainfall, and amount of rainfall in the days prior to that rainfall event.

It is important to keep in mind that in some areas, during large rainfall events, there were people swimming in intersections and car were completely submerged. In those areas it took up to two to three days to drain the water completely. The assumptions for head might be a little high, whereas the time to drain is probably estimated quite low. In the calculations, the time to drain affected the total flow much more than slight changes to the amount of head chosen. Therefore, the sizes of storm events are conservative.

- The number of flooded intersections was estimated from the Minneapolis Sewer Department's *Flood Report '97*. In their report, 75 intersections were reported by residents to have flooding. This report did not have flooding information in commercial areas or areas where residents did not report it. For these reasons, large storm events were assumed to have flooded more intersections than were reported--possibly intersections that had rarely flooded in the past. Different numbers of flooded intersections were used for different sized storm events.

Storm Event	Number of Intersections Flooded
Small	20
Average	55
Average/Large	75
Large	90

- The average number of sanitary manholes per intersection used was 1.5 manholes/intersection. There is usually one manhole in the center of an intersection, and one hundred feet on either side of it. For deeper flooding, the flooding itself extended beyond the immediate intersection and possibly into the other manholes. In addition, some of the flooding problems reported were in the middle of blocks, and therefore encompassed more than one sanitary manhole. The approximate 1.5 manholes/intersection is a conservative estimate, especially for the larger storms.

Results

Tabular results are shown on the attached page. Inflow from manhole covers contributed to 9.78% of I/I in 1997. Infiltration/Inflow increased 12.5% over I/I in 1996. This was partly because there were more incidents of flooding than in 1996. I/I from other sources, such as rainleaders, increase linearly as the amount of rain increases. However, manhole inflow increases exponentially because as it rains more, inflow increases at normally flooded areas **and** inflow occurs at areas that normally do not flood. During several storms, maintenance crews reported that residents had removed manhole covers in flooded intersections. The amount of flow taken into the sanitary system at these locations was not calculated, although it could account for great quantities of water entering the system. In the fall of 1997, maintenance crews switched sanitary manhole covers in problem flooding areas to covers without holes. In addition, crews sealed and plugged the covers in many other low-lying areas. Measures such as these can continue to be used to reduce the inflow from sanitary manhole covers.

Prepared by Jill Liska
January 6, 1998

Inflow from Commercial/Industrial Rainleaders

Commercial, industrial and residential rainleaders are major sources of infiltration/inflow into the sanitary sewer system. Since 1966, the Minneapolis City Council has prohibited new rainleader connections to the sanitary sewer. In the middle eighties, the Minneapolis Sewer Department began the task of locating and disconnecting many residential rainleaders. Residential rainleaders are relatively easy to locate as they are attached to the outside of most houses. Approximately 60% of residential rainleaders were disconnected through this project. The majority of sanitary rainleaders connections has always been and is still commercial and industrial connections. Many of these rainleaders are either located within buildings or are area drains. They, therefore, can contribute tremendous amounts of water to the sanitary sewer system during storms and become virtually undetectable.

Method of Calculation

Total rainfall amounts from the Minneapolis Sewer Department's downtown rainfall gauge were used in the volume calculations. The number of commercial and industrial buildings with sanitary rainleaders was estimated by taking 60% of the buildings built before 1966. Commercial and Industrial building's roof area were multiplied by the total rainfall for the storm. This volume of rainfall (acre-ft) was converted into gallons and compared to the estimated volume of I/I for that particular storm.

Assumptions

Assumptions were needed to determine the volume of water entering the sanitary sewer from commercial and industrial rainleaders.

- Building areas were not available for all commercial and industrial buildings. Average and median building areas were found for the building areas available. The average building area was found to be 7,576 ft^2 and the median building area was 5,105 ft^2. The median area was used as a representative of all building areas.
- Commercial and industrial buildings were sorted from residential buildings solely on the basis of their zoning. Although this is not always the case, the numbers were sufficiently close to actual land uses for these purposes. .
- Percentage of commercial/industrial buildings with sanitary rainleader connections was a compilation of estimates made by several Minneapolis Sewer Department staff members. Estimates ranged from greater than 50% to 75%. Most estimates centered around 60%. This percentage was used to estimate the total number of buildings connected to the sanitary system. Unfortunately, this crucial percentage is also the most subjective piece of data in this report. An accurate percentage could only be determined by citywide building inspections. This could take years.
- The total rainfall, as measured in downtown Minneapolis, was assumed to have fallen on top of every building throughout the city. However, rainfall amounts in downtown Minneapolis tend to be lower than other parts of the city.
- During the July 1, 1997 storm, a total of four inches of rain fell in downtown Minneapolis. Of this, 3.6 inches fell in one hour. However, there was a greater amount of I/I on July 2, 1997 (when it did not rain in Minneapolis). Most of the July 2nd I/I resulted from standing water infiltrating through pipes, inflow from overflows, or inflow through manhole structures. For simplification, two inches of the total four inches of rain were assumed to flow into rainleaders on July 1st, and two inches flowed into rainleaders on July 2nd.

Results

Inflow from rainleaders contributed to 56.9% of I/I during storms in 1997. Inflow from rainleaders contributes about 25% to the total sanitary flow during rainfall events. However, there is a reason commercial/industrial rainleaders were not pursued as a part of the eighties rainleader program: commercial rainleaders need not only to be disconnected, but also reconnected to the storm drain system.

With storm drains not located on every street, disconnecting and reconnecting commercial/industrial sanitary rainleaders could be a costly solution if Minneapolis paid for the improvements. *(Very likely, it would cost more to fix the sanitary rainleader connections than to pay for the additional treatment of the I/I for ten years.)*

Prepared by Jill Liska
January 13, 1998

Ave. Building Area sq. ft.	Number of Buildings Built <1960	Percentage w/ Rnldrs %	Total Building Area w/Rnldr sq. ft.	Total Building Area w/Rnldr Acres	
5,105	9,338	60%	28,602,294	657	acres
7,576	*Average area*				
5,105	*Median Area*				

Total Area of Buildings with Rainleaders	657	acres
Ave Summer Dry Day Flow	53,404,889	gallons/day

Rainfall Date	Max. Storm Intensity	Storm Volume	Volume of I/I (approx)	Max. Flow cfs	Volume gallons	Percent of I/I	Percent of Ttl. San Flow
6/28/97	-	-	19,663,111	-	-		
6/29/97	-	-	13,758,111	-	-		
7/1/97	3.60	2.00	37,250,111	1,182.44	35,675,783	***95.77%***	39%
7/2/97	3.60	2.00	71,986,111	1,182.44	35,675,783	***49.56%***	28%
7/7/97	-	0.73	20,023,111	-	13,021,661	***65.03%***	18%
7/11/97	0.50	0.50	33,053,111	164.23	8,918,946	***26.98%***	10%
7/13/97	1.40	1.70	37,325,111	459.84	30,324,416	***81.24%***	33%
7/17/97	1.28	1.90	59,983,111	420.42	33,891,994	***56.50%***	30%
7/19/97	-	0.27	24,151,111	-	4,816,231	***19.94%***	6%
7/22/97	0.67	2.60	87,810,111	220.06	46,378,518	***52.82%***	33%
8/30/97	1.20	1.40	43,213,111	394.15	24,973,048	***57.79%***	26%
9/16/97	1.28	1.90	53,460,111	420.42	33,891,994	***63.40%***	32%
			Ave Contribution to I/I			***56.90%***	**25.58%**

APPENDIX J
ACKNOWLEDGEMENTS

DEPARTMENT OF PUBLIC WORKS
ENGINEERING SERVICES
JUNE 18, 1999

The following staff of the Department of Public Works, Engineering Services, prepared this report:

Jacob Burggraff
Tim David
Robert Ervin
Jill Liska
Gayle Litchy
Jane Onorati
Karl Westermeyer

I hereby certify that this report was duly 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.

Jodi Polzin — June 18, 1999

Jodi Polzin, PE
Minnesota Reg. No. 16570

Chapter 5

Technical Appendix for Storm Water Management (Draft)

Adopted by City Council and Mayor: March 2000

Minneapolis Storm Water Management Ordinance

Volume 3, Technical Appendix
The Minneapolis Plan

The draft of the City's Storm Water Management Ordinance is attached. The draft will go to the City Council and the Planning Commission for consideration at the end of June 1999. The Council and Mayor are expected to adopt the ordinance this summer after completing a public review process that will take a minimum of six weeks.

Draft #12: Minneapolis Storm Water Management Ordinance

I. INTRODUCTION.
- Authority.
- Purpose.
- Minneapolis Storm Water Management Design Manual.
- Definitions.

II. PROCEDURES.
- Applicability.
  - Land-disturbing projects.
  - Pre-existing storm water management facilities.
- Exemptions.
- Responsibility prior to construction.
  - Storm Water Management Plan Application And Approval.
    - On-Site Management.
    - Full or Partial Off-Site Management (participation in a regional facility).
    - Storm Water Management Standards.
      - Standards According To Receiving Water Body.
      - Constructed Facilities.
      - Minimizing Land Disturbance.
      - Maximizing Infiltration.
      - Rate Control.
      - Ongoing Maintenance.
      - Accessibility For Maintenance.
      - Easement.
      - Impacts On Other Properties.
      - Conformity With Other Requirements.
    - Conditions of approval.
    - Denial.
    - Appeal.
- Responsibility during construction/completion.
  - Duration.
  - Renewals/Extensions.
  - Changes To Plans.
  - Conformity With The Plan.
  - Construction/Completion Final Report and Certification.
- Responsibility Following Construction/Completion.
  - Duration.
  - Annual Notification.
  - Annual Site Registration.
  - Annual Inspection Of Storm Water Facilities.
  - Maintenance Of Storm Water Facilities.
    - Regular Maintenance.
    - Compliance.
    - Action Upon Non-Compliance.

III. MISCELLANEOUS.
- Liability.
- Administration and enforcement.
- Penalties.
- Interpretation.
- Severability.
- Disclaimer.
- Abrogation and greater restrictions.
- Relation to other laws.
- Effective date.

AN ORDINANCE

of the
CITY OF
MINNEAPOLIS

_____presents the following ordinance

Amending Title 3 of the Minneapolis Code of Ordinances relating to Air Pollution and Environmental Protection, by adding hereto a new Chapter __ entitled "Storm Water Management."

The City Council of The City of Minneapolis do ordain as follows:

Section 1. That the Minneapolis Code of Ordinances be amended by adding thereto a new Chapter __ to read as follows:

CHAPTER __. STORM WATER MANAGEMENT

I. INTRODUCTION.

Authority. This ordinance is adopted pursuant to the authorization and policies contained in Minnesota Statutes Chapters 103B and 462 (and Minnesota Rules, Parts 6120.2500-6120.3900, Minnesota Rules Chapters 8410 and 8420?) **Question for Jack Frost or Doug Snyder.**

Purpose. The purpose of this ordinance is to minimize negative impacts of storm water runoff rates, volumes and quality on Minneapolis lakes, streams, wetlands, and the Mississippi River by guiding future significant development and redevelopment activity, and by assuring long-term effectiveness of existing and future storm water facilities. Chapter XX establishes standards and specifications for conservation practices and planning activities in order to achieve policies regarding water resource management, flood control, and other community services as described in City, regional, state, and federal documents and statutes.

Minneapolis Storm Water Management Design Manual (Design Manual). The Design Manual is the compilation of design, performance, and review criteria approved by the City Engineer and adopted by the City Council for storm water management practices. The Design Manual is in conformance with Chapter XX. In any event of apparent non-conformance, the provisions of Chapter XX shall prevail. In the absence of an adopted *Minneapolis Storm Water Management Design Manual*, the publication entitled *Protecting Water Quality in Urban Areas: Best Management Practices For Minnesota* prepared by the Minnesota Pollution Control Agency (MPCA), October, 1989, and subsequent updates shall serve as the approved *Design Manual.* Copies of the *Design Manual* can be obtained from the Minneapolis Department of Public Works.

Definitions. For the purposes of Chapter XX, the following terms, phrases, words, and their derivatives shall have the meaning stated below:

Applicant is any person who submits a Storm Water Management Plan to the City pursuant to this ordinance and his/her agents, employees, and others acting under his/her direction.

Architect is a person duly registered or authorized to practice architecture in the State of Minnesota.

Best Management Practices (BMP) -- see Storm Water Management Best Management Practices

City Engineer is the City Engineer / Director of Public Works of the City of Minneapolis and his / her duly authorized designees.

Civil Engineer is a professional engineer registered in the State of Minnesota to practice in the field of civil works.

Clearing and grubbing is the cutting and removal of trees, shrubs, bushes, windfalls and other vegetation including removal of stumps, roots, and other remains.

Connected actions – see *Phased or connected actions*

Constructed facilities – see Storm water management constructed facilities

Detention facility is a natural or built structure that provides for the temporary storage of storm water runoff and release at controlled rates.

Design Manual -- see Minneapolis Storm Water Management Design Manual, XX.XX

Developer is any person, firm, corporation, sole proprietorship, partnership, or governmental agency/unit engaged in land disturbing activity.

Director of Regulatory Services is the Director of Regulatory Services of the City of Minneapolis and his / her duly authorized designees.

Impervious surface is one that does not allow rainfall to soak into the ground, including but not limited to the rooftops and paved areas such as roads, parking lots, driveways, sidewalks and plazas.

Issuing authority for Storm Water Management Plan approval and certification is the City Engineer and for registration and maintenance is the Director of Regulatory Services.

Land disturbing activity is any land change, including phased or connected actions, within the City of Minneapolis including but not limited to building demolition, clearing and grubbing, grading, excavating, transporting and filling of land, or other changes of the land surface including removing vegetative or impervious cover.

Landscape architect is a person duly registered or authorized to practice landscape architecture in the State of Minnesota.

Minneapolis Storm Water Management Design Manual – see XX.XX

Mitigation is avoiding, minimizing, rectifying, or compensating for impacts.

Non-structural best management practices -- see *Best management practices.*

Owner is any person with a legal or equitable interest in the land.

Person is any individual, firm, corporation, partnership, franchisee, association or governmental entity.

Phased or connected actions are as defined by Minnesota Environmental Review Rules, as follows: *Phased action* means two or more projects to be undertaken by the same proposer that the City Engineer determines a) will have environmental effects on the same geographic area, and b) are substantially certain to be undertaken sequentially over a limited period of time. *Connected actions*: Two projects are "connected actions" if the City Engineer determines they are related in any of the following ways: 1) one project would directly induce the other; b) one project is a prerequisite for the other; or c) neither project is justified by itself.

Pollution is the human-made or human-induced alteration of the chemical, physical, biological or radiological integrity of an aquatic ecosystem.

Project is an undertaking that involves land disturbing activities, including phased or connected actions.

Public waters are waters identified under Minnesota Statutes, section 103G.005, subdivision 15.

Receiving water body is the initial lake, stream, river, or wetland into which site runoff is conveyed whether directly or through the public storm drain system.

Regional storm water facility is a natural or built structure or device within the project's receiving water body drainage area, when so designated by the City Engineer.

Retention facility is a natural or built structure that provides for the storage of storm water runoff by means of a permanent pool of water.

Runoff is rainfall, snowmelt, or irrigation water flowing over the ground surface.

Sediment is soils or other surficial materials transported by surface water as a product of erosion.

Site is the land on which the project, including phased or connected actions, is located.

Site plan is a plan or set of plans showing the details of any land disturbing activity including but not limited to the construction of structures, open and enclosed drainage facilities, storm water management facilities, parking lots, driveways, curbs, pavements, sidewalks, bike paths, recreational facilities, ground covers, plantings, and landscaping.

Soil is naturally occurring surficial deposits overlying bedrock.

Storm Water Best Management Practices (BMP's) are practices, techniques, or measures which are proven to be effective in managing one, or more than one, of the following: storm water runoff rate, storm water runoff volume, pollutants conveyed by storm water runoff, sediment conveyed by storm water runoff. Best management practices include, but are not limited to, official controls, structural and nonstructural best management practices, and operation and maintenance procedures. A partial list of *structural best management practices and devices* includes pond systems / detention basins, infiltration, bioretention and vegetated channels, grit chambers, oil / water separators, filtration systems, and diversions. A partial list of *non-structural best management practices* includes lawn care education, organic litter management, street sweeping, catch basin stenciling, and catch basin cleaning. BMP's are further defined in the *Design Manual*.

Storm water hotspot is a land use or activity that generates higher concentrations of hydrocarbons, trace metals or toxicants than are found in typical storm water runoff.

Storm water management is the collection, conveyance, storage, treatment and disposal of storm water runoff in a manner to minimize channel erosion, flood damage, or degradation of water quality and in a manner to protect and

enhance the environment, public health, safety, and general welfare.

Storm water management constructed facilities include but are not limited to wetlands, wet ponds, wet extended detention ponds, pocket ponds, multiple pond systems, settling basins, infiltration trenches or basins, filter systems, bioretention areas, dry or wet swales, grass channels, waterways, rooftop detention, skimming devices, grit chambers, and diversions.

Storm water management goals are based on the receiving water body and emphasize overall volume reduction, nutrient reduction for storm water discharge to lakes, rate control for storm water discharge to streams, and suspended solids removal for storm water discharge to the Mississippi River.

Storm Water Management Plan (Plan) is the set of drawings, calculations, and other documents that comprise all of the information and specifications for the drainage systems, structures, concepts and techniques that will be used to control storm water as required by this ordinance and the Design Manual.

Storm water pond is a facility capable of holding water on a long-term seasonal or permanent basis (retention), or a short-term basis (detention), the purpose of which is to collect runoff, nutrients, and sediment prior to releasing water into wetlands, lakes, streams, and rivers.

Storm water runoff is the direct response of a watershed to precipitation or snowmelt and includes runoff that enters a ditch, stream, storm drain or other concentrated flow.

Structural best management practices -- see *Best management practices*

Structure is anything manufactured, constructed or erected which is normally attached to or positioned on the land, including portable structures, roads, parking lots, and paved storage areas.

Subwatershed area is the drainage area contributing storm water runoff through a single outfall or point of discharge to a water body or watercourse.

Water quality refers to those characteristics of storm water runoff that relate to the physical, chemical, biological, or radiological integrity of water.

Water quantity refers to those characteristics of storm water runoff that relate to rate and volume.

Watershed is the drainage area contributing storm water runoff to a specific receiving body of water or watercourse such as a lake, creek, or river.

Watershed District / Watershed Management Organization (WMO) is an organization which oversees activities in a particular watershed as defined by Minnesota Statutes, Sections 103B and/or 103D.

Wetlands are waters identified under Minnesota Statutes, section 103G.005, subdivision 19.

Zoning Administrator is the Zoning Administrator / Director of Zoning of the City of Minneapolis and his/her duly authorized designees.

II. PROCEDURES.

Applicability. Chapter XX establishes procedures for land disturbing activities on sites greater than one acre including phased or connected actions, and for existing storm water facilities and devices.

a) Land-disturbing projects. All land-disturbing projects on sites in excess of one acre, including phased or connected actions, shall be served by storm water facilities, on or off site or a combination thereof, designed to meet or exceed targets according to the type of receiving water body as prescribed in the Design Manual. Land use and building permits will not be issued until a Storm Water Management Plan has been approved. On-site facilities are subject to annual site registration, annual inspection, and adherence to maintenance rules prescribed in the Design Manual.

b) Pre-existing storm water management facilities. Storm water facilities in existence prior to Chapter XX are subject to annual site registration, annual inspection, and adherence to maintenance rules prescribed in the Design Manual.

Exemptions. The following activities are exempt from procedures required in Chapter XX:

(1) Any project that has received all necessary approvals from the City on or before the effective date of this ordinance.

(2) Emergency work to protect life, limb, or property.

(3) Reconstruction of existing roadways, bridges, pathways or walkways.

(4) Installation of fence, sign, telephone, electric or other kinds of posts or poles.

Responsibility prior to construction. Land use and building permits will not be issued until a Storm Water Management Plan has been approved.

STORM WATER MANAGEMENT PLAN APPLICATION AND APPROVAL. The procedure for application of a Storm Water Management Plan and approval by the City Engineer is contained in the Design Manual.

a) On-Site Management. Measures to achieve storm water management standards should be incorporated on all sites to the greatest extent possible.

b) Full or Partial Off-Site Management (participation in a regional facility). When due to development density, topographic features, or soil or vegetation conditions, the applicant may apply for approval of full or partial participation in existing regional storm water facilities within the drainage area of the same receiving water body, or regional storm water facilities within the drainage area of the same receiving water body that are substantially certain to be developed, or, if none exist, other storm water mitigation programs in the City of Minneapolis. The Design Manual shall provide the method for calculating cost of full or partial off-site management in lieu of full on-site management. Off-site management may not circumvent the general purposes and intent of this ordinance.

c) Storm Water Management Standards.

Standards according to receiving waterbody. Storm water management standards include, but are not limited to, reduction of suspended solids discharged to the Mississippi River, controlled rate of discharge to streams, and reduction of nutrients in storm water draining to lakes. Minimum requirements for pollutant removal including total suspended solids removal, discharge rate control, and nutrient load reduction according to type of receiving water body are prescribed in the Design Manual.

Constructed facilities. When development density, topographic features, and soil and vegetation conditions are not sufficient to adequately handle storm water runoff using natural features and vegetation, constructed facilities or combinations of constructed facilities shall be used. Types of constructed facilities include but are not limited to wetlands, wet ponds, wet extended detention ponds, pocket ponds, multiple pond systems, settling basins, infiltration trenches or basins, filter systems, bioretention areas, dry or wet swales, grass channels, waterways, rooftop detention, skimming devices, grit chambers, and diversions. Suitability factors include but are not limited to development density, underlying soils, existing vegetation, drainage, location of utilities, aesthetic and recreational use, and management considerations.

Minimizing land disturbance. Development shall be planned and conducted in a manner that will minimize the extent of disturbed areas, runoff velocities, erosion potential, and reduce and delay runoff volumes. Disturbed areas shall be stabilized and protected as required in Chapter 52: Erosion Control Ordinance.

Maximizing infiltration. To the greatest possible degree (except in the case of storm water hotspots), natural drainage ways and vegetated soil surfaces should be used to convey, store, filter, and retain storm water before discharging runoff into public waters or the public storm drain system. Opportunities for maximizing infiltration include minimizing the extent of impervious surfaces and directing runoff from impervious surfaces and from roof gutter systems onto lawns or other pervious surfaces.

Rate control. Changes in land cover effect changes in storm water runoff rates. Rate increases can degrade receiving water bodies or conveyance facilities or can cause flooding. Development should be planned in a manner that does not increase peak flows.

Ongoing maintenance. No storm water facilities shall be approved without a maintenance plan that defines the maintenance regimen, including type and interval of maintenance and party to conduct such maintenance.

Accessibility for maintenance. All public and private owned storm water management facilities shall provide an unobstructed access path capable of supporting light truck traffic during normal weather for the purpose of conducting inspections of the facility and maintenance thereof, unless waived by City Engineer.

Easement. No storm water facility shall be approved unless all necessary access easements are provided to the City of Minneapolis.

Impacts on other properties. No Storm Water Management Plan shall be approved without written agreement among property owners regarding impacts or possible impacts of storm water management.

Conformity with other requirements. Storm Water Management Plans must conform to all applicable federal, state, city, and water management organization statutes, ordinances, and regulations.

d) Conditions Of Approval. In granting any approval pursuant to Chapter XX, the City Engineer may impose such conditions as may be reasonably necessary to prevent creation of a nuisance or unreasonable hazard to persons or to a public or private property. Such conditions shall include (even if not specifically written in the Plan), but need not be limited to the granting (or securing from others) and recordation in County land records of easements for drainage facilities, including the acceptance of their discharge on the property of others, and for the maintenance of facilities.

e) Denial. If the Issuing Authority determines that the Storm Water Management Plan does not meet the requirements of Chapter XX, the Plan will not be approved. The Storm Water Management Plan must be resubmitted for approval before any land disturbing activity begins. All land use and building permits must be suspended until the Applicant has an approved Storm Water Management Plan.

f) Appeal. Any affected party may appeal any Storm Water Management Plan decision by an Issuing Authority to the City Council.

Responsibility during construction/completion.

DURATION. The Applicant shall fully perform and complete all of the work within one year or as otherwise specified in the Plan and approved.

RENEWALS/EXTENSIONS. Prior to the end of the approved schedule the Applicant may present a written request for an extension to the City Engineer. If, in the opinion of the City Engineer, an extension is warranted, an extension may be granted not to exceed one year.

CHANGES TO PLANS. **Any** modifications to an approved Storm Water Management Plan must be approved by the City Engineer.

CONFORMITY WITH THE PLAN. The Applicant shall, at all times, be in conformity with the approved Storm Water Management Plan.

CONSTRUCTION/COMPLETION FINAL REPORT and CERTIFICATION. The Applicant shall submit a final report to the City Engineer for certification of completion.

Responsibility following construction/completion.

DURATION. An approved Storm Water Management Plan shall remain in effect unless cancellation is approved by the City Engineer. All site areas used for the purpose of flood storage or treatment of storm water runoff shall be preserved and maintained for that use, including areas required for maintenance and inspection.

ANNUAL NOTIFICATION. The Director of Regulatory Services shall annually notify owners of storm water management constructed facilities of the need to register, that the facilities are subject to annual inspection, and to conduct maintenance on a one (1) year interval or in accordance with maintenance plans on file.

ANNUAL SITE REGISTRATION. Any person(s), organization, company, group, or any other entity, public or private, in control of a storm water management constructed facility installed under this ordinance or existing prior to this ordinance shall register that site annually with the Director of Regulatory Services and confirm that site has been inspected, maintained and is functioning satisfactorily.

ANNUAL INSPECTION OF STORM WATER FACILITIES. All storm water management constructed facilities are subject to annual inspection by the Director of Regulatory Services. If the City Engineer or Director of Regulatory Services deems that devices are not functioning satisfactorily, a notice of noncompliance may be issued and procedures followed as described in Section XX.XX.

MAINTENANCE OF STORM WATER CONSTRUCTED FACILITIES.

(1) Regular maintenance. Regular maintenance of storm water management constructed facilities shall be required. All facilities shall be maintained in proper condition for sustained use, consistent with the performance standards for which they were originally designed.

(a) All settled materials from ponds, sumps, grit chambers, and other devices, including settled solids, shall be removed and properly disposed of.

(b) All planted materials integral to storm water facility performance, safety, and/or aesthetic quality shall be maintained in proper condition consistent with design performance standards, including replacement when necessary.

(2) Compliance. Maintenance responsibility shall be vested with a responsible authority by means of a legally binding and enforceable maintenance agreement that is executed as a condition of plan approval. The responsible authority, his/her agent, contractors and employees shall carry out the proposed work in accordance with the approved plans and specifications, unless each and every modification or waiver is given specific approval by the Issuing Authority.

(3) Action upon non-compliance. In the event maintenance does not conform to the approved Plan or to any instructions of the Issuing Authority, notice to comply shall be given to the Owner in writing. After a notice to comply is given, in the determination of the Issuing Authority, the responsible party shall be required to make the corrections within the time period determined

by the Issuing Authority. If an imminent hazard exists, the Issuing Authority may require that the corrective work begin immediately. Failure of the Owner to comply with the directives of Section XX.XX. will constitute a violation pursuant to Section XX.XX., and the Issuing Authority may proceed with the necessary maintenance of the site at the expense of the Owner. The Owner will be billed for the expenses incurred by the Issuing Authority. Failure to pay will result in the Issuing Authority seeking recovery of costs and damages pursuant the conditions set forth in Section XX.XX.

II. MISCELLANEOUS.

Liability. The Applicant is responsible for safe and legal compliance with Chapter XX. Neither approval under the provisions of Chapter XX, nor the compliance with the provisions hereto or with any condition imposed by the Issuing Authority, shall relieve any person from responsibility for damage to persons or property resulting therefrom, or as otherwise imposed by law, nor impose any liability upon the City for damages to persons or property.

Administration and enforcement. The Issuing Authority shall be responsible for the administration and enforcement of Chapter XX. Land use and building permits will not be issued until a Storm Water Management Plan or Variance has been approved. The Issuing Authority may post a stop work-order if any land disturbing activity regulated under Chapter XX is being undertaken without an approved Storm Water Management Plan or Variance or if any of the conditions of the Storm Water Management Plan are not being met.

Penalties. Any person, firm, corporation or agency acting as principal, agent, employee or otherwise, who fails to comply with the provisions of this Chapter XX shall be guilty of a misdemeanor and upon conviction thereof shall be punishable by a fine of not less than _____($____.00) and not more than _____($____.00), or by imprisonment for not more than ninety (90) days, or both, for each separate offense. Each day there is a violation of any part of This Chapter XX shall constitute a separate offense.

Interpretation. In their interpretation and application, the provisions of this ordinance shall be held to be minimum requirements and shall be liberally construed in favor of the City and shall not be deemed a limitation or repeal of any other powers granted by State statutes.

Severability. If any section, clause, provision or portion of this Chapter is adjudged unconstitutional or invalid by a court of competent jurisdiction, the remainder of this Chapter shall not be affected thereby.

Disclaimer. This Chapter does not imply that areas will be free from flooding or flood damages. This Chapter does not create liability on the part of the City or its officers or employees for any flood damage that may result from reliance on this Chapter or any administrative decisions made under it.

Abrogation and greater restrictions. It is not intended by this Chapter to repeal, abrogate, or impair any existing easements, covenants, or deed restrictions. However, where this Chapter imposes greater restrictions, the provisions of this Chapter shall prevail. All other

ordinances inconsistent with this ordinance are hereby repealed to the extent of the inconsistency only.

Relation to other laws. Neither Chapter XX nor any administrative decision made under it exempts the Applicant or any other person from procuring other required permits or complying with the requirements and conditions of such a permit, or limits the right of any person to maintain, at any time, any appropriate action, at law or in equity, for relief or damages against the Applicant or any other person arising from activity regulated by Chapter __.

Effective date. This ordinance shall become effective on _____.

CHAPTER 52. EROSION AND SEDIMENT CONTROL FOR LAND DISTURBANCE ACTIVITIES

52.10. Purpose. The purpose of Chapter 52 is to control or eliminate soil erosion and sedimentation within the City of Minneapolis. It establishes standards and specifications for conservation practices and planning activities which minimize soil erosion and sedimentation. (96-Or-042, § 1, 5-10-96)

52.20. Scope. Chapter 52 controls land disturbances, soil storage, and erosion and sedimentation resulting from such activities and establishes procedures for issuance, approval, administration, and enforcement of a permit. (96-Or-042, § 1, 5-10-96)

52.30. Definitions. For the purposes of Chapter 52, the following terms, phrases, words, and their derivatives shall have the meaning stated below:

Applicant is any person who submits an application to the city for a permit pursuant to Chapter 52.

Architect is a person duly registered or authorized to practice architecture in the State of Minnesota.

ASTM is the American Society for Testing Materials.

Bedrock is inplace solid rock.

Bench is a relatively level step excavated into earth material on which fill is to be placed.

Best management practices (BMP) is a technique or series of techniques which are proven to be effective in controlling runoff, erosion, and sedimentation.

Borrow is earth material acquired from an off-site location for use in grading on a site.

City engineer is the city engineer/director of public works of the City of Minneapolis and his/her duly authorized designees.

Civil engineer is a professional engineer registered in the State of Minnesota to practice in the field of civil works.

Civil engineering is the application of the knowledge of the forces of nature, principles of mechanics and the properties of materials to the evaluation, design and construction of civil works for the beneficial uses of mankind.

Clearing and *grubbing* is the cutting and removal of trees, shrubs, bushes, windfalls and other vegetation including removal of stumps, roots, and other remains in the designated areas.

Demolition is any act or process of wrecking or destroying a building or structure as defined in the City of Minneapolis Building Code, Chapter 117, Wrecking.

Detention facility is a temporary or permanent natural or manmade structure that provides for the temporary storage of stormwater runoff.

Developer is any person, firm, corporation, sole proprietorship, partnership, state agency, or political subdivision thereof engaged in a land disturbance activity.

Director of inspections is the director of inspections of the City of Minneapolis and his/her duly authorized designees.

Erosion is the wearing away of the ground surface as a result of the movement of wind, water, ice, and/or land disturbance activities.

Erosion and sediment control plan (plan) is a plan which includes a set of best management practices or equivalent measures designed to control surface runoff and erosion and to retain sediment on a particular site during the period in which pre-construction and construction related land disturbances, fills, and soil storage occur, and before final improvements are completed, all in accordance with the specific requirements set forth in section 52.100 of Chapter 52.

Erosion control inspector is a Minneapolis employee who has in his/her possession a provisional certification for erosion and sediment control plan design sponsored or endorsed by the Minnesota Pollution Control Agency (MPCA) and the Minnesota Board of Water and Soil Resources (BWSR), or who has completed a training program approved by the city engineer.

Excavation is the mechanical removal of earth material.

Fill is a deposit of soil or other earth materials placed by artificial means.

Final erosion and sediment control plan (final plan) is a plan which includes permanent measures and best management practices to control surface runoff and control sediment if not included in the erosion and sediment control plan (plan).

Floodplain is the one hundred (100) year floodplain which is that area adjoining a watercourse which could be inundated by a flood that has a one (1) percent chance of being equaled or exceeded in any given year and is delineated on the Federal Emergency Management Agency Floodway Maps for Minneapolis.

General stormwater permit is the Minnesota Pollution Control Agency's (MPCA) general National Pollutant Discharge Elimination System (NPDES) construction stormwater permit covering anyone conducting a land disturbing activity which disturbs five (5) or more acres of total land area.

Grade is the vertical location of the ground surface.

(1) Existing grade is the grade prior to grading.

(2) Rough grade is the stage at which the grade approximately conforms to the approved plan.

(3) Finish grade is the final grade of the site which conforms to the approved plan.

Hennepin Conservation District (HCD) is the Hennepin Conservation District organized and operating under Minnesota Statutes, Chapter 40.

Issuing authority is the city engineer/director of public works and the director of inspections of the City of Minneapolis and their duly authorized designees.

Land disturbance activity is any land change that may result in soil erosion from wind, water and/or ice and the movement of sediments into or upon waters, lands, or rights-of-way within the City of Minneapolis, including but not limited to building demolition, clearing and grubbing, grading, excavating, transporting and filling of land. Land disturbance activity does not include the following:

(1) Minor land disturbance activities including, but not limited to, underground utility repairs, home gardens, minor repairs, and maintenance work which do not disturb more than five hundred (500) square feet of land.

(2) Installation of fence, sign, telephone, and electric poles and other kinds of posts or poles.

(3) Emergency work to protect life, limb, or property and emergency repairs. If the land disturbing activity would have required an approved erosion and sediment control plan except for the emergency, then the land area disturbed shall be shaped and stabilized in accordance with the requirements of Chapter 52.

Landscape architect is a person duly registered or authorized to practice landscape architecture in the State of Minnesota.

Maintenance project is a non-construction related activity.

Manual of Standards is a compilation of technical standards and design specifications adopted by the City of Minneapolis Department of Public Works as being proven methods of controlling construction related surface runoff, erosion and sedimentation. This includes the Erosion and Sediment Control Manual as developed by the Hennepin Conservation District of Hennepin County, 1989, and subsequent amendments thereto, and "Protecting Water Quality in Urban Areas" prepared by the Minnesota Pollution Control Agency (MPCA), 1989, and subsequent updates.

MnDOT is the Minnesota Department of Transportation.

Outfall is the point of discharge to any watercourse from a public or private stormwater drainage system.

Owner is any person with a legal or equitable interest in the land for which an erosion control permit has been issued.

Permittee is the applicant in whose name a valid permit is duly issued pursuant to Chapter 52 and his/her agents, employees, and others acting under his/her direction.

Retention facility is a temporary or permanent natural or manmade structure that provides for the storage of stormwater runoff by means of a permanent pool of water.

Runoff is rainfall, snowmelt, or irrigation water flowing over the ground surface.

Sediment is soils or other surficial materials transported by surface water as a product of erosion.

Sedimentation is the process or action of depositing sediment that is determined to have been caused by erosion.

Select topsoil borrow is the material furnished under MnDOT specification 3877.2 designated as "B" as defined by the Soil Science Society of America.

Site is the entire area of land on which the land disturbance activity is proposed in the permit application.

Site plan is a plan or set of plans showing the details of any land disturbance activity of a site including but not limited to the construction of: structures, open and enclosed drainage facilities, stormwater management facilities, parking lots, driveways, curbs, pavements, sidewalks, bike paths, recreational facilities, ground covers, plantings, and landscaping.

Slope is the incline of a ground surface expressed as a ratio of horizontal distance to vertical distance.

Soil is naturally occurring surficial deposits overlying bedrock.

Soils engineer (geotechnical engineer) is an engineer experienced and knowledgeable in the practice of soils engineering (geotechnical) engineering.

Soils engineering (geotechnical engineering) is the application of the principles of soils mechanics in the investigation, evaluation and design of civil works involving the use of earth materials and the inspection and/or testing of the construction thereof.

Stripping is any activity which removes or significantly disturbs the vegetative surface cover including clearing, grubbing of stumps and root mat, and topsoil removal.

Structure is anything manufactured, constructed or erected which is normally attached to or positioned on land, including buildings, portable structures, earthen structures, roads, parking lots, and paved storage areas.

Surveyor is a person duly registered or authorized to practice land surveying in the State of Minnesota.

Topsoil is the upper layer of soil.

Topsoil borrow is the material furnished under MnDOT specification 3877.2 designated as "A" as defined by the Soil Science Society of America.

Utility is the owner/operator of any underground facility including an underground line, facility, system, and its appurtenances used to produce, store, convey, transmit, or distribute communications, data, electricity, power, heat, gas, oil, petroleum products, water (including stormwater), steam, sewage, and other similar substances.

Watercourse is any natural or improved stream, river, creek, ditch, channel, canal, conduit, gutter, culvert, drain, gully, swale, or wash in which waters flow either continuously or intermittently.

Watershed is a region draining to a specific river, river system, or body of water.

Watershed District/Watershed Management Organization (WMO) is an organization which oversees the activities in a particular watershed as defined by Minnesota Statutes, Sections 103B and 103D.

Wetlands is a lowland area, such as a marsh, that is saturated with moisture, as defined in Sec. 404, Federal Water Pollution Control Act Amendments of 1987, or the Minnesota Wetland Conservation Act of 1991. (96-Or-042, § 1, 5-10-96)

52.40. Relation to other laws. Neither Chapter 52 nor any administrative decision made under it exempts the permittee or any other person from procuring other required permits or complying with the requirements and conditions of such a permit, or limits the right of any person to maintain, at any time, any appropriate action, at law or in equity, for relief or damages against the permittee or any other person arising from the activity regulated by Chapter 52. (96-Or-042, § 1, 5-10-96)

52.50. Exemptions. The following activities are exempt from obtaining a permit and from following the procedures required in Chapter 52:

(1) Cemetery graves.

(2) Emergencies posing an immediate danger to life or property, or substantial flood or fire hazards.

(3) Any activity where the total volume of material disturbed, stored, disposed of or used as fill does not exceed five (5) cubic yards or the area disturbed does not exceed five hundred (500) square feet provided it does not obstruct a watercourse, and is not located in a floodplain. (96-Or-042, § 1, 5-10-96)

52.60. Manner of work. All land disturbing or land filling activities or soil storage, whether pursuant to Chapter 52 or otherwise, shall be undertaken in a manner designed to minimize surface runoff, erosion and sedimentation. Whenever the issuing authority determines that any land disturbing activity on any private property has become a hazard to life and limb, or endangers the property of another, or adversely affects the safety, use, slope, or soil stability of a public way, publicly controlled wetland, or watercourse, then the owner of the property upon which the land disturbing activity is located, or other person or agent in control of said property, upon receipt of notice in writing from the issuing authority, shall within the period specified therein repair or eliminate such conditions.

Exempt activities under section 52.50 or the activities excluded under the definition of land disturbance activities under section 52.30 are also subject to the provisions of this section. If the city incurs costs to enforce the provisions of the section because of any activity listed in section 52.50, reimbursement of city costs associated with the correction work completed by the city must occur prior to the issuance of a letter certifying completion, when required under section 52.320. (96-Or-042, § 1, 5-10-96)

52.70. Erosion and sediment control performance standards. A construction project shall be considered in conformance with Chapter 52 if soils have been prevented from being deposited onto adjacent properties, rights-of-ways, public storm drainage system, or wetland or watercourse. The design, testing, installation, and maintenance of erosion and sediment control operations and facilities shall adhere to the standards and specifications contained in the Manual of Standards which shall be hereby incorporated into Chapter 52. In the event of conflict between provisions of said manual and of Chapter 52, Chapter 52 shall govern. A copy of the Manual of Standards and amendments shall be filed with the city engineer/director of public works. (96-Or-042, § 1, 5-10-96)

52.80. Application. A written application from the owner of the site, or his/her authorized representative, in the form prescribed by section 52.90, shall be required for each permit. The fees for said permit shall be paid pursuant to the schedules set forth in Chapter 91, Art. XIII. Plans and specifications shall be prepared or approved and signed by a civil engineer, surveyor, architect, or landscape architect. The city engineer may waive the preparation or approval and signature by the civil engineer, surveyor, architect, or landscape architect when it is self-evident that the work is simple, clearly shown, and entails no hazard or nuisance potential to adjacent property or watercourse, and does not include the placement of fill upon which a structure may be erected. (96-Or-042, § 1, 5-10-96)

52.90. Permit application form. The following information is required on the application:

(1) Name, address, and telephone number of owner.

(2) Name, address, and telephone number of applicant, if different than owner.

(3) Names, addresses, and telephone numbers of any and all contractors, subcontractors or persons actually doing the land disturbing or land filling activities and their respective tasks.

(4) Name(s), address(es), and telephone number(s) of the person(s) responsible for the preparation of the site map and grading plan.

(5) Name(s), address(es), and telephone number(s) of the person(s) responsible for the preparation of the erosion and sediment control plan.

(6) Name(s), address(es), and telephone number(s) of the registered engineer(s) responsible for the preparation of the soils engineering and engineering geology reports, where required.

(7) Address of site.

(8) Date of the application.

(9) Signature(s) of the owner(s) of the site or an authorized representative. (96-Or-042, § 1, 5-10-96)

52.100. Erosion and sediment control plan (plan). Land disturbance activities which are in excess of either five thousand (5,000) square feet or five hundred (500) cubic yards of earth moved require an erosion and sedimentation control plan approved by the city engineer. These plans shall be drawn to an appropriate scale and shall include sufficient information to evaluate the environmental characteristics of the affected areas, the potential impacts of the proposed grading on water resources, and measures proposed to minimize soil erosion and off-site sedimentation. The owner/developer shall perform all clearing, grading, drainage, construction, and development in strict accordance with the approved plan. In addition, the following information shall be included in any plan.

(1) A letter of transmittal, which includes a project narrative.

(2) An attached vicinity map showing the location of the site in relationship to the surrounding area's watercourses, water bodies and other significant geographic features, and roads and other significant structures.

(3) An indication of the scale used.

(4) The name, address, and telephone number of the owner and/or developer of the property where the land disturbing activity is proposed.

(5) Suitable contours for the existing and proposed topography.

(6) The proposed grading or land disturbance activity including: the surface area involved, excess spoil material, use of borrow material, and specific limits of disturbance.

(7) A clear and definite delineation of any areas of vegetation or trees to be saved.

(8) A clear and definite delineation of any wetlands, natural or artificial water storage detention areas, and drainage ditches on the site.

(9) A clear and definite delineation of any one hundred (100) year floodplain on or near the site.

(10) Storm drainage system, including quantities of flow and site conditions around all points of surface water discharge from the site.

(11) Erosion and sediment control provisions to minimize on-site erosion and prevent off-site sedimentation, including provisions to preserve topsoil and limit disturbance.

(12) Design details for both temporary and permanent erosion control structures.

(13) Details of temporary and permanent stabilization measures including a construction note on the plan stating: "Following initial soil disturbance or redisturbance, permanent or temporary stabilization shall be completed within seven (7) calendar days on all perimeter dikes, swales, ditches, perimeter slopes, and all slopes greater than 3 horizontal to 1 vertical (3:1); embankments of ponds, basins, and traps; and within fourteen (14) days on all other disturbed or graded areas. The requirements of this section do not apply to those areas which are shown on the plan and are currently being used for material storage or for those areas on which actual construction activities are currently being performed."

(14) A chronological construction schedule and time frame including, as a minimum, the following activities:

a. Clearing and grubbing for those areas necessary for installation of perimeter erosion control devices.

b. Construction of perimeter erosion control devices.

c. Remaining interior site clearing and grubbing.

d. Installation of permanent and temporary stabilization measures.

e. Road grading.

f. Grading for the remainder of the site.

g. Utility installation and whether storm drains will be used or blocked after construction.

h. Building, parking lot, and site construction.

i. Final grading, landscaping or stabilization.

j. Implementation and maintenance of final erosion control structures.

k. Removal of temporary erosion control devices.

(15) A statement noting that the contractor, developer, and owner shall request the erosion control inspector to inspect and approve work completed in accordance with the approved erosion and sediment control plan, and in accordance with Chapter 52. The contractor, developer, or owner shall be required to obtain written approval by the inspector at the stages of development as outlined in section 52.250, subsections (1), (2), and (3).

(16) A signed statement on the plan by the owner, developer, and contractor that any clearing, grading, construction, or development, or all of these,

will be done pursuant to the plan.

(17) The city engineer may require any additional information or data deemed appropriate and/or may impose such conditions thereto as may be deemed necessary to ensure compliance with the provisions of Chapter 52, the Manual of Standards, or the preservation of public health and safety.

(18) A description of, and specifications for, sediment retention structures.

(19) A description of, and specifications for, surface runoff and erosion control devices.

(20) A description of vegetative measures.

(21) The applicant may propose the use of any erosion and sediment control techniques in a final plan provided such techniques are proven to be as or more effective than the equivalent best management practices as contained in the Manual of Standards.

(22) Proposed conditions of the site on the 15th of each month between and including the months of April through October. (96-Or-042, § 1, 5-10-96)

52.110. Soils engineering report. A soils engineering report, when required by the city engineer, based upon his/her determination that the condition of the soils is unknown or unclear so that additional information is required to protect against erosion or other hazard, shall be based on adequate and necessary test borings, and shall contain all the information listed below. Recommendations included in the report and approved by the city engineer shall be incorporated in the grading plans and/or specifications.

(1) Data regarding the nature, distribution, strength, and erodibility of existing soils.

(2) If applicable, data regarding the nature, distribution, strength, and erodibility of soil to be placed on the site.

(3) Conclusions and recommendations for grading procedures.

(4) Conclusions and recommended designs for interim soil stabilization devices and measures, and for permanent soil stabilization after construction is completed.

(5) Design criteria for corrective measures when necessary.

(6) Opinions and recommendations covering the stability of the site. (96-Or-042, § 1, 5-10-96)

52.120. Engineering geology report. When deemed necessary by the city engineer, based upon his/her determination that the condition of the soils is unknown or unclear so that additional information is required to protect against erosion or other hazard, an engineering geology report shall be provided based on adequate and necessary test borings, giving an adequate description of the geology of the site with conclusions and recommendations regarding the effect of geologic conditions on the proposed development, and giving opinions and recommendations covering the adequacy of sites to be developed by the proposed land disturbing activity. Recommendations included in the report and approved by the city engineer shall be incorporated in the grading plans

and/or specifications. (96-Or-042, § 1, 5-10-96)

52.130. Work schedule. When not submitted as part of a plan the applicant shall submit to the city engineer, a master work schedule showing the following information:

(1) Proposed grading schedule.

(2) Proposed schedule for installation of all erosion and sediment control measures including, but not limited to, the stage of completion of erosion and sediment control devices and vegetative measures.

(3) Schedule for construction of final improvements, if any.

(4) Schedule for installation of permanent erosion and sediment control devices where required. (96-Or-042, § 1, 5-10-96)

52.140. Permit required. Except as otherwise provided in Chapter 52, no person may grade, fill, excavate, store, stockpile or dispose of earth materials or perform any other land disturbing or land filling activity without first obtaining an erosion and sediment control permit from the director of inspections. Annual maintenance permits are available for maintenance projects greater than five hundred (500) square feet. (96-Or-042, § 1, 5-10-96)

52.150. Permit duration. Permits issued under Chapter 52 shall be valid for the period during which the proposed land disturbing or filling activities and soil storage takes place or is scheduled to take place, whichever is shorter, but in no event shall such a permit be valid for more than one (1) year. The permittee shall commence permitted activities within one hundred eighty (180) days of the scheduled commencement date for grading or the permittee shall resubmit all required application forms, maps, plans, and schedules to the issuing authority, except where an item to be resubmitted is waived by the issuing authority. (96-Or-042, § 1, 5-10-96)

52.160. Permit renewals/extensions. The permittee shall fully perform and complete all of the work required in the sequence shown on the plans within the time limit specified in the permit. Prior to the expiration of an erosion and sediment control permit, the permittee may present a written request for an extension to the director of inspections. If, in the opinion of the issuing authority, an extension is warranted, a one time no fee extension, not to exceed ninety (90) days, may be granted. The issuing authority may authorize additional extensions not to exceed a total of one (1) year at the rate of seventy-five dollars ($75.00) per extension. (96-Or-042, § 1, 5-10-96)

52.170. Permit denial. If the issuing authority determines that the erosion and sediment control plan does not meet the requirements of Chapter 52, he/she shall not issue a permit for the land disturbing activity. The erosion and sediment control plan must be resubmitted for approval before the land disturbance activity begins. All land use and building permits must be suspended until the permittee has an approved erosion and sediment control plan. (96-Or-042, § 1, 5-10-96)

52.180. Conditions of approval. In granting any permit pursuant to Chapter 52, the issuing authority may impose such conditions as may be reasonably necessary to prevent creation of a nuisance or unreasonable hazard to persons or to a public or private property. Such conditions shall include (even if not specifically written in the

permit), but need not be limited to:

(1) The granting (or securing from others) and the recording in county land records of easements for drainage facilities, including the acceptance of their discharge on the property of others, and for the maintenance of slopes or erosion control facilities.

(2) Adequate control of dust by watering, or other control methods acceptable to the issuing authority, and in conformance with applicable air pollution ordinances.

(3) Improvements of any existing grading, ground surface or drainage condition on the site (not to exceed the area as proposed for work or development in the application) to meet the standards required under Chapter 52 for new grading, drainage and erosion control.

(4) Sediment traps and basins located within a densely populated area or in the proximity of an elementary school, playground or other area where small children may congregate without adult supervision may be requested to install additional safety related devices. (96-Or-042, § 1, 5-10-96)

52.190. Liability. The permittee is responsible for safely and legally completing the project. Neither the issuance of a permit under the provisions of Chapter 52, nor the compliance with the provisions hereto or with any condition imposed by the issuing authority, shall relieve any person from responsibility for damage to persons or property resulting therefrom, or as otherwise imposed by law, nor impose any liability upon the city for damages to persons or property. (96-Or-042, § 1, 5-10-96)

52.200. Responsibility of permittee. The permittee shall maintain a copy of the permit, approved plans and reports required under the permit on the work site and available for public inspection during all working hours. The permittee shall, at all times, be in conformity with the approved grading plan, erosion and sediment control plans and also conform to the following:

(1) *General* - Notwithstanding other conditions or provisions of the permit, or the minimum standards set forth in Chapter 52, the permittee is responsible for the prevention of damage to adjacent property. No person shall grade on land in any manner, or so close to the property line as to endanger or damage any adjoining public street, sidewalk, alley or any other public or private property without supporting and protecting such property from settling, cracking, erosion, sedimentation or other damage or personal injury which might result.

(2) *Public ways* - The permittee shall be responsible for the prompt removal of, and the correction of damages resulting from any soil, miscellaneous debris or other materials washed, spilled, tracked, dumped or otherwise deposited on public streets, highways, sidewalks or other public thoroughfare, incident to the construction activity, or during transit to and from the construction-site. (96-Or-042, § 1, 5-10-96)

52.210. Permit authorization. The issuance of an erosion and sediment control permit shall constitute an authorization to do only that work described in the permit, or shown on the approved site plans and specifications, all in strict compliance with the

requirements of Chapter 52, unless each and every modification or waiver is specifically listed and given specific approval by the issuing authority. (96-Or-042, § 1, 5-10-96)

52.220. Compliance. The permittee, his/her agent, contractors and employees shall carry out the proposed work in accordance with the approved plans and specifications, and in compliance with all the requirements of the permit, including those documents referenced in section 52.70 of Chapter 52. (96-Or-042, § 1, 5-10-96)

52.230. Action upon noncompliance. (a) In the event work does not conform to the permit or to the plans and specifications or to any instructions of the issuing authority, notice to comply shall be given to the permittee in writing. After a notice to comply is given, in the determination of the issuing authority, the permittee or his/her contractor shall be required to make the corrections within the time period determined by the issuing authority. If an imminent hazard exists, the issuing authority may require that the corrective work begin immediately.

(b) If the issuing authority finds any existing conditions not as stated in the application or approved plans, he/she may stop the work on the entire project or any specified part thereof until a revised plan is submitted conforming to the currently existing conditions.

(c) Failure of the permittee to comply with the directives of this section will constitute a violation pursuant to section 52.290, and will be considered a nuisance pursuant to Laws of Minnesota for 1994, Chapter 587, Article 9, Section 4, and the issuing authority may cancel the permit and proceed with the necessary restoration of the site at the expense of the owner. The owner will be billed for the expenses incurred by the issuing authority. Failure to pay will result in the issuing authority seeking recovery of costs and damages pursuant to the conditions set forth in section 52.290. (96-Or-042, § 1, 5-10-96)

52.240. Changes to plans. All changes or modifications to the approved erosion and sediment control plans must adhere to the following conditions:

(1) All proposals to modify the approved plans must be submitted to the city engineer for his/her approval. No grading or any type of work in connection with any proposed modification shall be without prior written approval of the issuing authority.

(2) When inspection of a site indicates that the approved erosion and sediment control plan needs change, the change shall be in compliance with the erosion and sediment control criteria contained in the Manual of Standards. The erosion control inspector may approve minor modifications to approved erosion and sediment control plans in the field if documented on a field inspection report. The modification shall be noted on the approved plans, signed by the inspector, and dated. A list of allowable field modifications for use by field inspection personnel will be kept in the Manual of Standards.

(3) The permittee shall submit requests for major revisions to approved erosion and sediment control plans, such as the addition or deletion of a sediment basin, to the city engineer. This includes revisions due to plan and site discrepancies and inadequacies at controlling erosion and sediment as revealed through inspection. (96-Or-042, § 1, 5-10-96)

52.250. Inspection and supervision. The contractor and/or their agents shall conduct a pre-construction meeting on-site with the issuing authority on each site which has an approved erosion and sediment control plan. After commencing initial grading or land disturbing activities, the permittee shall obtain written inspection approvals by the issuing authority at the following stages in the development of the site, or of each subdivision thereof:

(1) Upon completion of installation of perimeter erosion and sediment controls, prior to proceeding with any other land disturbance or grading. Other building or grading inspection approvals may not be authorized until initial approval by the erosion control inspector is made.

(2) Upon completion of stripping, the stockpiling of topsoil, the construction of temporary erosion and sediment control facilities, disposal of all waste material, and preparation of the ground and completion of rough grading, but prior to placing top soil, permanent drainage or other site development improvements and ground covers.

(3) Upon completion of final grading, permanent drainage and erosion control facilities including established ground covers and planting, and all other work of the permit. The issuing authority may require additional inspections as may be deemed necessary. Work shall not proceed beyond the stages outlined above until the erosion control inspector inspects the site and approves the work previously completed. Requests for inspections shall be made at least twenty-four (24) hours in advance (exclusive of Saturdays, Sundays, and holidays) of the time the inspection is desired. Upon request for inspections, the issuing authority shall perform the inspection within forty-eight (48) hours of request. In making application for a permit covered by Chapter 52, the applicant or the landowner performing or allowing such work consents to the issuing authority having the right to enter the site for the purpose of inspecting compliance with the erosion and sediment control plan or for performing any work necessary to bring the site into compliance with the erosion and sediment control plan. This does not include consent to enter into any building which is completed and which has been secured, but does include consent to inspect any area of the property where land disturbing activity is occurring or is thought to be planned as a site of land disturbing activity. (96-Or-042, § 1, 5-10-96)

52.260. Changes during construction reports. The permittee shall submit written reports to the issuing authority under the following circumstances along with recommendations for corrective measures, if deemed necessary and appropriate, with such reports unless the recommendation requirement is waived by the issuing authority.

(1) There are delays in obtaining materials, machinery, services or manpower necessary to the implementation of the grading, or erosion and sediment control plan as scheduled.

(2) There are delays in land disturbing or filling activities or soil storage.

(3) The work is not being done in conformance with the approved grading, or erosion and sediment control plans.

(4) There are any departures from the approved grading plan which may

affect implementation of the erosion and sediment control plans as scheduled.

(5) There are any delays in the implementation of the erosion and sediment control plans.

(6) There are any other departures from implementation of the erosion and sediment control plans. (96-Or-042, § 1, 5-10-96)

52.270. Maintenance during and after construction. On any property on which grading or other work has been done pursuant to a permit granted under the provisions of Chapter 52 the permittee or owner, their agent, contractor, and employees shall, at a minimum, daily inspect, maintain and repair all graded surfaces and erosion control facilities, drainage structures or means and other protective devices, plantings, and ground cover installed while construction is active. After construction is complete, the owner or their agent shall continue to regularly inspect the vegetation until adequate turf establishment or other suitable vegetative cover is established. (96-Or-042, § 1, 5-10-96)

52.280. Security. The issuing authority may require the posting of a surety bond in a form approved by the city attorney, when in the judgment of the issuing authority the project provides potential for environmental damage. The bond shall be in such form and amount as is necessary to assure that the work, if not completed in accordance with the approved plans and specifications, will be corrected. In lieu of a surety bond, with the approval of the issuing authority, the applicant may file a cash bond or instrument of credit that has been approved by the city attorney in an amount equal to that which would be required in the surety bond. (96-Or-042, § 1, 5-10-96)

52.290. Enforcement. The issuing authority shall be responsible for the enforcement of Chapter 52.

(1) The issuing authority may post a stop-work order for the entire project or any specified part thereof if any of the following conditions exist:

a. Any land disturbance activity regulated under Chapter 52 is being undertaken without a permit.

b. The erosion and sediment control plan is not being fully implemented.

c. Any of the conditions of the permit are not being met.

(2) For the purposes of this section, a stop-work order is validly posted by posting a copy of the stop-work order on the site of the land disturbing activity in reasonable proximity to a location where the land disturbing activity is taking place. Additionally, a copy of the order, in the case of work for which there is a permit, shall be mailed by first class mail, postage pre-paid, to the address listed by the permittee on the permit. In the case of work for which there is no permit, a copy of the order shall be mailed to the person listed as owner of the property by the city assessor on the homestead record, or if none, to the taxpayer shown by the records of the city assessor.

(3) If the permittee does not cease the activity or comply with the erosion and sediment control plan or permit conditions within one (1) day, the issuing

authority may revoke the permit.

(4) If the owner or land user where no permit has been issued does not cease the land disturbance activity, the issuing authority may request the city attorney to obtain injunctive relief.

(5) The issuing authority may retract the stop-work order or the revocation.

(6) Ten (10) days after posting a stop-work order, the issuing authority may issue a notice of intent to the permittee, owner, or land user of the issuing authority's intent to perform work necessary to comply with Chapter 52. The issuing authority may go on the land and commence work after fourteen (14) days from issuing the notice of intent. The costs incurred by the issuing authority to perform this work shall be paid by the owner or permittee out of the bond referred to in section 52.280 of Chapter 52, to the extent that the amount is covered thereby, with the remainder being directly due and owing by the owner or permittee. In the event no permit was issued or no bond was posted, the cost, plus interest at the rate authorized by the issuing authority, plus a reasonable administrative fee shall be billed to the owner. If in any event the amount due is not paid, the city clerk shall enter the amount due on the tax roll and collect as a special assessment against the property using the procedures for collecting the assessment, providing for the notice of assessment, hearing thereon, and appeal as provided by section 227.100 of the Minneapolis Code of Ordinances.

(7) Compliance with the provisions of Chapter 52 may also be enforced by injunction.

(8) A notice of intent to perform work necessary to comply with Chapter 52 pursuant to subsection (6) of this section may be served in the manner specified for a stop-work order in subsection (2). (96-Or-042, § 1, 5-10-96)

52.300. Penalties. Any person, firm, corporation or agency acting as principal, agent, employee or otherwise, who fails to comply with the provisions of Chapter 52 shall be guilty of a misdemeanor and upon conviction thereof shall be punishable by a fine of not less than one hundred dollars ($100.00) and not more than seven hundred dollars ($700.00), or by imprisonment for not more than ninety (90) days, or both, for each separate offense. Each day there is a violation of any part of Chapter 52 shall constitute a separate offense. (96-Or-042, § 1, 5-10-96)

52.310. Final reports. Upon completion of the work, the issuing authority may require a report (including as-built construction plans) from a civil engineer, surveyor, architect, or landscape architect certifying that all erosion and sediment control devices have been completed in accordance with the conditions of the permit and approved plans and specifications, and with specific listing of all approved changes and modifications. (96-Or-042, § 1, 5-10-96)

52.320. Certification of completion. Upon receipt and approval of the final reports, if required by section 52.310 and/or upon otherwise determining that all work of the permit has been satisfactorily completed in conformance with this subtitle, the issuing authority will issue a letter certifying completion. (96-Or-042, § 1, 5-10-96)

52.330. Effective date. This ordinance shall become effective on June 15, 1996. (96-Or-042, § 1, 5-10-96)

CHAPTER 560. SHORELAND DISTRICTS GENERALLY

560.05. Purpose. The purpose of this chapter is to comply with the requirements of the Shoreland Management Act and the Mississippi River Critical Area Act. To better facilitate the existing development controls of shoreland areas of public waters within the city for the purpose of preserving and enhancing the environmental qualities of surface waters, the natural and economic values of shoreland areas, to provide for the wise utilization of these waters, and to protect the best interests of the public health, safety and welfare, the city has adopted these special environmental regulations and created the shoreland overlay to the zoning map. (84-Or-226, § 1, 11-21-84)

560.10. Permitted uses. All uses permitted within any underlying zoning classification and subject to the provisions of that classification are permitted in the shoreland district. Any development or activity within a shoreland district is further regulated by the conditions of sections 560.10 through 560.90. (84-Or-226, § 1, 11-21-84)

560.20. Conditional uses. The following conditional uses may be allowed in the shoreland district subject to the provisions of Chapter 525:

(1) New structures or additions to existing structure on steep slopes, other than riverbanks or bluffs, where there is already development that is built on the steep slope within five hundred (500) feet of the subject property. No conditional use permit is required to add to the height of a structure or to add to the structure if the addition is on the side of the structure away from the protected water.

(2) Electrical transmission services of under two hundred (200) kilowatts, subject to the following standards;

(a) When routing transmission services of under two hundred (200) kilovolts, the following shall be avoided where practicable:

1. Steep slopes.
2. Scenic intrusions into streams, valleys and open exposures of water.
3. Scenic intrusions into areas such as ridge crests and high points.
4. Creating tunnel vistas by, for example, building deflections into the route.
5. Wetlands.
6. Forests by running along rather than through them. If necessary to route through forests, utilize open areas in order to minimize cutting.
7. Soils susceptible to erosion, which would create sedimentation and pollution problems.
8. Areas of unstable soils which would be subject to extensive slippages.

9. Areas with high water tables, especially if construction requires excavation.

10. Open space recreation areas.

(b) Structure design of transmission services. With regard to locating the utility, overhead or underground:

1. Primary considerations shall be given to underground placement in order to minimize visual impact. When considering overhead placement, the proposers shall explain the economic, technological or land characteristic factors which make underground placement feasible. Economic considerations alone shall not justify overhead placement.

2. If overhead placement is necessary, the crossing should be hidden from view as much as practicable.

3. With regard to the appearance of the structures, they shall be made as compatible as practicable with the natural area with regard to height and width, materials used and color.

4. With regard to the width of the right-of-way, the cleared portion of the right-of-way should be kept to a minimum.

(c) In the construction of transmission service, the effective erosion and sedimentation control programs shall be conducted during all clearing, construction or reconstruction operations in order to prevent the degradation of the river and adjacent lands.

(d) Right-of-way maintenance.

1. If possible, natural vegetation of value to fish or wildlife, which does not pose a hazard to or restrict reasonable use of the utility, shall be allowed to grow in the right-of-way.

2. Where vegetation has been removed, new vegetation consisting of native grasses, herbs, shrubs and low-growing trees shall be planted and maintained on the right-of-way.

3. Chemical control of vegetation should be avoided when practicable, but where such methods are necessary, chemicals used and the manner of their use must be in accordance with rules, regulations and other requirements of all state and federal agencies with authority over the use.

(3) Three (3) or more family developments, not including cluster developments, of more than four (4) stories on blocks that are zoned partially for high density and partially for low density. (R1, R2 and R3). (84-Or-226, §1 1, 11-21-84; 95-Or-189, § 1, 12-29-95)

560.30. Definitions. *Clear cutting* means the removal of an entire stand of trees.

Hardship means the property in question cannot be put to reasonable use under the conditions allowed by the official controls; the plight of the landowner or developer is due to circumstances unique to his property, not created by the landowner; and the variance, if granted, will not alter the essential character of the locality. Economic

considerations alone shall not constitute a hardship if a reasonable use for the property exists under terms of the official controls.

Shoreland means land located within the following distances from protected waters: (i) one thousand (1,000) feet from the ordinary highwater mark of a lake, pond or flowage; and (ii) three hundred (300) feet from a river or stream or the landward extent of a floodplain on such rivers or streams, whichever is greater. The practical limits of shorelands may be less than the statutory limits where such limits are designated by natural drainage divides at lesser distances, as shown on the official zoning map of the city.

Structure means any building (including mobile homes) or appurtenance thereto, except aerial or underground utility lines such as sewer, electric, telephone, telegraph or gas lines, including towers, poles and other supporting appurtenances.

Variance means any modification or variation of official controls where it is determined that, because of hardships, strict enforcement of the official controls is impractical.

Ordinary highwater mark means a mark delineating the highest water level which has been maintained for a sufficient period of time to leave evidence upon the landscape. The ordinary highwater mark is commonly that point where natural vegetation changes from predominantly aquatic to predominatly terrestrial.

Protected waters means the following lakes, rivers and streams: Brownie Lake, Cedar Lake, Lake of the Isles, Lake Calhoun, Lake Harriet, Lake Nokomis, Lake Hiawatha, Mother Lake, Legion Lake, Diamond Lake and Powderhorn Lake; Shingle Creek, Bassett Creek, Minnehaha Creek and the Mississippi River.

Natural vegetation means the vegetation that was in place along protected waters at the time the shoreland zoning ordinance was passed. It may include trees, shrubs and bushes that have been planted. It does not include flowers, grass or noxious weeds.

Bluff means a steep rock outcropping generally along the Mississippi River.

Riverbank means the initial steep slope adjacent to the water's edge of a creek or river.

Lake bank means the initial steep slope adjacent to the water's edge of a lake.

Top of steep slope or riverbank means the contour at which the slope ceases to be eighteen (18) per cent or more.

Steep slope means a slope of eighteen (18) per cent or more. A steep slope can include riverbanks, lake banks and bluffs, if their slope is eighteen (18) per cent or greater. Steep slopes other than riverbanks, lake banks and bluffs that are less than ten (10) feet in height shall not be regulated by this section. (84-Or-226, § 1, 11-21-84)

560.40. Shoreland alteration; grading and filling. Any alteration of the natural topography where the slope of the land is toward a protected water or a watercourse leading to a protected water must be authorized by a permit issued by the zoning administrator. The permit may be granted subject to the following conditions:

(1) The smallest amount of bare ground is exposed for as short a time as feasible.

(2) Temporary ground cover, such as mulch, is used and permanent ground

cover, such as sod, is established.

(3) Methods to prevent erosion and trap sediment are employed.

(4) Fill is stabilized to accepted engineering standards.

(5) Any work which will change or diminish the course, current or cross-section of a protected water or wetland shall be approved by the commissioner of natural resources, and such approval shall be construed to mean the issuance by the commissioner of natural resources of a permit under the procedures of Minnesota Statutes, Section 105.42 and other related statutes.

(6) In no case may the top of a riverbank or lake bank be moved closer to the protected water or watercourse. (84-Or-226, § 1, 11-21-84)

560.50. Vegetation. Removal of natural vegetation on steep slopes and their adjacent setbacks in the shoreland district must be authorized by the zoning administrator subject to these conditions:

(1) Clear cutting of natural vegetation is prohibited, except as necessary for placing public roads, utilities, structures and parking areas where these uses are permitted. This does not prohibit the cutting, killing or removal of noxious weeds. Removal of dead or diseased vegetation is also permitted.

(2) Selective removal of natural vegetation is allowed, provided that sufficient vegetative cover remains to screen cars, dwellings and other structures when viewed from the water. Selective cutting of trees greater than four (4) inches in diameter may be permitted when cutting is appropriately spaced and staged so that a continuous natural cover is maintained.

(3) Natural vegetation shall be restored insofar as feasible after any construction project is completed to retard surface runoff and soil erosion and provide screening. Restoration shall be completed as soon as feasible, but in no case later than the beginning of the next growing season following the completion of a project.

(4) Adequate erosion protection measures, such as trees and vegetation plantings on slopes, and other devices such as plazas, terraces and retaining walls, must be used to ensure that soil loss levels do not degrade the protected water body. (84-Or-226, § 1, 11-21-84)

560.60. Shoreland alteration; slopes and bluffs. (1) Developments on riverbanks and bluffs are prohibited. On other steep slopes in the shoreland district where there is already development on the steep slope within five hundred (500) feet, new structures and additions to existing structures that would extend closer to the protected water may be allowed by conditional use permit. For structures that are already built on steep slopes, other than riverbanks or bluffs, no conditional use permit is required to add to the height or add to the structure if the addition is on the side of the structure away from the protected water. Any development must be set back at least forty (40) feet landward from the top of the slope, unless a variance has been granted subject to conditions of Chapter 525.

(2) Developments shall be permitted on slopes of twelve (12) per cent to eighteen (18) per cent, subject to the following conditions:

(a) The foundation and underlying material of any structure should be adequate for the slope condition and soil type.

(b) The proposed development presents no danger of falling rock, mud, uprooted trees or other materials.

(c) The view of the developed slope from the river and opposite riverbank is consistent with the natural appearance of the undeveloped slope, with any historic areas nearby, and with surrounding architectural features.

(3) Special riverbank provisions. The following uses are permitted on riverbanks or bluffs of any degree of slope, provided they do not cause a hazard to river navigation:

(a) Recreation facilities developed by the city.

(b) Barge terminal developments.

(c) Locks and dams.

(d) Bridge abutments.

(e) Private and public docks.

(f) Marinas.

(g) Observation platforms.

(h) Excavation to provide access to underground space development.

(4) Where appropriate, trees and other plant material should be used to improve the appearance of the district.

(5) Vegetation and/or pruning to increase visual contact with the river and to open up scenic views is allowed.

(6) No significant alteration of the character or massing of the vegetation is permitted. Except in the case of activities identified in this section, clear cutting of trees or shrubs is prohibited. (84-Or-226, § 1, 11-21-84; 95-Or-189, § 2, 12-29-95)

560.70. Underground space access. No provision in this section is intended to prohibit the excavation of any steep slope or bluff along the Mississippi River for the purpose of creating access to future underground space developments. (84-Or-226, § 1, 11-21-84)

560.80. Height of structures. The maximum height for one- and two-family houses and townhouses shall be as specified in the underlying zoning district regulations. The maximum height for any apartment or commercial structure shall be as follows:

(1) Two and one-half ($2^1/_2$) stories or thirty-five (35) feet (whichever is less) unless the developer can demonstrate that the project does not shade or shadow any one- or two-family home in an R1 through R2B district for more than one and one-half ($1^1/_2$) hours on December 21 between the hours of 10 a.m. and 2 p.m. If no shadows are cast upon the one- and two-family homes in an adjacent R1 or R2 district, then the height limits shall be as follows:

(a) Sixty (60) feet when the structure is located within the first block back from the lake, creek or river and its park grounds in that part of the shoreland described as follows: Beginning at the west city limits thence east along Lake St. to the Soo Line tracks, thence east along the tracks to a point 150 feet east of Thomas Av, thence south to Lake St, thence west along Lake St to Excelsior Blvd, thence west along Excelsior Blvd to the west city limits, thence north to the point of beginning.

(b) Two and one-half ($2^1/_2$) stories or thirty-five (35) feet (whichever is less) in that part of the shoreland area that is not in the area described in (a) above when the structure is located within the first block from the lake, creek, or river and its park grounds.

For the purpose of this ordinance, the first blocks that are affected by this regulation are those (measured at a right angle to the lake, creek, or river [amenity]) that contain private property either contiguous to the amenity or separated from the amenity by a street, highway, or parkway. Also, for the purpose of this ordinance, the limitations above shall not apply to the downtown riverfront between Plymouth Av and I-35W or the east bank of the river from First Av NE to Central Av. Nor shall the limitations above apply to any project located within the shoreland which is limited in height to twelve (12) stories, including parking, or to the height of the now existing Calhoun Beach Club building, whichever is less, where in addition a concept plan, and any required environmental studies and reports, was submitted to the planning department prior to April 5, 1988. A concept plan and any required environmental studies and reports for any such exempt project may be amended, revised, or resubmitted in response to and in order to comply with the above height requirements without affecting the exemption. Nor shall the limitations above apply to any project located wholly or in part within the shoreland which has previously received final concept plan approval from the city council. A concept plan which has received such final approval, and any required environmental studies and reports for any such project may be amended, revised, or resubmitted, without affecting the exemption. Furthermore, the height shall be measured from the point at which the building, including parking, first extends above ground. (84-Or-226, § 1, 11-21-84; 88-Or-097, § 1, 5-13-88; 95-Or-189, § 3, 12-29-95)

Chapter 6

Technical Appendix for Libraries

Adopted by City Council and Mayor: March 2000

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Printed by Minneapolis Public Library, a MELSA Library, September 1997

MINNEAPOLIS PUBLIC LIBRARY

<Mission>

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The Minneapolis Public Library (MPL) is the community's resource for **information and knowledge** and a source of **community pride** and **economic stimulation**.

In a democratic society that depends on the free flow of information, the library system, with its central facility and community libraries, is the key public institution and most visible **symbol of democracy** and the importance of education, lifelong learning, and **intellectual freedom** in the city of Minneapolis.

The library is the **pivotal information, education, and cultural resource** for the people of the community.

<Values>

In fulfilling this mission, the Minneapolis Library Board of Trustees and library staff affirm our responsibility to:

- create and safeguard open and equitable access to information
- be responsive to the community's changing interests and needs
- respect the diversity and safety of customers
- serve everyone with courtesy and dignity

We are committed to continuing our tradition of providing excellent collections and preserving cultural heritage as an investment for future generations.

We value the work we do in facilitating the continuous learning and competency necessary for a literate and productive society and are inspired by connecting people to the information and knowledge they need to be successful at work, in school, and in their personal lives.

We cultivate staff knowledge, expertise, and teamwork to provide the organization of information and assistance required for timely and accurate delivery of materials and information.

<Goals>

The Library's **primary purpose is to ensure access to information.** The Library has identified six major goals of equal importance to the fulfillment of its mission, values, and purpose.

TECHNOLOGY: Ensure customer access to digital information and improve internal operations by expanding technological capability.

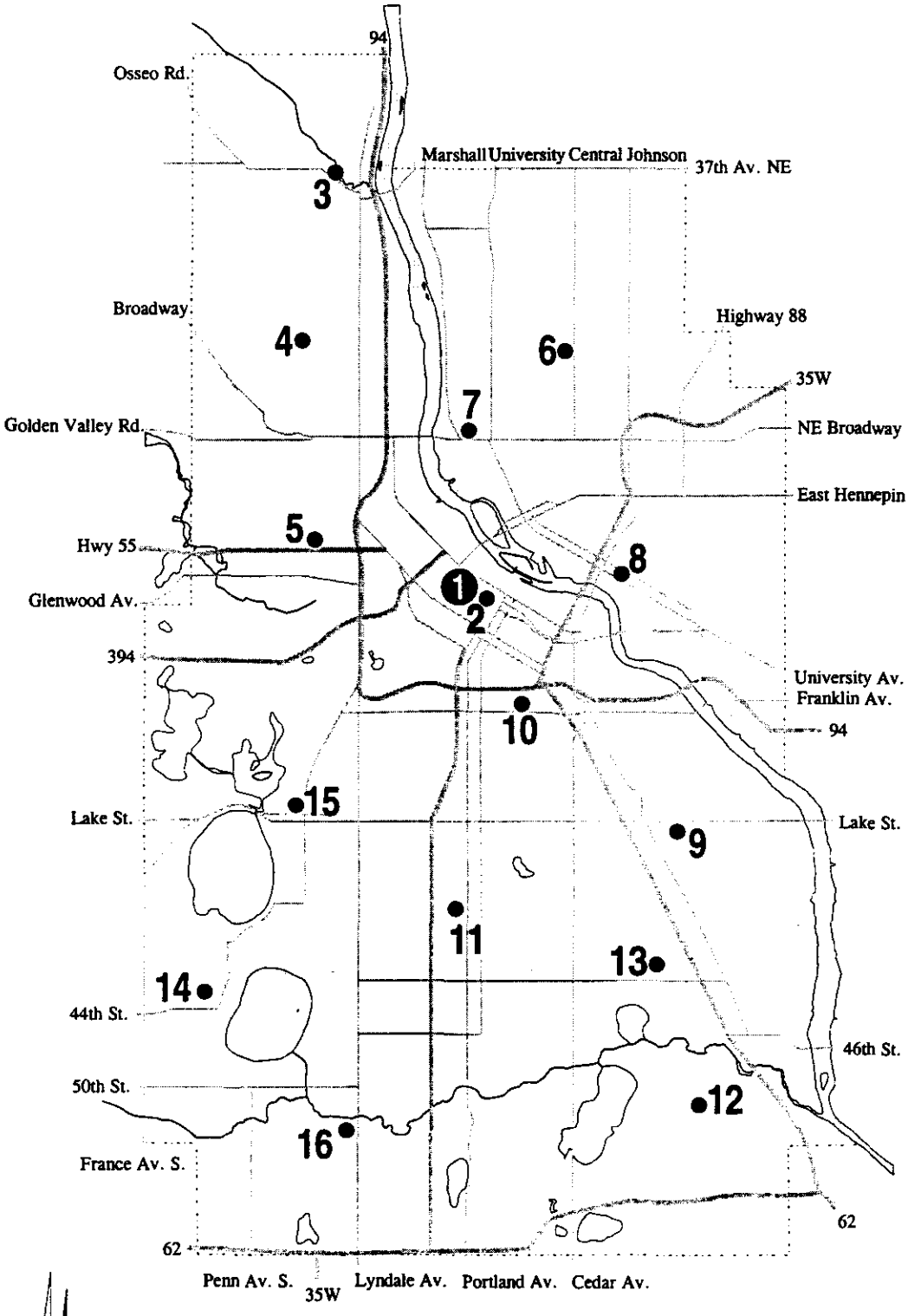
SERVICES: Design services and programs in response to needs resulting from demographic and societal changes in Minneapolis.

COLLECTION: Ensure the integrity of the MPL collection as a major community investment.

INFORMATION SERVICES: Enhance information services that contribute to a strong Minneapolis economy.

FUNDING: Secure new funding sources to augment basic, tax-supported library service.

FACILITIES: Ensure safe, accessible, and well-maintained library facilities that contribute to the civic pride of Minneapolis, preserve historical integrity, and are designed to be a community focus for education, information and culture.



Downtown
1 Central
2 Municipal Library

North Sector
3 Webber Park
4 North Regional
5 Sumner

Northeast & Southeast Sector
6 Northeast
7 Pierre Bottineau
8 Southeast

South Sector
9 East Lake
10 Franklin
11 Hosmer
12 Nokomis
13 Roosevelt

Southwest Sector
14 Linden Hills
15 Walker
16 Washburn

Citywide
Bookmobile

minneapolis
city of lakes

1 mile
1 kilometer

source: Minneapolis Public Library

Minneapolis Public Library Locations

map 3.6.1

Chapter 7

Technical Appendix for the Energy Plan

Adopted by City Council and Mayor: March 2000

Minneapolis ENERGY PLAN

PASSED BY CITY COUNCIL 5/10/96

MINNEAPOLIS ENERGY PLAN

CONTENTS

ACKNOWLEDGEMENTS..... 1

INTRODUCTION 2

MUNICIPAL ENERGY EFFICIENCY.....3-7

RESIDENTIAL ENERGY EFFICIENCY..... 8-9

COMMERCIAL/INDUSTRIAL ENERGY EFFICIENCY..... 10-12

TRANSPORTATION EFFICIENCY..... 13-18

NOTES..... 19-21

IMPLEMENTATION SCHEDULE.....22-23

APPENDIX A

Table 1: Local Government Energy Conservation Program (LGECP) Flowchart 24

Table 2: LGECP Results Worksheets.....25-27

ACKNOWLEDGEMENTS

..ıe Minneapolis Energy Plan is the product of many individuals, City of Minneapolis departments and agencies, nonprofits and utilities. In particular, the Energy Plan resulted from the cooperative efforts of the City of Minneapolis Inspections Division in the Department of Regulatory Services, Planning Department, Public Works Department, Minneapolis Park and Recreation Board, Department of Health and Family Support and the Minneapolis Community Development Agency. The directors of these six City entities comprise the Minneapolis Environmental Coordinating Team (ECT). It is under the auspices of the ECT that this Plan is submitted to the Mayor of Minneapolis, Sharon Sayles Belton, Minneapolis City Council President Jackie Cherryhomes and City Council Members.

Additionally, invaluable assistance with the development of this Plan has been provided by Hennepin County, the Minneapolis Neighborhood Revitalization Program, the Downtown Minneapolis Transportation Management Organization, Northern States Power and Minnegasco, who have contributed considerable staff time and resources to this ongoing project, as well as the Center for Energy and Environment and the Citizens Environmental Advisory Committee. The basis for much of this document can be found in the Minneapolis/Saint Paul Urban CO2 Reduction Project. The International Council for Local Environmental Initiatives, the Urban Consortium Energy Task Force, the U.S. Department of Energy and both Argonne and Oak Ridge National Laboratories have also provided ongoing technical assistance. The University of Minnesota and the Minnesota Department of Public Service have reviewed and commented on the plan.

The City of Minneapolis also wishes to acknowledge the cooperation and assistance received from the cities of Saint Paul, San Francisco, Portland and Seattle.

INTRODUCTION

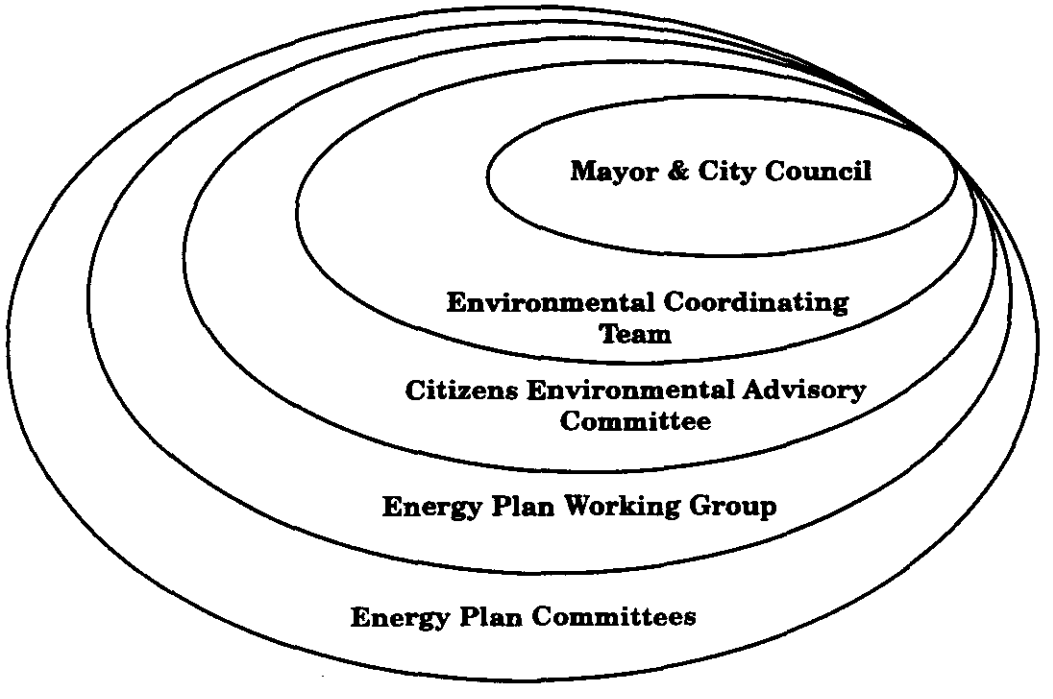
The City of Minneapolis has a direct interest in promoting and implementing energy efficiency measures that save future taxpayer dollars and improve the local economy and environment.

The Minneapolis Energy Plan represents an ongoing effort to implement energy efficiency initiatives that are deemed cost effective, feasible and consistent with the City's Directions Framework and other relevant City policies.

The Minneapolis Energy Plan was developed to integrate energy conservation initiatives through a flexible framework of goals, objectives, strategies and identification of resources which address the four energy sectors of the urban economy identified as Municipal, Residential, Commercial/Industrial and Transportation.

Development of the Energy Plan was facilitated by the Energy Working Group. Implementation of the plan is being undertaken by the four energy committees (meeting on an ad hoc basis) who have expressed an ongoing committment to enact the Plan's various strategies. This improved interdepartmental and intergovernmetnal coordination occurs under the aegis of the Environmental Coordinating Team (ECT), the Citizens Environmental Advisory Committee, the City Council and Mayor.

MINNEAPOLIS ENERGY PLAN : DECISION-MAKING PROCESS



I. MUNICIPAL ENERGY EFFICIENCY

The municipal component of the Minneapolis Energy Plan focuses on accomplishing energy conservation measures for municipal buildings and operations. Previous studies (Great Lakes Municipal Energy Collaborative - 94' and City as Example- 94') estimated that the City can save 10 - 20% on its energy costs. It is the City's intent to serve as a positive example for others to follow.

GOAL 1: Increase energy conservation in building management operations.

In 1988, the City began raising the overall condition of its buildings by committing an annual appropriation of City net debt bonds to fund capital improvement projects. This ongoing effort allows Public Works to increase energy efficiencies in many City owned buildings by including "deep" energy retrofit projects with payback periods that would not be justifiable based on energy savings alone. Typically, 75% of the $1.0M to $1.5M annual Building and Facility Capital Improvement Program appropriation deals with projects affecting energy issues, including window systems, roof systems, HVAC systems, lighting upgrades, and weather stripping. The City continues to benefit from savings resulting from these capital efforts.

Objective A: Reduce energy use in City owned buildings.

Strategies:

1. Continue deep energy retrofit projects through the City's annual Building and Facility Capital Improvement Program appropriation.

   Resources: The Municipal committee of the Energy Working Group will review and explore viable energy saving projects.

   Time line: 1996 - ongoing

2. Energy audits of selected municipal buildings will be conducted and bids will be let for the installation of energy retrofits with a confirmed payback of ten years or less. The City will continue to participate in Northern States Power Company's Local Government Energy Conservation Program to improve its facilities and operations by reducing energy costs without an up-front capital expenditure from City funds.

   See Minneapolis Energy Plan Appendix A:
   Table 1: Local Government Energy Conservation Program Flowchart (LGECP)
   Table 2: LGECP Results Worksheet

   Note: Information updated on an ongoing basis.

   Resources:
   1. Local Government Energy Conservation Program (NSP)

   Time line: 1995 - termination of NSP's Local Government Conservation Program.

3. Participate in Minnegasco's Conservation Improvement Program (CIP) whereby energy audits are provided for building mechancial systems to identify qualifying energy efficiency upgrade projects. Projects that are funded as part of the City's Building and Facility Capital Improvement Program will qualify for rebates from Minnegasco.

   Note: Information updated on an ongoing basis.

   Resources:
   1. Conservation Improvement Programs (Minnegasco)

   Timeline: 1995- Termination of Minnegasco CIP

Objective B: Document Energy Savings for municipal buildings.

Strategy:

1. Determine actual energy savings for municipal buildings which are part of the LGECP program.

   Resources: Public Works General Services Division's *Building Energy Information System,* City Net, NSP and Minnegasco.

   Time line: 1996 - ongoing

Objective C: Create an energy reinvestment fund from municipal energy savings to continue energy conservation projects for municipal buildings.

Strategy:

1. Create an energy reinvestment/revolving loan fund based upon actual energy savings to finance municipal building retrofits

   Resources: The Municipal committee of the Energy Working Group will develop the energy reinvestment fund and applicable disbursement guidelines.

   Time line: 1997

Objective D: Create energy saving opportunities by improving Municipal investment and purchasing decisions.

Government procurement on the state and local levels amounts to approximately 12 percent of .e U.S. gross national product[1]. Government investment and procurement strategies should increase municipal energy savings and encourage industry to manufacture more energy efficient and environmentally sound products.

Strategy:

1. Explore developing a centralized energy purchasing strategy for the City to improve accountability for actual usage and cost control.

   Resources: The Municipal committee of the Energy Working Group will consult available information and expertise and assess the feasibility and implications of a centralized energy purchasing strategy for the City.

   Time line: 1996 - 1997

2. Design and implement municipal purchasing guidelines that promote energy conservation and source reduction investments[2]. The purchasing guidelines should include the following:

   - Product life cycle costs of 10 years or less.
   - A ten percent price allowance for energy efficient/renewable energy projects.
   - Increased purchases of energy efficient products which are indigenously produced.
   - Joining a buying consortium or purchase through state contracts to reduce the costs of recycled products.
   - Provide staff incentives to encourage purchases of energy efficient products.

   Resources: The Municipal committee of the Energy Working Group will develop and implement municipal purchasing guidelines.

   Time line: 1996-1998

3. Create a purchasing guide illustrating low energy intensity products for distribution among the various municipal purchasing units.

   Resources: The Municipal committee of the Energy Working Group will develop and distribute a purchasing guide.

   Time line: 1996-1998

4. Require all municipal construction projects which receive public financing to meet stringent building energy efficiency standards for projects with a 10 year payback or better[3].

   Resources: The Municipal committee of the Energy Working Group will work to ensure that all municipal construction projects which receive public financing meet stringent building energy efficiency standards.

   Time line: 1996 - ongoing

5. Hold energy saving competitions between municipal buildings similar to those conducted at the University of Minnesota's Building Energy Efficiency Program to help educate staff on appropriate measures.

   Resources: The Municipal committee of the Energy Working Group will develop and conduct energy saving competitions between municipal buildings .

   Time line: 1997 - ongoing

Objective E: Increase urban tree planting to sustain and improve the urban forest of the City.

Trees and other foliage shelter buildings, effectively reducing fuel consumption needed for heating and cooling. Strategic planting of deciduous trees can substantially reduce air conditioning energy demand while minimizing the reduction in winter solar gain (i.e. heating).

Strategies:

1. Establish a dedicated tree planting fund within the Minneapolis Park Board budget.

   Resources: The Park Board will establish a dedicated tree fund within its annual budget.

   Other potential resources include:

   - Minnesota Department of Natural Resources Metro Forestry Divisions' Minnesota ReLeaf Community Forest Program. Under this program, local units of government (municipal, township, school district, and other legal local governmental entities) and nonprofit organizations with a 501 (c) (3) status can apply for program funds.
   - Minneapolis Neighborhood Revitalization Program (NRP) Neighborhoods have invested in tree planting projects on boulevards and City parks.
   - The Cool Communities program of American Forests.
   - The Minnesota Shade Tree Advisory Committee and the Minnesota Extension Service.

   Timeline: 1996 - ongoing

2. Reexamine the Minneapolis Park Boards' Reforestation Plan to ensure its continued relevance and applicability as a tree planting blue print for the City.

   Resources: The Minneapolis Park Board and the Municipal committee of the Energy Working Group will review the Reforestation Plan.

   Timeline: 1996

3. Reduce the need to replace trees due to "line clearance" in conjunction with an agreement with NSP to voluntarily bury power cables when possible.

   Resources: The Minneapolis Park Board will work closely with NSP to alleviate tree/power line conflicts.

   Timeline: 1996 - ongoing

Objective F: Reduce the amount of electricity used by City street lights.

Strategy:

1. Continue to develop/study photocell prototypes that will reduce unnecessary street lighting.

   Resources: University of Minnesota, Public Works and NSP will work to develop and test photocell prototypes.

   Timeline: 1995-1996

II. RESIDENTIAL ENERGY EFFICIENCY

The residential section of the Minneapolis Energy Plan focuses on creating energy saving opportunities by increasing education and services delivery to renters, homeowners and rental property owners. Minneapolis will work to facilitate and market existing and new energy conservation program information and promote a practical standard for making cost-effective energy conservation improvements in the housing sector.

GOAL 1: Maximize opportunities to increase energy efficiency in the residential sector.

Objective A: Promote energy efficiency improvements for new construction and rehab of single, multi-family and rental housing.

Strategies:

1. Promote cost-effective energy standards for new and existing single, multi-family and rental properties.

   Resources: Minneapolis Inspections Division will promote practical, cost-effective energy standards in the course of performing plan review and field inspection, and provide information to renters, homeowners and residential property owners on energy saving programs, products/materials, rehab and new construction techniques.

   Timeline: 1996-Ongoing

2. Develop and integrate a home energy rating program for new/existing housing that recognizes and rewards energy efficiency improvements in residential construction.

   Resources: The Residential committee of the Energy Working Group will work to integrate an energy "star" rating system for the Minneapolis residential sector.

   Timeline: 1996-Ongoing

3. Explore opportunities for developing energy conservation programs that focus on the residential sector of Minneapolis.

   Resources: The Residential committee of the Energy Working Group will explore developing applicable energy improvement programs for the residential sector of Minneapolis.

   Timeline: 1996-Ongoing

4. Institute a training program for City Inspectors on the R-2000 Home Program Technical Requirements for new construction of one and two family residences by 1998[4].

   Resources: The Minneapolis Inspections Division will monitor DPS' efforts to develop a training program that could be used for educating Minneapolis Inspectors on the R2000 Home Program Technical Requirements of the Minnesota Energy Code.

   State funding will also be pursued to provide the necessary budget for this project in combination with internal funding from the inspections department.

   Timeline: 1996 - ongoing

5. Better utilize existing energy efficient mortgage programs in conjunction with area financial institutions.

   Qualifying home buyers can include 100 percent of the cost of needed, cost-effective energy improvements into their home mortgage at the time of purchase or refinance, when the improvements can be documented to pay for themselves by lowered utility bills.

   Resources: The Residential committee of the Energy Working Group will work to promote the use of energy efficient mortgage programs.

   Timeline: 1996-1997.

Objective B: Improve accessibility of residential energy loan and grant programs to owners of single, multi-family and rental properties.

Strategies:

1. Integrate existing energy conservation programs and services into neighborhoods involved in Neighborhood Revitalization Program (NRP) planning activities. Promote audits for any residential structure receiving property improvement financing from the MCDA and the NRP.

   Resources: Inspections, MCDA, and NRP will distribute the *Residential and Commercial / Industrial Energy Programs* guide/flyers to NRP neighborhoods and educate residents and neighborhood organizations on the use of the Guide.

   Timeline: 1995-Ongoing

III. COMMERCIAL/INDUSTRIAL ENERGY EFFICIENCY

The commercial/industrial sector comprises one of the largest users of energy in Minneapolis. This component of the Minneapolis Energy Plan will focus on strategies that increase the efficiency of current energy saving programs by improving outreach efforts to the private/public sector to maximize energy saving opportunities. Additionally, this

GOAL 1: Increase commercial/industrial and institutional energy efficiency.

Objective A: Increase accessibility of energy loan and grant programs to commercial/industrial property owners.

Strategy:

1. Integrate existing energy conservation programs and services into neighborhoods involved in Neighborhood Revitalization Program (NRP) planning activities. Promote audits for any commercial/industrial project receiving financing from the MCDA and the NRP.

   Resources: Distribute the *Residential and Commercial/Industrial Energy Programs* guide to NRP neighborhoods and educate neighborhood organizations and businesses on the use of the Guide.

   Time line: 1995-ongoing

Objective B: Develop pollution prevention (P2) partnerships to reduce source pollution and increase energy conservation.

"Environmental costs can be reduced or avoided through P2 practices such as product design changes, input materials substitution, process redesign, and improved operation and maintenance (O&M) practices"[5]. Studies show that "the average savings per P2 project was $3.49 for every dollar spent" for companies with some type of environmental cost accounting program[6].

1. Approach commercial/industrial businesses with pollution prevention assistance that promotes energy and water conservation, encourages hazardous/solid waste source reduction and promotes environmental cost accounting methods.

   Resources: The MPLS Environmental Section will work with Hennepin County Hazardous Waste Division, Office of Environmental Assistance (OEA) , MN Technical Assistance Program (MNTAP), MCDA, the NorthEast Business Association, NSP, Minnegasco and other interested organizations to develop partnerships that facilitate pollution prevention activities for commercial/industrial businesses.

   Timeline: 1995 - ongoing

Objective C: Increase effectiveness of new and existing commercial/industrial energy efficiency programs in Minneapolis.

Strategies:

Develop MCDA "pilot" development projects to provide energy efficiency information and determine if sufficient financing is available to make energy improvements[7].

Resources: The Commercial/Industrial committee of the Energy Working Group will determine applicable pilot projects.

Timeline: 1996 - ongoing (follow-up steps will be based on results of pilot projects)

2. Improve information distribution to business customers to better promote available energy programs/resources and financing.

   Resources: MCDA's Business Link and the Minneapolis Environmental Section's Business Assistance Team will provide energy efficiency information to local businesses.

   Timeline: 1995 - ongoing

3. The City, MCDA, NSP and Minnegasco, will work to define the current level of energy efficiency improvements/savings that have been achieved by Minneapolis businesses.

   Resources: The Commercial/Industrial subcommittee of the Energy Working Group will work to quantify energy savings and develop energy improvement goals for the commercial/industrial sector.

   Timeline: 1996-1997

Objective D: Expand district heating, cooling and cogeneration systems in Minneapolis.

District Heating/Cogeneration: Minneapolis has an extensive district heating system which offers opportunities for cogeneration of heat and electricity. Typical electricity production efficiency is 35-50 percent. If the waste heat generated in the process can be used (as it is in cogeneration), then overall production efficiency of the heating system and generating electricity can be increased to 70 percent or more.

District Cooling: District cooling is available to only a small fraction of the downtown area. Expanding district heating/cooling systems will lower installation and maintenance costs. District cooling systems distribute chilled water, replacing air conditioners using chlorofluorocarbons (CFC's)[8], decreasing electricity demand in peak times, and eliminating ground water cooling systems.

Strategy:

1. MCDA will continue to work with the Minneapolis Energy Center to incorporate district heating/cooling in MCDA supported developments when the customer can benefit by reduced heating/cooling costs.

   Resources: MCDA and the Minneapolis Energy Center determine district heating/cooling opportunities on a customer-case by case basis.

   Timeline: 1995 - ongoing

Objective E: Initiate Integrated Resource Planning

Integrated Resource Planning (IRP) provisions in the Energy Policy Act of 1992 expand and increase competition by broadening the field of electricity producers and utility service providers. IRP efforts seek to assure that utilities provide safe, reliable and cost effective service to customers. In Minnesota, the costs and benefits of providing utility services to customers will soon include quantifying external, indirect costs (environmental and health related issues), as a means of comparing alternative generating options for new power.

Regional IRP may take on increased importance in light of the deregulation of the electric and gas utility industries. Utility mergers and subsequent market structures which occur on a multi-state level will redefine the efficacy/relevance of regulatory oversight and the degree of financial commitment dedicated towards Conservation Improvement Programs.

Strategy:

1. The City will work with the Center for Energy and Environment (CEE), The City of St. Paul, the Public Utilities Commission (PUC), the Department of Public Service (DPS), NSP and Minnegasco to guide utility decision making, helping to insure that utilities provide safe, reliable, cost effective service to the customer.

   Resources: The City, CEE, St. Paul, PUC, DPS, NSP, and Minnegasco.

   Timeline: 1995 - ongoing

2. Demand Side Management Programs that offer greater individualized energy initiatives to commercial/industrial businesses and institutions will be strengthened and continued.

   Resources: Minnegasco, NSP and the PUC.

   Timeline: 1995 - ongoing

3. Training programs for businesses and institutions on operation and maintenance, energy accounting, life-cycle costing and other energy efficiency system management practices will be continued and expanded.

   Resources: The Commercial Development Committee of the Energy Working Group will review available programs and resources.

   Timeline: 1995 - ongoing

Objective F: Promote development of environmental and energy conservation related businesses.

Strategy:

1. Encourage development of and financial support for "green" and energy efficient businesses and businesses that produce and sell energy conservation products.

   Resources: The City, MCDA and NRP.

   Timeline: 1996 - ongoing

IV. TRANSPORTATION EFFICIENCY

Increasing the efficiency of the transportation system is important for several reasons. First, transportation is a major contributor to air emissions and pollution problems in the region. Second, congestion on roads during rush hours continues to worsen, resulting in longer commuting times[9], decreases in productivity and increases in worker stress. Finally, transportation energy costs have a major impact on the local economy[10].

Several problems contribute to the regional transportation dilemma: high numbers of single occupant vehicle trips, increasing numbers and distance of trips and sprawling suburbs. As a result, it is very important for the City to work with the Downtown Minneapolis Transportation Management Organization, Hennepin County, the City of St. Paul, Metropolitan Council, MNDOT, the suburbs and the State to develop a common vision and policies to increase local and regional transportation efficiency.

Federal and State funding subsidies for transportation projects are entering a period of austerity. Plans for Light Rail Transit (LRT) and major interstate corridor projects are threatened. The goals and accompanying objectives and strategies provide an opportunity to take stock of current transit policies/programs and will help increase transportation efficiency to further enhance the quality of life for those who live, work and visit Minneapolis.

GOAL 1: Change the mix of Minneapolis' transportation sector to increase transportation efficiency as much as possible.

Objective A: Support the Downtown Minneapolis Transportation Management Organization (TMO) whose goal is to "...promote efficient and environmentally sound transportation networks in order to assure the continued growth and prosperity of the downtown area."[11]

Concerns over worsening congestion[12] and air quality in downtown prompted the Minneapolis City Council, in June 1991, to become one of the first political bodies in the nation to establish a transportation management organization in the central business district.

The implementation of the Downtown Transportation Management Plan, as approved by the Minneapolis Planning Commission in 1993, is being coordinated in part by the TMO. The goals and strategies contained therein provide a ready platform and guide to increase downtown transportation efficiency.

Strategy:

<u>EMPLOYER OUTREACH</u>

1. The City supports the continued development and expansion of the Downtown Minneapolis TMO program as it works with relocating and existing businesses to design travel demand management (TDM) strategies that are tailored to their corporate culture and the commuting needs of their employees[13].

   Resources: Representatives of the City; downtown retailers, developers, service industries, and parking facilities; the Downtown Council; and the Minneapolis Building Owners and Managers Association participate in the TMO.

   Timeline: 1993 - ongoing

Objective B: Increase and promote the use of alternatives to driving alone.

Strategies:

EDUCATIONAL

1. Increase transit ridership by developing stronger partnerships with the Metropolitan Transit Education Committee (MTEC), TMO, and MCTO. Provide all new employees with information about alternatives to driving alone.

   Resources: A Transportation subcommittee of the energy working group will support the efforts of the TMO and MCTO to develop educational campaign materials that strengthen transit ridership.

   Timeline: 1996 and beyond

PUBLIC TRANSIT

2. Develop more designated lanes for buses to decrease travel time on busy arterials.

   Resources: The City has identified streets for future bus lanes and in the near future, some freeway entrances from the downtown area may have exclusive lanes for buses/HOV use.

   Timeline: 1997 and beyond

3. Increase bus capacity in downtown during peak hours through such services as the Nicollet Mall Shuttle.

   Resources: Transportation Engineering, Downtown TMO, Downtown Council, MCTO.

   Timeline: 1996 and beyond

4. Advocate for dedicated transit funding to keep transit fares low and improve services through a strong lobbying effort at the legislature and with the governor.

   Resources: Minneapolis City Council, Minneapolis Downtown Council and Minneapolis Downtown TMO.

   Timeline: 1995 - ongoing

5. Work with the Downtown Minneapolis TMO and other governmental agencies (MCTO, MN Rideshare, MNDOT, Hennepin County) to sponsor special events and programs on a regular or monthly basis that encourage the use of alternative transportation options.

   Resources: The Transportation subcommittee of the Energy Working Group will work to develop special events and programs such as B-BOP and voluntary no drive days that reduce individual automobile use.

   Timeline: 1997 and beyond

6. Develop a "drive or bus system" at City parking garages that allows those who regularly drive 3-5 days per week and pay monthly parking fees to receive prorated credit for those days when they don't need to drive and opt for taking the bus instead.

Resources: The Transportation subcommittee of the Energy Working Group will work to develop options for implementation.

Timeline: 1996-1997

CARPOOL/VANPOOLING

7. One of the mandatory elements of the Local Comprehensive Plans required by the Metropolitan Council's Transportation Plan suggests many tools that Minneapolis could use including legislation and community ordinances for incentives such as:

- Providing tax incentives to building owners for providing parking rate discounts or preferential parking spaces for carpool/vanpoolers.

Increasing the availability of :

- Passenger waiting areas at major employment centers.
- Provide discount parking for carpoolers/vanpoolers. As part of this strategy:
  - Parking validation systems can be made more modal-neutral and offer free bus tokens as an alternative to paid parking. If a parking benefit is offered, a cash-equivalent commuting allowance can be offered to workers who use other modes.

    Providing employees with pre-tax transit passes (draft legislation that allows governmental entities to exclude from taxation up to $65.00 per month from a participating employee's paycheck if it is used for the purchase of a transit pass) should be considered by the City.

  - Employers could reduce parking subsidies that they provide to employees[14] and only offer free parking to those who carpool/vanpool

    City policies regarding under what conditions employees receive free parking would be reviewed).

  - Additional research can be conducted to review preferential HOV pricing strategies in public and private parking spaces.
- Ramp bypass and HOV lanes

Resources: The Transportation subcommittee of the Energy Working Group will review these strategies, develop recommendations and establish criteria for their implementation

Timeline: 1996-1997

8. Provide incentives to parkers who are involved in carpooling and vanpooling.

The Department of Public Works Transportation Division continues to provide leadership in recommending various incentive programs to individuals or groups who wish to car pool or vanpool. These programs are City, state, and/or federally subsidized programs. These subsidies, along with higher single occupant vehicle (SOV) prices allow these programs to continue.

Resources: Public Work's Transportation, MnDOT, FHWA, Minnesota Rideshare

Timeline: Ongoing.

BICYCLING

8. Encourage extensions to existing bike route/lane systems.

The Minneapolis City Council passed a Commuter Bikeways System Plan in 1992 to increase the percentage of City bicycle trips (currently comprising 1.5% - 2% of the total transportation modes used in the City). As part of this strategy:

- Provision should be made for biking safety and accessibility by creating:
  - Secure bike parking/showering facilities.
  - Rewards/incentives for building owners and managers who provide secure bicycle parking per zoning code revision.
  - Continued funding for bicycle routes and trails in the City.

Resources: The Transportation subcommittee of the Energy Working Group will review these strategies and develop recommendations/criteria for their implementation

Timeline: Ongoing

Objective C: City of Minneapolis as a model employer.

Strategies:

1. Institute a guaranteed ride home program. Public funds would pay for a cab ride home for a City employee who misses the bus or the car pool ride because they are required to work occasionally during abnormal hours or in the case of an emergency.

The State is already sponsoring a pilot program for the users of I-394 using both state and federal funds. Similar subsidies might be available for a City program.

Resources: The Transportation subcommittee of the Energy Working Group will review the State's pilot program and develop recommendations and establish criteria for developing a guaranteed ride home program in Minneapolis.

Timeline: 1997

2. Establish guidelines for employee telecommuting to reduce energy consumption, traffic congestion and wasted employee driving time.

   Resources: The Transportation subcommittee of the Energy Working Group will monitor Hennepin County's efforts to implement a telecommuting program, work with the MPLS' Information Technical Services (ITS) office to develop City guidelines for City Net users outside of MPLS facilities for the purpose of telecommuting and work with ITS to develop a city wide telecommuting center of excellence.

   Timeline: 1997

3. Provide a generic commuting coupon that adds incentive to taking the bus, carpooling or vanpooling.

   Resources: The Transportation subcommittee of the Energy Working Group will determine project cost/feasibility.

   Timeline: 1997

4. Reduce car pool parking costs.

   Resources: The Transportation subcommittee of the Energy Working Group will determine project cost/feasibility.

   Timeline: 1997

5. New employee information/incentives.

   Resources: The Transportation subcommittee of the Energy Working Group will determine project cost/feasibility.

   Timeline: 1997

GOAL 2: Reduce transportation energy use in City fleets and non-passenger vehicles.

Objective 1: Promote driver training/maintenance programs with fuel efficiency as the goal.

Studies estimate that teaching drivers to drive safely and economically can achieve a 30 percent short term reduction in fuel consumption and a long term reduction of about 15 percent[15].

Strategy:

1. Promote drivers education and maintenance programs which teach efficient driving techniques and best vehicle maintenance practices to the public/private sector.

   Resources: The Transportation subcommittee of the Energy Working Group will work to integrate driver's education and maintenance programs into City and private sector operations.

   Timeline: 1997

GOAL 3: Coordinate and accelerate the percentage of vehicles used in Minneapolis that are powered by alternative fuels (other than petroleum based fuel).

Minnesota Statutes 216C.40 Subdivision 1 was created to encourage the use of alternative fueled vehicles, stating:

> "It is in the long term economic, environmental and social interest of the State of Minnesota to promote the development and market penetration of alternative fuel vehicles that reduce harmful emissions from motor vehicles...so as to assist in attaining and maintaining healthful air quality, to provide fuel security through diversity of alternative fuel supply sources and to develop additional markets for indigenous crop-based fuels."

Objective A: Participate in the Clean Fuels Minnesota (Clean Cities) program.

A committee structure has been established through the MN Department of Public Service (DPS) for Clean Fuels Minnesota, to engage in a fuel neutral effort to get Alternative Fueled Vehicles (AFV) "on the roads of Minnesota." The City of Minneapolis is a member on the Steering Committee whose principle task is to assure implementation of the program. Standing committees are working to develop the goals and objectives and action strategies which will make up the basic implementation plan[16].

Strategy:

1. Meet State or federal requirements for municipal fleet vehicles[17].

   Resources: The Transportation subcommittee of the Energy Working Group will continue to monitor this situation in the event that future budgeting is more conducive to meeting the proposed AFV acquisition requirements for its fleet vehicles.

   Timeline: 1996- ongoing

NOTES/REFERENCES

I. Municipal Energy Efficiency pages 3-7

1. Lewis, Eleanor and Eric Weltman. "Government buying can save tax dollars and the environment," *Public Management*, February, 1993.

2. Implementation would require standards for heating and cooling systems, lighting, insulation, tree planting, light colored surfaces, green fleets, transit commuting incentives, bicycle parking with shower facilities etc.

3. New building construction represents long-term investments which have the potential for significant energy savings. It is important to build energy efficiency into new construction projects, rather than retrofit later. These energy measures should not only relate to the operating efficiency of the completed buildings, but also the materials and procedures used to construct them. "Public financing" is defined as any time the City or City agency directly expends City resources for construction.

II. Residential Energy Efficiency pages 8-9

4. The Minnesota Energy Code [MEC] (Minn. Rules Chapt. 7670, subp. 6) stipulates, "Building assemblies are required to maintain the thermal performance of required insulation and the integrity of building materials against cold weather water vapor condensation and intrusion of unconditioned air."

   Category 2 standards are the current norm for building assemblies with Category 1 standards requiring installation of a mechanical ventilation system. Effective January 1, 1998, newly constructed residential buildings in Minnesota (one and two family and other residential buildings three stories or less in height) must meet the standards of the R-2000 Home Program Technical Requirements (Canadian Home Builders' Association, 8/92).

III. Commercial/Industrial Energy Efficiency pages 10-12

5. *An introduction to Environmental Accounting As A Business Management Tool: Key Concepts and Terms*, Environmental Protection Agency, p. 2. June 1995

6. Ibid. p. 3. (*Cutting Chemical Wastes* [1985], INFORM, New York, NY; *Environmental Dividends: Cutting More Chemical Wastes* [1992], INFORM, New York, NY.)

7. This pilot project attempts to improve the energy efficiency standards of new and used commercial/industrial construction/rehab projects. Participants will be selected on a case by case basis and assisted in evaluating and if feasible, making energy improvements that are cost effective, combining public*/private financing (which may include existing utility programs) to improve building energy efficiency standards. Projects shown to be affordable with up to a 10 year payback will be encouraged.

   * "Public financing" is defined as any time that the City or City agency directly expends City resources for construction or site acquisition or sells bonds on behalf of a private concern for construction for housing or commercial purposes. This would include write downs, tax increment financing , and industrial revenue and housing revenue bonds.

III. Commercial/Industrial Energy Efficiency pages 10-12 cont.

8. A production ban on the worst ozone depleting CFC's will take effect on January 1, 1996. the municipalities of Minneapolis and St. Paul collaborated on the development of an ordinance which regulates the sale and distribution of certain products which contain CFC's, regulates the servicing of equipment and appliances which contain CFC's and controls the release of halons into the atmosphere. This effort prompted the State to add its own CFC ordinance modeled on the Cities' version. *MPLS/St. Paul C02 Reduction Project, 12/93 p. 47.*

IV. Transportation Efficiency pages 13-18

9. The miles of freeway with major or severe congestion in the Twin Cities is expected to double by the year 2010. *Metropolitan Council's Regional Transit Facilities Plan, February 1992.*

10. Only about 15 cents of every dollar spent for gasoline stays in the local economy. Morris, David. *A Rational Transportation System: Getting From Here to There, Institute for Local Self Reliance, Saint Paul, Minnesota, May 4, 1991.*

11. *Downtown Minneapolis Transportation Management Plan, TMO Work Program, Appendix A, p. 5, 1993.*

12. Of the city's 266,522 employed labor force "..it is estimated that 160,000 (60 percent) drive alone to work, about 28,000 carpool (10.5 percent), and nearly 43,000 use public transit (16 percent)." *State of the City, City of Minneapolis, page 72, 1995.*

13. This includes programs and services that improve access to transportation information, increase flexible alternative work arrangements/schedules and support the use of alternative transportation modes: biking, busing, carpooling, telecommuting, vanpooling, or walking. Participants are encouraged to determine the present commuting patterns and needs of their employees by conducting surveys. The TMO sponsors Commuter Connection and serves as the clearinghouse for transportation information for the City, MCTO, MNDOT, Minnesota Rideshare,and other organizations. As such, the TMO provides a vaulable educational service to downtown Minneapolis commuters, Twin Cities visitors and newcomers.

14. Minneapolis has subsidized 250 HOV stalls in the City owned parking system. Along with this MnDOT has subsidized 100 City owned stalls. The Third Avenue North Distributor Parking Facilities are State owned, City operated, facilities with approximately 6000 stalls. These facilities offer a substantially discounted rate to those carpoolers coming in on I-394. By the end of 1995, 100 stalls will be subsidized in the Third Avenue North Distributor C for those poolers registered and coming in from the north on I094.

    The purpose of these special stalls is to encourage people to car pool, especially on I-394 which contains exclusive HOV lanes and direct access from these lanes to the facilities.

    HOV users pay only $25-30 a month to park while others pay $85-95 per month. Preferential HOV pricing strategies in Montgomery County Maryland have achieved over 75% HOV stall use of public spaces. Seattle has achieved 95% HOV space use in public spaces and 35% in private space.

15. Bock, M., NOVA PRO, Denmark, *Improved Driving Techniques*. CADDET Newsletter, No. 2. 1992.

IV. Transportation Efficiency pages 13-18 cont.

16. Committees which are currently meeting, their functions and progress to date are described briefly as follows (committee information excerpted from *Clean Fuels Minnesota application to DOE, 1994)*:

Legislative Committee: Determine barriers or incentives to the timely implementation of Clean Fuels Minnesota Minnesota that could be affected by legislation and develop a legislative agenda that would be beneficial to implementation.

This committee suggests enacting one or more of the following fuel neutral financial incentives to encourage and expand the use of these clean-burning alternative fuel vehicles in Minnesota:

► Exempt alternative fuel vehicles from the state motor fuels tax for a specifc amount of time (i.e. 5 years). Approximately $750,000 annual revenue reduction.

► Establish a capital pool to fund AFV development activities by implementing a one-time $1 dollar fee on all vehicles requiring state registration. Approximately $3,700,000 in revenue and expenditure.

► Implement a 50% vehicle registration (up to $100) for alternative fuel vehicles for a specific period of time (i.e. 5 years). Approximately $250,000 annual revenue reduction.

Infrastructure and Procurement: What is required from a user perspective to make the program effective.

Education and Information Committee: Monitor public interest in alternative fuels and AFV's to develop programs that will foster a greater interest

Technical Advisory Committee: Assure that all of the latest technical developments are examined and are properly communicated to the appropriate parties.

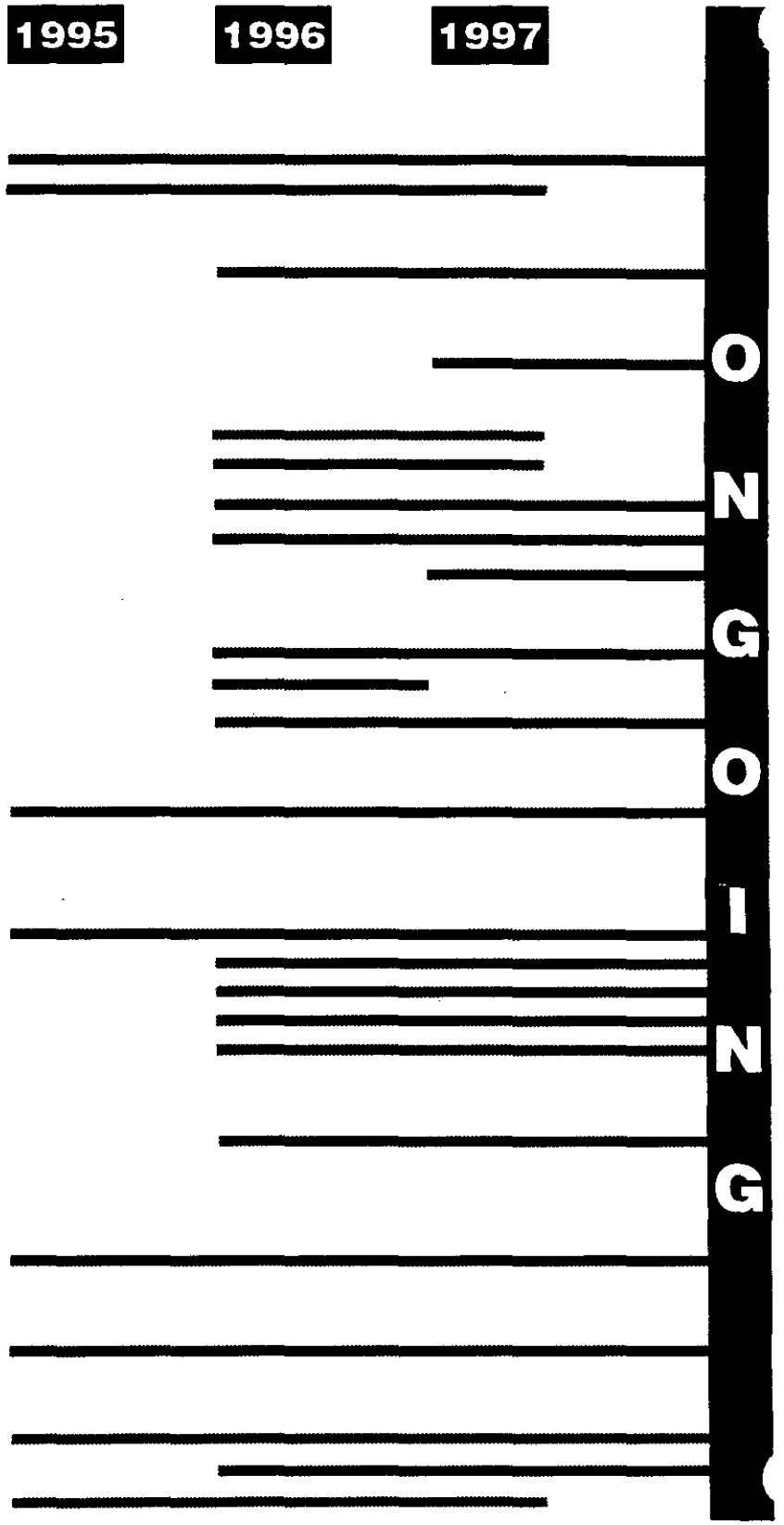
The aforementioned committee structure and is designed to facilitate the U.S. Department of Energy's **proposed** regulations requiring State government fleets to begin purchasing alternative fueled vehicles as of September 1, 1995.

17. U.S. Department of Energy's proposed regulations requiring State government fleets to begin purchasing alternative fueled vehicles as of September 1, 1995. Note: this regulation has been deferred for one year (10/96). Based upon this change, proposed acquisition requirements for state fleet vehicles are:

10 percent of vehicles acquired after September 1, 1996;
15 percent of vehicles acquired after September 1, 1997;
20 percent of vehicles acquired after September 1, 1998;
50 percent of vehicles acquired after September 1, 1999;
75 percent of vehicles acquired after September 1, 2000;

Federal Register, Energy Efficiency and Renewable Energy Office, *Alternative fueled vehicle acquisition requirements; implementation*, Vol. 60, #112, pgs. 30795-96.

IMPLEMENTATION SCHEDULE



MPLS ENERGY PLAN

MUNICIPAL

GOAL 1, OBJ. A, STRATEGY:
1. Deep energy retrofit projects
2. Energy audits of select municipal bldgs.

OBJ. B, STRATEGY:
1. Determine municipal energy savings

OBJ. C, STRATEGY:
1. Create energy reinvestment fund

OBJ. D, STRATEGY:
1. Centralize energy purchasing
2. Municipal purchasing guidelines
3. Purchasing guide
4. Energy standards for municipal bldgs.
5. Energy saving competitions

OBJ. E, STRATEGY:
1. Dedicated tree planting fund
2. Reexamine reforestation plan
3. Alleviate tree/power line conflicts

OBJ. F, STRATEGY:
1. Develop/study photocell prototypes

RESIDENTIAL

GOAL 1, OBJ. A, STRATEGY:
1. Cost-effective energy standards
2. Home Energy Rating System
3. Develop energy conservation programs
4. R-2000 training program
5. Energy efficient mortgages

OBJ. B, STRATEGY:
1. Energy programs/services

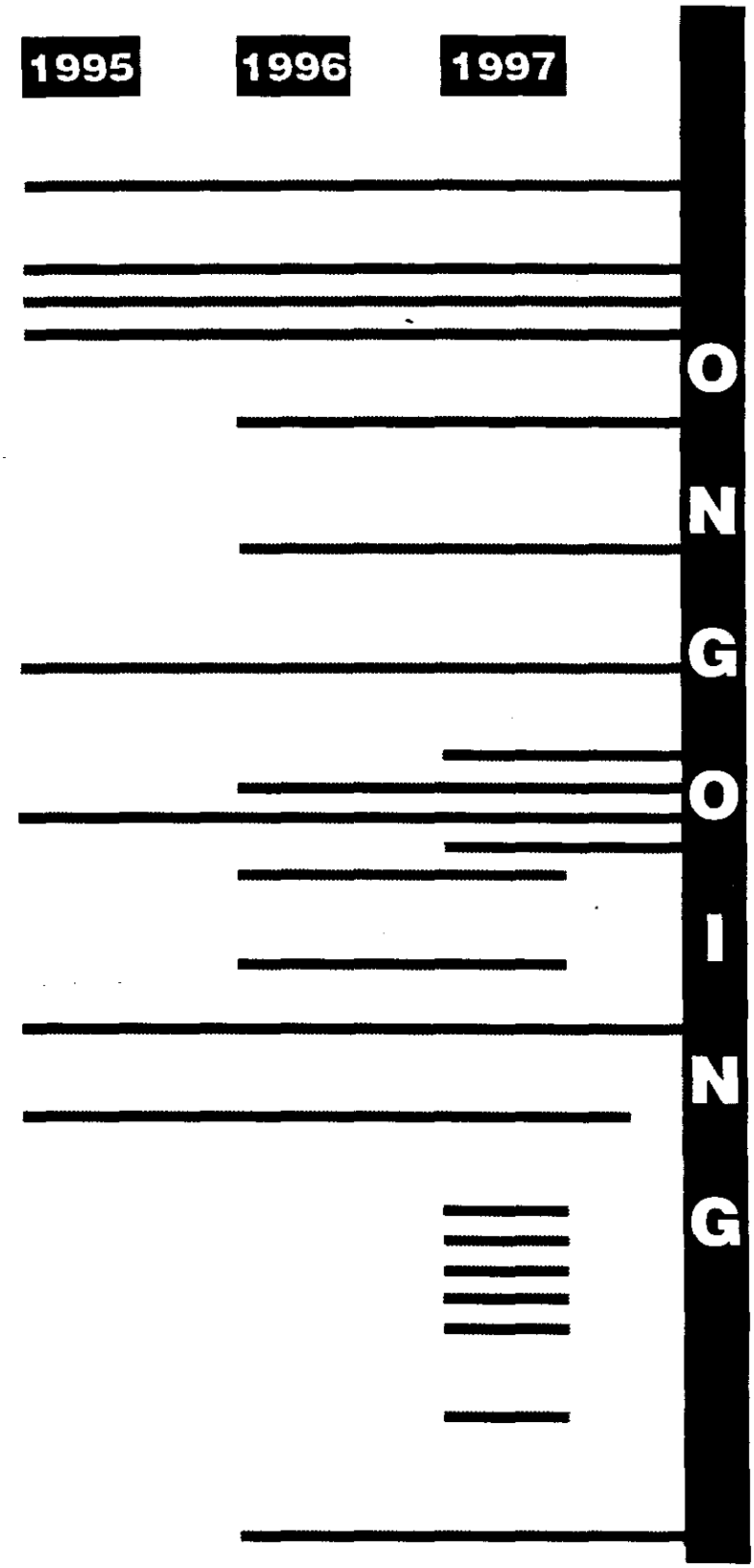
COMMERCIAL/INDUSTRIAL

GOAL 1, OBJ. A, STRATEGY:
1. Accessible energy loans/grants

OBJ. B, STRATEGY:
1. Pollution Prevention assistance

OBJ. C, STRATEGY:
1. Pilot projects for businesses
2. Improved information distribution
3. Determine energy savings

IMPLEMENTATION SCHEDULE



MPLS ENERGY PLAN

COMMERCIAL/INDUSTRIAL Cont.

OBJ. D, STRATEGY:
1. District heating/cooling-cogeneration

OBJ. E, STRATEGY:
1. Integrated resource planning
2. Strengthen DSM programs
3. Training progams for businesses/institutions

OBJ. F, STRATEGY:
1. Develop green businesses

TRANSPORTATION

GOAL 1, OBJ. A, STRATEGY:
1. Employer outreach

OBJ. B, STRATEGY:
EDUCATIONAL
1. Increase transit ridership

PUBLIC TRANSIT
2. Develop more designated bus lanes
3. Increas bus capacity
4. Advocate for dedicated transit funding
5. Special events/programs
6. Develop bus use options

CARPOOL/VANPOOLING
7. Legislative and community ordinances incentives
8. Carpooling/vanpooling incentives

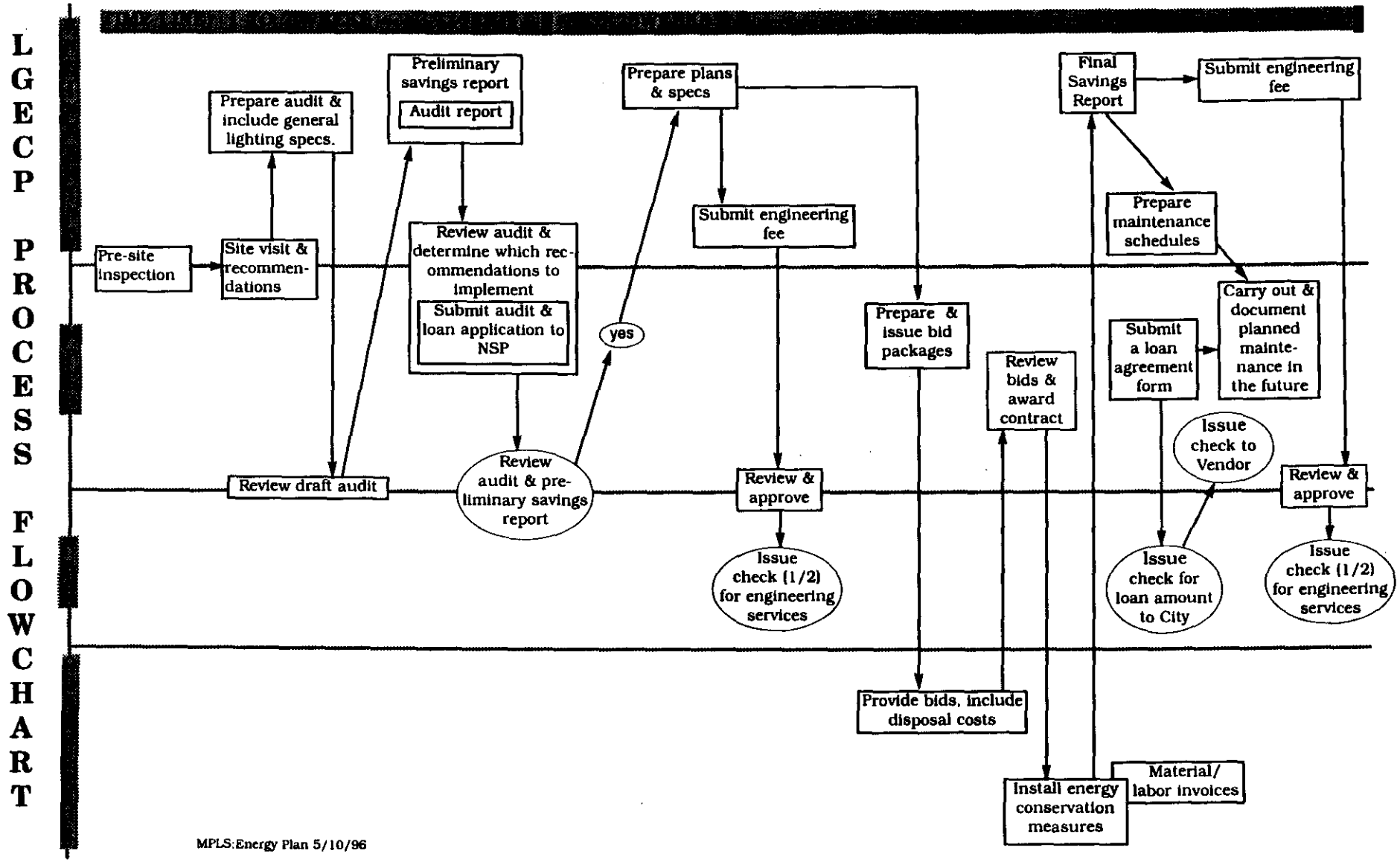
BICYCLING
9. Bike route/lane system extensions

OBJ. B, STRATEGY:
1. Guaranteed ride home program
2. Employee telecommuting guidelines
3. Generic commuting coupon
4. Reduce car pool costs
5. New employee information/incentives

GOAL 2, OBJ. A, STRATEGY:
1. Promote driver education/maintenance programs

)AL 3, OBJ. A, STRATEGY:
1. Meet state/federal requirements for fleet vehicles

Appendix A: Table 1



Appendix A: Table 2

LOCAL GOVT. PROGRAM [1] - NSP

MINNEAPOLIS ENERGY CONSERVATION PROJECTS - 1995 - 96												2/9/96
		PUBLIC WORKS										
	Audits Completed											
1	LWPB 10/14/94	Cent. Store-1858 27th St. E.	PTK83301858000205	$14,057.34	$28,114.68							
2	LWPB 10/14/94	Col-309 2nd Ave.	TGS2C00309000022	$67,908.72	$135,817.44	$7,367.00	City					
3	A & C 9/12/95	Equip-1308 Currie Ave. N.	T4HHZ0130800011	$13,031.42	$26,062.84	$6,890.50	City					
4	A & C 9/12/95	Equip. (N)-2710 Pacific Ave.	BTB3P302710000119	$17,236.25	$34,472.50	$1,840.00	City					
5		Equip. (NE)-1809 Washington	KTF36Z01809000016	$13,599.25	$27,198.50							
6	A & C 9/12/95	Equip. (SE)-6024-36 Harriet	OT6M2P06036000008	$21,219.99	$42,439.98	$3,848.00	City					
			OT6M2P06036000115									
7		Equip.-3607 E. 44th	MTLB4T03607000016	$17,891.35	$35,782.70							
			MTLB4T03607000115									
8	A & C 8/9/95	FS#1-526 S. 3rd St.	QTGG4G00526000006	$7,492.83	$14,985.66	$1,522.00	City					
9	A & C 10/21/95	FS#2 -143 13th Ave. NE	KTHT4500143000011	$5,479.76	$10,959.52	$882.00	City					
10	A & C 10/11/95	FS#4-1101 6th St. N.	KTHT44H0110100001	$3,919.18	$7,838.36	$1,128.00	City					
11		FS#5-2700 Boomington	PT2V4502700000021	$8,662.20	$17,324.40							
12	LWPB 10/14/94	FS#6-121 E. 15th St.	TJ92P0012100003	$12,170.45	$24,340.90	$5,112.00	City					
13		FS#7-2000 E. Franklin	KT5K4T02000000100	$7,721.23	$15,442.46							
14		FS#8-2749 Blaisdel	RT2RGT02749000010	$6,460.10	$12,920.20							
15	A & C 10/11/95	FS#10-19 4th St. N.	QTGN3R00019000011	$6,852.82	$13,705.64	$960.00	City					
16	A & C 10/11/95	FS#11-229 6th St. SE	JTH73300229000114	$8,060.91	$16,121.82	$802.00	City					
17		FS#12-5401 33rd Ave. S.	MTKN4H05401000012	$7,784.51	$15,569.02							
18		FS#14-3301 James Ave. No.	GT7LHK03301000116	$5,362.91	$10,725.82							
19		FS#15-2701 Johnson Ave. N.	JT7S8F02701000018	$6,326.39	$12,652.78							
20	A & C 10/11/95	FS#16-1600 Glenwood Ave.	BT673F01600000116	$5,278.84	$10,557.68	$806.00	City					
21		FS#17-330 38th St. E.	QTKZ4500330000017	$9,355.11	$18,710.22							
22		FS#19-200 Ontario St. NE	KTB36900200000124	$10,447.88	$20,895.76							
23		FS#20-4646 Humboldt Av. N.	HT7M504646000019	$4,883.18	$9,766.36							
24		FS#21-3029 38th St. E	MTKZ4503209000027	$10,260.28	$20,520.56							
25		NIAC-1530 Franklin Ave. E.	PT5K4T01530666000	$49,472.40	$98,944.80							
26	A & C 9/12/95	P.H.C.-250 So. 4th St.	TGC2C00300000018	$93,195.61	$186,391.22	$28,336.00	City					
27	A & C 8/9/95	Paving Lab-1915 E. 26th St.	TK54T0191500001	$1,791.16	$3,582.32	$1,726.00	City					
28	A & C 9/12/95	PCS Bldg.-217 3rd St. S.	QTGC4H00217000018	$21,486.18	$42,972.36	$5,300.00	City					
29		Pilot City-1349 Penn Ave. N.	BTB9V901349000114	$70,615.70	$141,231.40							
			BTB9V901349000213									
30	A & C 8/9/95	PP#3-3000 Minnehaha Ave.	LT97DP03000000021	$19,364.63	$38,729.26	$2,080.00	City					
31	A & C 8/9/95	PP#4-1925 Plymouth Ave.	BTBP3F01925000027	$40,420.02	$80,840.04	$6,634.00	City					
32		PP#5-2429 Nicollet Ave.	RT9M2P02429000041	$26,976.34	$53,952.68							
33		S. Street-4444 Snelling Ave.	MTCNFL04444000111	$1,915.41	$3,830.82							
34	A & C 9/12/95	St. Mtnc-121 Glenwood Ave.		$22,965.25	$45,930.50	$1,022.00	City					
35	A & C 8/9/95	Traff Mtnc. -300 Border St.	KT2VFF00300000017	$59,084.12	$118,168.24	$9,508.00	City					
		TOTALS		$698,749.72	$1,397,499.44	$85,763.50						

Appendix A: Table 2

LOCAL GOVT. PROGRAM [2] -NSP

MINNEAPOLIS ENERGY CONSERVATION PROJECTS - 1995 - 96												9/27/95
		MPLS PARK BOARD										
1		Armatage-2500 57TH ST. W	TLM950250000012	$4,065.00	$8,130.00							
2		Audubon-1320 9th Ave. NE	TKC4H0132000061	$3,741.18	$7,482.36							
3		Beltrami										
4		Bethune-919 Fremont Ave. N.	T5N7P0091900001	$10,874.75	$21,749.50							
5		Bottineau-2000 2nd St. NE	TG83F0200000012	$7,534.71	$15,069.42							
6		Br. Sq.-3111 Bryant Ave. S.	T3B2P0311100001	$4,651.40	$9,302.80							
7		Brackett-3900 1/2 28th St. E.	TKC3F0390000001	$8,517.55	$17,035.10							
8		Corcoran-3334 20th Ave. S.	TJP3F0333400001	$4,722.27	$9,444.54							
9	CEE *	Creekview-5001 Irving Ave. N.		$3,293.89	$6,587.78	$5,921.00	$5,386.00					
10		Elliot-1000 14th St. E.	TJ62P0100000001	$5,730.50	$11,461.00							
11		Fairview-629 29th Ave. N.	TKC450062900001	$10,979.22	$21,958.44							
12	Associated *	Folwell-1601 Dowling Ave. N.		$16,490.00	$32,980.00	$9,028.00						
13		Fuller-4800 Grand Ave. S.	T6B2P0480000002	$3,900.14	$7,800.28							
14		Hiawatha-4301 42nd St. E.	TK82CP044000000	$4,528.76	$9,057.52							
15		Hiawatha-4400 27th Ave. SE	TL74H0430100001	$11,095.46	$22,190.92							
16		Keewaydin-3030 53rd St. E.	TLJG50300200001	$8,460.79	$16,921.58							
17		Kenney-1320 58th St. E.	TLMBK0132000013	$5,857.43	$11,714.86							
18		King-4055 Nicollet Ave. S.	T9M2P0405500000	$13,958.65	$27,917.30							
19		Linden Hills-3610 43rd St. W.	TLB2P0310600001	$11,207.29	$22,414.58							
20	Associated *	Logan-690 13th Ave. NE	THT450069000001	$15,560.12	$31,120.24	$13,602.00						
21		Longfellow-3610 E. 35th St.	TKR5K0361000021	$16,141.89	$32,283.78							
22		Loring-1370 Willow St.	TF9G50137000000	$7,054.87	$14,109.74							
23		Luxton-2808 St. Mary's Pl.	TCGBK0280800011	$12,766.34	$25,532.68							
24		Lyn. Frm.-3900 Bryant Ave. S.	TCB2P0390000002	$1,326.50	$2,653.00							
25	Associated *	Lynnhurst-1501 50th St. W.	TLJ8R0150100011	$11,097.18	$22,194.36	$9,105.00						
26	CEE *	Matthew-2309 28th Ave. S.	TKC2P0230900001	$11,300.78	$22,601.56	$17,681.00	$18,408.00					
27		McRae-906 47th St. E.	TLJ2C0090600001	$9,447.73	$18,895.46							
28		N. Com.-1801 James Ave. N.	TJLHK0180100001	$14,993.62	$29,987.24							
29		NE-1616 Buchanan St. NE	T3F3Z0161600001	$11,170.64	$22,341.28							
30		Nokomis-2401 Minnehaha Pkwy E	T97G50240100012	$8,250.01	$16,500.02							
31	Associated *	Operations Center		$31,428.00	$62,856.00	$30,968.00						
32		Painter-620 34th St. W.	TKR330062000000	$4,713.81	$9,427.62							
33	Contractor *	Pearl-5426 Portland Ave.	TBS2P0542600001	$9,562.34	$19,124.68							
34	CEE *	Pershing-3523 48th St. NE	TLJ4T0352300002	$7,468.57	$14,937.14	$10,180.00	$9,547.00					
35	Contractor *	Phillips-3900 Chicago Ave.	T3T2P0390000000	$8,614.38	$17,228.76							
36	Associated *	Powderhorn-3340 15th Ave. S.	TJ6450334000001	$14,849.54	$29,699.08	$10,749.00						
37	CEE *	Sibley-1910 40th St. E.	TL4570191000001	$8,056.51	$16,113.02	$10,426.00	$11,545.00					
38		Stewart-2700 12th Ave. S.	THT2C0270000001	$5,315.69	$10,631.38							
39	CEE *	Van Cleve-991 15th Ave. SE	TJ92C0099100001	$95.54	$191.08	$23,507.00	$22,330.00					
40		Waite-3405 Ulysses St. NE	TDBWJ0340500001	$6,483.25	$12,966.50							
41		Webber-4348 Webber Pkwy	TF68K0434800001	$3,180.26	$6,360.52							
42	Contractor *	Whittier-2600 Grand Ave. S.	T6B2P0260000002	$5,566.77	$11,133.54							
		TOTALS		$364,053.33	$728,106.66	$141,167.00	$67,216.00					

Appendix A: Table 2

LOCAL GOVT. PROGRAM [3] -NSP

MINNEAPOLIS ENERGY CONSERVATION PROJECTS - 1995 - 96													9/27/95
		MPLS WATER WORKS											
#	Auditor - Completed(1)	Facility	NSP Acct.	Annual Elec. $	Total Cap. @ 2X Savings	Auditor Cost	% Paid by Contractor	$ Paid by Contractor	Rebate Amount	Date Paid	Payback (Years)	Savings (Years)	Comments
1		3700 E. River Road -PS#4	CTC8SG0370066602	$276,369.64	$552,739.28								
2		4500 Marshall Blvd. NE -DP	CTL46Z00001666005										
3		4500 Marshall Blvd. NE -FF	CTL46Z00001666005										
4		4500 Marshall Blvd. NE -FS	CTL46Z00001666005										
5		4500 Marshall Blvd. NE -PS#5	CTL46Z00001666005	$1,214,591.80	$2,429,183.60								
6		4500 Marshall Blvd. NE -PS#6	CTL46Z00001666005										
7		4500 Marshall Blvd. NE MS1	CTL46Z00001666005										
8		4500 Marshall Blvd. NE MS2	CTL46Z00001666005										
9		4500 Reservoir Blvd. NE -CH	CTC84504500666002	$160,721.02	$321,442.04								
10		4500 Reservoir Blvd. NE -PS8	CTC84504500666002										
11		935 5th Ave. S.E. -E YD-M B	JTGZ2C00935000117										
12		935 5th Ave. S.E. -E YD-REC	JTGZ2C00935000117	$6,459.78	$12,919.56								
13		Chatha Rd.-PS#7	CTC84504500666002										
		TOTALS		$1,658,142.24	$3,316,284.48								
		MPLS LIBRARY BOARD											
#	Auditor - Completed(1)	Facility											
1		300 Nicollet Mall -PL	T9Q230030000001	$218,100.24	$436,200.48								
2		2725 E. Lake St. -CL	T852P0272500002	$16,499.54	$32,999.08								
3		1318 E. Franklin Ave. -CL	T5K4T0131800000	$4,478.09	$8,956.18								
4		347 E. 36th St. -CL	TKV330034700001	$4,513.69	$9,027.38								
5		2900 W. 43rd St. -CL	TLB2P0290000001	$3,310.70	$6,621.40								
6		5100 34th Ave. s. -CL	TKN6Z0510000001	$11,915.92	$23,831.84								
7		1315 Lowry Ave. N. -CL	T8N2P0131500001	$27,151.29	$54,302.58								
8		2200 Central Ave. NE -CL	T3Q2P0220000001	$17,084.66	$34,169.32								
9		1224 2nd St. NE -CL (leased)	TG83F0122400003	$704.96	$1,409.92								
10		4026 28th Ave. S. -CL	TKC2P0402600001	$1,669.69	$3,339.38								
11		1222 4th St. SE -CL	TGR2P0122200013	$9,060.88	$18,121.76								
12		611 Emerson Ave. N. -CL	T55M50061100000	$5,130.43	$10,260.86								
13		2880 Hennepin ave. S. -CL	T6T2P0288000000	$12,581.16	$25,162.32								
14		5244 Lyndale Ave. S. -CL	T8R2P0524400003	$18,615.68	$37,231.36								
15		4310 Webber Parkway -CL	TF66K0431000000	$4,055.10	$8,110.20								
		TOTALS		$354,872.03	$709,744.06								
		CONVENTION CENTER											
#	Auditor - Completed(1)	Facility	NSP Acct.	Annual Elec. $	Total Cap. @ 2X Savings	Auditor Cost	% Paid by Contractor	$ Paid by Contractor	Rebate Amount	Date Paid	Payback (Years)	Savings (Years)	Comments
1		1301 2ND Ave. S.	TG520130166600	$763,307.08	$1,526,614.16								
		MPLS BLDING COMMISSION											
1		Mpls City Hall/Courthouse	TGZ3R0035066600	$419,891.06	$839,782.12								

Acknowledgments

Minneapolis Planning Department:
Chuck Ballentine, *Director*
Robyn Adolphson-Huspek
Neil Anderson
Geoffrey Batzel
Jack Byers
Sally Benjamin
Marlena Bromschwig
Gary Dorek
Blake Graham
Kristine Harley
Ingrid Holley
Kristi Jensen
Sue Jensen
Dan Jones
Laura Lambert
Mike Larson
Thomas Leighton
Amy Lucas
Monique MacKenzie
Greg Mathis
Phil Meininger
Mary Murphy
Fred Neet
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Julia Paulsen
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City Coordinator:
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Charter Department Heads:
Rocco Forte', *Fire Chief*
Chuck Ballentine, *Planning Director*
Jay Heffern, *City Attorney*
David Doth, *Comissioner of Health*
Merry Keefe, *City Clerk*

Charter Department Heads: *(Continued)*
Cora McCorvey, Minneapolis Public Housing Authority, *Executive Director*
Robert Olson, *Police Chief*
Scott Renne, *City Assessor*
David Sonnenberg, *Public Works Director* and *City Engineer*
Kenneth White, *Civil Rights Director*
Steve Cramer, Minneapolis Community Development Agency, *Executive Director*

Assistant City Coordinators:
John Bergquist, *Assistant City Coordinator* (Operations and Regulatory Services)
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John Moir, *Finance Officer*
Holly Morris, *Former ITS Director*
Don Saelens, *ITS Director*
Mary Small, *Communications Director*

Public Agencies:
Minneapolis Community Development Agency (MCDA) *staff*
Minneapolis Public Schools, Special School District #1
Minneapolis Board of Education
Minneapolis Park and Recreation Board *and staff*
Minneapolis Public Library
Minneapolis Public Library Board
Minneapolis Heritage Preservation Commission
Minneapolis Public Housing Authority Neighborhood Revitalization Program (NRP) *staff*
Metropolitan Council *staff*

Members of the Minneapolis Plan Working Groups:
Neighborhood Quality and Variety
The New Economy
Neighborhood Design and Preservation
Natural Systems and Resource Use
Neighborhood Commercial/Density
Moving People, Goods and Information
Lifelong Learning/Arts/Culture/Recreation
Community Form and Land Use
Minnesota Multi Housing Association, Minneapolis Committee
Urban Ecology Coalition

Attendees of Minneapolis Plan workshops, open houses and city-wide meetings: *too numerous to list but whose contributions of time, talent, and thought form the basis of so much in this plan and so much of our optimism about Minneapolis' future.*

Plan Production

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