2005
BUDGET

Water and Sewer Utility Budget

- As Approved by City Council -

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Office of the City Manager
May 2, 2005

To: His Worship the Mayor,
and Members of City Council

Re: Water and Sewer Utility Budget

Each year City Council is required to adopt an operating and capital budget. There are three components to the budgets, the General Operating Budget, the Water and Sewer Utility Operating and Capital Budget and the General Capital Program. **This document is the Water and Sewer Utility Budget, including the 2005 Utility Operating Budget and the 2005 – 2009 Utility Capital Program as approved by City Council at its meeting on December 20, 2004.** The budget also includes amendments resulting from the allocation of Municipal Rural Infrastructure Funding by City Council at its meeting on April 4, 2005, and the approval of the General Operating Budget by City Council at its meeting on April 6, 2005.

Regina's location, in a sensitive natural environment far from a major water source impacts on the standards and costs for water supply and wastewater treatment and disposal. Additional information on the regional setting and the implications for Regina is provided in the Introduction Section of this document.

Federal and Provincial standards have been strengthened in recent years due in part to public concerns resulting from water quality problems in other communities. **Regina has been and will continue to be a leader in ensuring that utility operations adhere to standards and respect the environment**. **Regina's operators have met the certification requirements set out in regulations pursuant to *The Environmental Management and Protection Act*.** In 2004, the Province circulated for comment, drafting instructions for new regulations that would require municipalities to establish and publicly report on pricing and capital investment policies for their waterworks by July 1, 2006. While the final requirements have not been determined, it is likely new regulations will be implemented in 2005. Much of the information required in the draft regulations is provided in the budget document. A continued commitment to training, reporting and monitoring will be required.

The 2005 Utility Operating Budget provides the funding necessary to meet Council's service objectives for water, wastewater and drainage. The budget includes funding for:

- Completion of the update to the Long Term Water Supply Study ($255,000),
- A Wastewater Collection Inflow and Infiltration Study ($200,000),
- Completion of the Wascana Creek Receiving Study ($75,000), and,
- Development of an Asbestos Cement Watermain Repair Strategy ($50,000).

The 2005 – 2009 Utility Capital Program totals $104.2 million. In addition to funding for infrastructure replacement and upgrades, the capital program includes $48.2 million for an expansion to the sewage treatment plant (a further $25 million is required in 2010) and about $3.3 million for upgrades to the treatment plant. The expansion project is required to provide expanded hydraulic and process capability to meet projected future requirements and to meet increased federal standards pursuant to

The Canadian Environmental Protection Act and *The Fisheries Act* related to nitrogen reduction requirements and reduction in ammonia toxicity in discharged effluent.

City Council (Bylaw 2004-35) previously approved a rate schedule for 2005 – 2007. Based on the approved rates for 2005, for the average home owner using 360 cubic meters of water a year, **the average monthly cost for water, wastewater and drainage, will increase from $64.27 to $67.11, an increase of $2.84 per month or 4.4%**. For the sample commercial customer described in the budget document, the increase is 4.8%.

Maintenance of the water, wastewater and drainage systems is a duty of the City in the interest of public health and safety. Ageing infrastructure, regulatory standards and Regina's environmental and geographic location all contribute to increasing costs, which result in a requirement to increase rates. **The City has a duty to be responsible stewards of these essential utilities to promote the health, well being and economic opportunity of the community.**

Respectfully submitted,

A.R. Linner
City Manager

Introduction

Service Overview

Annually the City of Regina conducts a public survey. The following table provides a comparison of the public's responses since the inception of the survey. **The public's rating of water and sewer services has increased since 1995**. The high rating is significant given the increased scrutiny in recent years toward the provision of water and sewer services.

Rating of Water and Sewer Services

Year	Very or Somewhat Satisfied	Very or Somewhat Dissatisfied
2004	**89%**	**8%**
2003	86%	13%
2002	88%	11%
2001	83%	15%
2000	81%	17%
1999	83%	15%
1998	81%	17%
1995	82%	18%

The Water and Sewer Utility provides water, wastewater and drainage services primarily to customers in Regina. The services provided through the utility include:

- **Water Supply, Pumping and Distribution**

  The water system provides water for residential, institutional, commercial and industrial customers as well as water for fire protection. The system serves a population of over 190,000 including some customers outside the city limits. Service goals include:

  – Providing water that meets or exceeds Provincial water quality standards and objectives.

  – Providing water at adequate pressure and in sufficient quantity to satisfy the requirements for domestic and commercial use, irrigation and fire protection.

  – Identifying and implementing improvements to the City's water system through long range planning, monitoring, improved operation, capital works and new technology.

- **Wastewater Collection and Treatment**

  The wastewater system collects wastewater from all residential, institutional, commercial and industrial customers in the city. Wastewater treatment and final effluent meets provincial environmental standards. Service goals include:

  – Collecting domestic, commercial and industrial wastewater in the city and delivering it to wastewater treatment facilities.

  – Producing a treated wastewater effluent that is biologically and physically safe for the environment that meets the provincially issued operating permit.

- Ensuring solids removed from the wastewater are treated and disposed in an environmentally responsible manner.

- **Drainage**

  The drainage system controls water runoff resulting from rainfall and melting snow in and around the city. The system serves approximately 60,000 residential, institutional, commercial and industrial properties. Service goals include:

  - Operating and maintaining the drainage system to control run off water within the city to minimize inconvenience, property damage and danger to the public.

  - Monitoring the potential for flood conditions in Wascana Creek and the storm channels and carrying out flood control measures as required.

Regional Setting

Regina's location, in a sensitive natural environment far from a major water source, is unique among the major Canadian cities. Regina's location impacts on the standards and costs for water supply and wastewater treatment and disposal. The map on the next page provides an overview of the regional setting.

The City's water supply originates with snow melt and rainfall in the eastern Rocky Mountains that feed the tributaries of the South Saskatchewan River. The Gardiner and Qu'Appelle dams impound the South Saskatchewan River to form Diefenbaker Lake from where water is released into the Qu'Appelle River. The Qu'Appelle flows through Buffalo Pound Lake, the source of Regina and Moose Jaw's treated water supply. Buffalo Pound Lake is also the water source for large industrial users including the SaskFerco fertilizer plant and IMC's Belle Plaine potash mine.

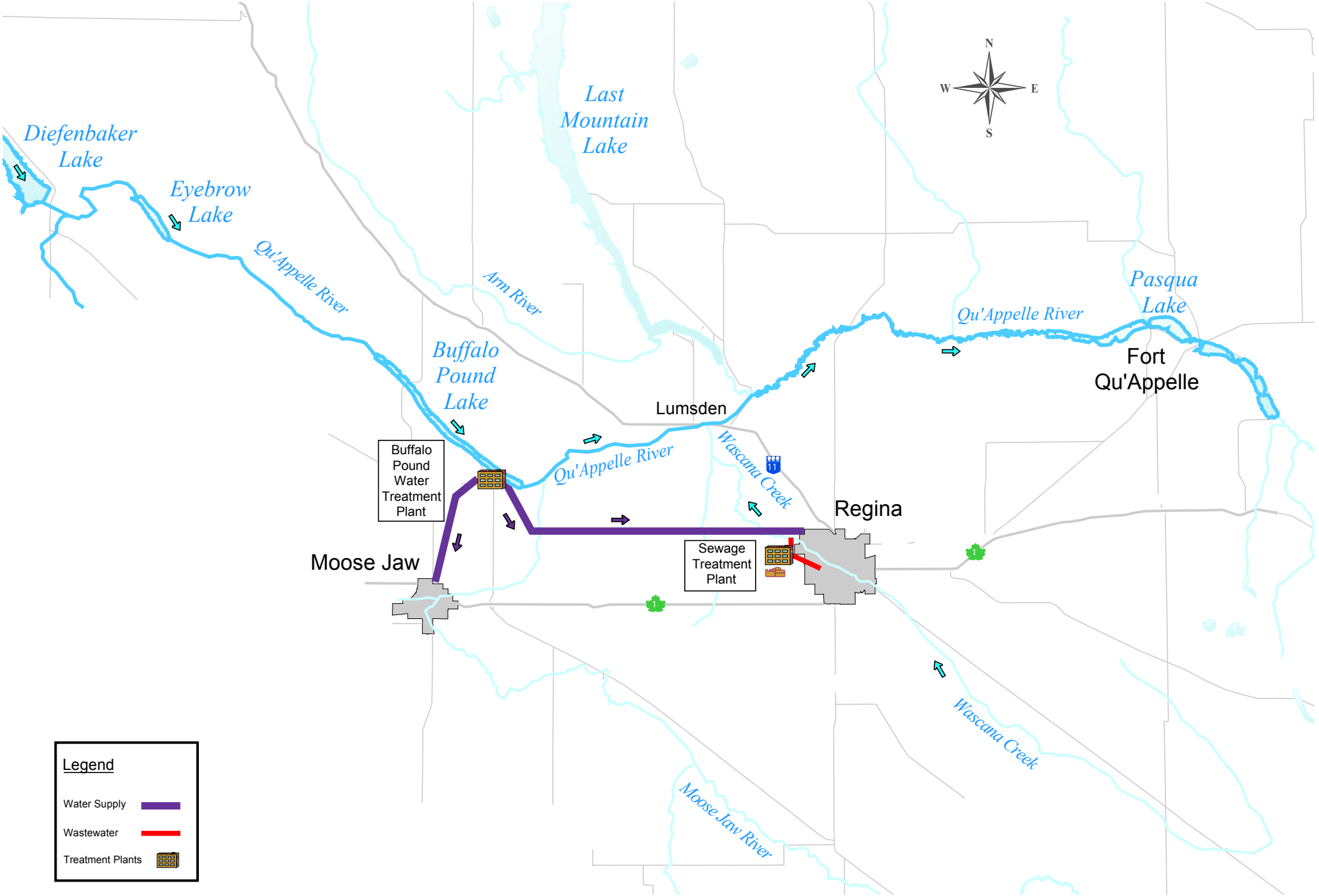
From Buffalo Pound Lake the Qu'Appelle flows eastwards through the Fishing Lakes on its way to joining the Assiniboine in the east of the Province. Saskatchewan Watershed Authority manages water releases from Lake Diefenbaker to support a variety of uses in the Qu'Appelle valley besides water supply. Releases maintain lake levels for recreation use and provide water for agricultural irrigation. The Watershed Authority also operates dams and control structures maintaining water levels when flows are low and controlling flooding when flows are high.

Wascana Creek is a seasonal stream that originates to the east of Regina and flows through the city to join the Qu'Appelle downstream of Lumsden. Regina's storm water run off and treated wastewater flow into Wascana Creek. For much of the year these sources are the only water that feeds Wascana Creek. Without those sources, the Creek would be dry.

The nature of the Qu'Appelle system is influenced by both its natural setting and its many uses. Abundant sunshine and naturally occurring nutrients result in a highly productive biological system typical of prairie water bodies. Human activities (agriculture and development) create their own demands and influence the system.

Regina water supply and wastewater treatment systems are adapted to provide treatment that is appropriate to its natural setting and to minimize the city's influence on the receiving environment.

Regina and Region



Regulatory Environment

Saskatchewan's Department of the Environment regulates water supply and distribution, and wastewater collection, treatment and disposal. Permits for the construction and operation of water and wastewater systems require specific standards to protect human health and to minimize impacts on the natural environment. A system of routine testing, inspections and annual reports ensures compliance.

Saskatchewan Watershed Authority is responsible for management of Saskatchewan's surface water and ground water resources. The Authority regulates the allocation of water, establishes management plans for the Province's river basins and is responsible for land drainage and wetland preservation and enhancement. In 2004, the Authority initiated a consultative process to develop a plan for the Upper Qu'Appelle. City staff and Buffalo Pound Water Administration Board staff are actively involved in the planning process. The process is expected to take several years to complete.

In 2002, the Province responded to public concerns highlighted by the North Battleford cryptosporidium outbreak and subsequent inquiry by passing new regulations pursuant to *The Environmental Management and Protection Act*. This Act with its regulations introduced a range of measures to ensure consistent water quality and appropriate environmental protection throughout Saskatchewan. The requirements include mandatory operator certification, routine facility inspections, testing and reporting. System operators were required to provide a Water Quality Control Policy before December 31, 2003 (this was completed) and undertake an Assessment and Audit of Water by December 31, 2005.

The mandatory certification program requires that certified operators are in charge of all key water supply and distribution, and wastewater collection and treatment operations. The level of certification depends on the size and complexity of the system, level one being the simplest and smallest systems, level four the largest and most complex. Regina's systems are designated as level four systems. The program provided a transition period to allow operators to achieve the required certification before July 15, 2005. **Regina's operators have already met the certification requirements.**

In 2004, the Province circulated for comment, drafting instructions for new regulations that would require municipalities to establish and publicly report on pricing and capital investment policies for their waterworks by July 1, 2006. While the final requirements have not been determined, it is likely new regulations will be implemented in 2005. While much of the information required in the draft regulations is provided in the budget document, further review will be required once regulations are adopted.

In 1999, the Federal Government enacted *The Canadian Environmental Protection Act*, (CEPA). This Act together with *The Fisheries Act* provides authority to regulate Municipal Waste Water Effluents and control discharges to receiving waters. CEPA regulations require municipalities to develop and implement pollution prevention plans for their treated wastewater discharges. These plans, which must be developed and implemented by 2009, must address any substances deemed to be "toxic" under CEPA. At present only two substances, ammonia and chlorination by-products have been designated "toxic". Ammonia is present in Regina's wastewater but there is a list of several hundred substances that could be so designated. Municipalities and provincial regulators have been very concerned that Federal regulation with inflexible broadly based national standards could replace the current site-specific regulatory regime.

Recently, the Canadian Council of Ministers of the Environment proposed a national strategy to deal with Municipal Waste Water Effluents. This proposal, which has the support of the Federal Government, addresses the need to maintain a national approach to pollution prevention and environmental protection while recognizing local conditions and requirements.

Regina's practice has been to provide water and wastewater treatment that meets all regulatory requirements, anticipates potential higher standards and, where practical, meets the higher requirement. Costs of regulatory compliance, such as the costs of training, certification, documentation and reporting will be higher than in the past.

Financial Information

Customer Impact of Utility Rates

The 2005 – 2007 water, wastewater and drainage rates were approved by City Council (Bylaw 2004-35) in 2004. Examples of the impact of the 2005 rates are provided below.

Average Home Owner

The following chart illustrates the impact of the 2005 rates on a home owner who uses 360 cubic metres of water per year. The water consumption is typical for a family of two adults and two children, in a home with two bathrooms, a dishwasher and washing machine, on a lot with typical landscaping for Regina.

2005 Rate Impact - Average Home Owner

	2004	**2005**	Dollar Change	Per Cent Change
Water				
Basic Charge	$ 117.00	**$ 123.00**	$ 6.00	
Volume Charge	291.60	**298.80**	7.20	
Total Water	408.60	**421.80**	13.20	3.2
Wastewater				
Basic Charge	87.00	**93.00**	6.00	
Volume Charge	203.69	**212.54**	8.85	
Total Wastewater	290.69	**305.54**	14.85	5.1
Drainage Infrastructure Levy	72.00	**78.00**	6.00	8.3
Total Annual Utility Charges	$ 771.29	**$ 805.34**	$ 34.05	4.4

The cost increase resulting from the 2005 rates is about $2.84 per month for the average homeowner.

Sample Commercial Customer

The following chart illustrates the impact of the 2005 rates on a commercial customer with a 50 mm meter, an average of 200 cubic metres of water consumption per billing period, and a property size in the range of 7,001 to 9,000 m^2. This water consumption would be typical for a retail store of 418 m^2 with a paved parking lot, minimal landscaping, bathrooms for customers and employees, and no food service.

2005 Rate Impact - Sample Commercial Customer

	2004	**2005**	Dollar Change	Per Cent Change
Water				
Basic Charge	$ 339.30	**$ 357.00**	$ 17.70	
Volume Charge	972.00	**996.00**	24.00	
Total Water	1,311.30	**1,353.00**	41.70	3.2
Wastewater				
Basic Charge	252.30	**270.00**	17.70	
Volume Charge	811.44	**846.72**	35.28	
Total Wastewater	1,063.74	**1,116.72**	52.98	5.0
Drainage Infrastructure Levy	576.00	**624.00**	48.00	8.3
Total Annual Utility Charges	$ 2,951.04	**$ 3,093.72**	$ 142.68	4.8

Utility Operating Budget Summary

Details ($000's)	2004 Budget	2004 Actual	**2005 Budget**	Change 2004 to 2005 Dollar Change	Change 2004 to 2005 Per Cent Change
Operating Revenue:					
Water	27,261.4	26,930.5	**28,126.9**	865.5	3.2
Wastewater	19,140.3	18,921.2	**20,121.9**	981.6	5.1
Drainage	5,119.3	5,112.6	**5,570.4**	451.1	8.8
Other	471.3	493.5	**503.5**	32.2	6.8
Total Operating Revenue	51,992.3	51,457.8	**54,322.7**	2,330.4	4.5
Operating Expenditures:					
Water	12,383.9	10,879.8	**12,619.9**	236.0	1.9
Wastewater	5,915.9	6,137.9	**6,285.3**	369.4	6.2
Drainage	1,058.8	952.1	**1,121.0**	62.2	5.9
Engineering and Operations	5,272.5	5,329.0	**6,056.9**	784.4	14.9
Utility Administration	4,798.1	4,633.4	**4,854.1**	56.0	1.2
Debt Costs	12,385.1	12,588.0	**12,699.7**	314.6	2.5
Total Operating Expenditures	41,814.3	40,520.2	**43,636.9**	1,822.6	4.4
Utility Operating Surplus	10,178.0	10,937.6	**10,685.8**	507.8	5.0
Distribution of Surplus:					
Transfer to General Operating	4,297.6	4,297.6	**4,503.9**	206.3	4.8
Transfer to General Capital:					
CSIP Funding	2,500.0	2,500.0	**2,500.0**	-	-
MRIF Funding	-	-	**1,700.0**	1,700.0	-
Transfer to General Utility Reserve	3,380.4	4,140.0	**1,981.9**	(1,398.5)	(41.4)
Total Surplus	10,178.0	10,937.6	**10,685.8**	507.8	5.0

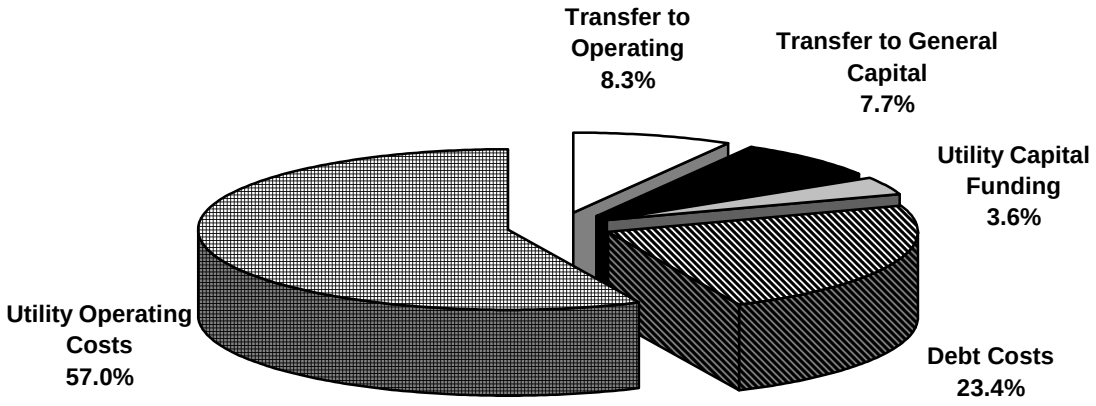
Utility Capital Program Summary

	2005	**2006**	**2007**	**2008**	**2009**	**Total**
Capital Expenditures						
Water Supply, Pumping & Distribution	**1,240**	1,890	1,590	1,690	1,690	8,100
Wastewater Collection & Treatment	**6,305**	5,990	5,540	34,340	24,390	76,565
Drainage	**5,250**	3,450	2,950	3,800	4,050	19,500
Total Expenditures	**12,795**	11,330	10,080	39,830	30,130	104,165
Capital Funding						
General Utility Reserve	**5,016**	9,580	8,310	6,930	9,080	38,916
New Debt	**-**	-	-	30,000	20,000	50,000
Debt issued in Prior Years	**6,000**	-	-	-	-	6,000
Municipal Rural Infrastructure Fund	**1,700**	1,700	1,700	1,700	-	6,800
Utility Development Charges	**79**	50	70	1,200	1,050	2,449
Total Funding	**12,795**	11,330	10,080	39,830	30,130	104,165

Utility Operating Revenues

Revenue Details ($000's)	2004 Budget	2004 Actual	**2005 Budget**	Change 2004 to 2005 Dollar Change	Change 2004 to 2005 Per Cent Change
Water Revenue					
Metered Water Charges	26,785.7	26,132.1	**27,651.2**	865.5	3.2
Unmetered Water Charges	198.7	152.3	**198.7**	-	-
Other Water Service Charges	277.0	646.1	**277.0**	-	-
Subtotal	27,261.4	26,930.5	**28,126.9**	865.5	3.2
Wastewater Revenue				-	
Wastewater Charges	19,090.3	18,893.5	**20,071.9**	981.6	5.1
Wastewater Service Surcharges	50.0	27.7	**50.0**	-	-
Subtotal	19,140.3	18,921.2	**20,121.9**	981.6	5.1
Drainage Revenue				-	
Drainage Infrastructure Levy	5,119.3	5,112.6	**5,570.4**	451.1	8.8
Other Revenue				-	
Local Improvement Levy	82.3	74.3	**82.3**	-	-
Late Payment & Transfer Charges	312.0	383.4	**316.7**	4.7	1.5
Claims Revenue	60.0	17.5	**60.0**	-	-
Other Revenues	17.0	15.9	**44.5**	27.5	161.8
Green Municipal Enabling Fund	-	2.4	**-**	-	
Subtotal	471.3	493.5	**503.5**	32.2	6.8
Total Utility Revenue	51,992.3	51,457.8	**54,322.7**	2,330.4	4.5

Use of 2005 Utility Revenue



Utility Operating Expenditures

Expenditure Details ($000's)	2004 Budget	2004 Actual	**2005 Budget**	Change 2004 to 2005 Dollar Change	Change 2004 to 2005 Per Cent Change
Water					
Water Supply	5,358.9	4,874.0	**5,487.8**	128.9	2.4
Water Pumping	957.0	831.2	**1,130.4**	173.4	18.1
Water Distribution	6,068.0	5,174.6	**6,001.7**	(66.3)	(1.1)
	12,383.9	10,879.8	**12,619.9**	236.0	1.9
				-	
Wastewater				-	
Wastewater Collection	1,533.4	1,709.0	**1,708.5**	175.1	11.4
Wastewater Treatment	4,382.5	4,428.9	**4,576.8**	194.3	4.4
	5,915.9	6,137.9	**6,285.3**	369.4	6.2
				-	
Drainage	1,058.8	952.1	**1,121.0**	62.2	5.9
				-	
Engineering and Operations				-	
General Administration	571.4	489.9	**702.5**	131.1	22.9
Water, Wastewater Collection and Drainage Engineering	1,165.7	442.4	**1,566.4**	400.7	34.4
Environmental Engineering	223.4	628.1	**281.6**	58.2	26.1
Development and Technical Services	731.7	968.5	**734.5**	2.8	0.4
Operations Administration	2,367.1	2,615.1	**2,578.7**	211.6	8.9
Facilities	213.2	185.0	**193.2**	(20.0)	(9.4)
	5,272.5	5,329.0	**6,056.9**	784.4	14.9
				-	
Utility Administration				-	
Customer Service, Billing & Collection	2,332.7	2,168.0	**2,254.5**	(78.2)	(3.4)
Utility Administration Charge	2,465.4	2,465.4	**2,599.6**	134.2	5.4
	4,798.1	4,633.4	**4,854.1**	56.0	1.2
				-	
Debt Costs	12,385.1	12,588.0	**12,699.7**	314.6	2.5
Total Utility Expenditures	41,814.3	40,520.2	**43,636.9**	1,822.6	4.4

Staffing Summary

FTE's by Department	**2004**	**2005**
Corporate Services		
Permanent	3.0	3.0
Casual	-	-
Engineering and Works		
Permanent	151.5	151.5
Casual	28.8	31.6
Finance		
Permanent	22.5	22.0
Casual	3.7	2.8
Total	209.5	210.9

Analysis of Operating Budget Change

	Details of Operating Budget Changes	($000's)
	2004 Budget	41,814.3
1.	Salaries and Benefits - Includes cost changes resulting from merit increases, classification reviews, employer benefit costs, the full cost of positions added in the 2004 budget, and changes in the organization structure within Engineering and Works.	417.1
2.	Purchase of Water - Increase in cost of water from Buffalo Pound Water Treatment Plant ($127,200) less a decrease of $11,400 in electrical cost for pumping.	115.8
3.	Increase in fleet charges due to increased depreciation charges as old vehicles and equipment are replaced in accordance with the Fleet Review.	33.9
4.	Electrical rate increase.	171.8
5.	Delete 2004 specials ($313,900) and GST adjustment ($182,400).	(496.3)
6.	Bacteriological testing of water - Effective July 1, 2004, Sask Environment has initiated a charge of $20 plus GST for each water test. There are about 1,500 tests annually.	32.1
7.	Increase for utility operating costs - Historically, increased costs for non-salary expenditures were offset through underexpended salary and benefit costs. In 2003 salary budgets were adjusted but non-salary costs were not adjusted. This increase provides the funding level required to sustain the current level of operations.	245.0
8.	Domestic and storm sewer cleaning - Additional funding (1.3 casual FTE) to accommodate the increase in infrastructure over the last 15 years, and provide for expansion of the program to reduce blockages. Regina has a high level of blockages as compared to other cities.	90.0
9.	Water meters for new installations and replacements - funding in prior years was eliminated during the capital projects to replace meters.	50.0
10.	Special - Wastewater Collection Inflow and Infiltration Study - determine solutions for reducing inflow and infiltration to the wastewater collection system.	200.0
11.	Special - Long Term Water Supply Study - Study approved in 2004, with a total cost of $300,000, of which $45,000 was expended.	255.0
12.	Special - Wascana Creek Receiving Environment Study - Study approved in 2004 with a total cost of $100,000 of which $25,000 was expended.	75.0
13.	Special - Asbestos Cement (AC) Watermain Repair Strategy - 750 km of watermains constructed in the 1950s, 60s and 70s are AC. High levels of breaks have occurred and development of a long-term management plan is required.	50.0
14.	Special - SCADA computer upgrade to keep the control system compatible with the City's current network operating system and upgrade computers to those suited for industrial conditions.	40.0
15.	Special - Ventilation upgrades for 4 of 16 lift stations to reduce sewer gases, thereby improving safety and lessening corrosion.	25.0
16.	Special - Service main duty pumps at water pumping stations.	20.0
17.	Funding (1.5 casual FTE) for Engineering Assistants to inspect capital projects and perform related work.	55.0
18.	Utility Administration Charge - Increase in the administration levy charged for the Utility's use of other City services. The charge is 5% of the prior year's utility operating budget.	134.2
19.	Increase in debt costs.	314.6
20.	Total of all other changes.	(5.6)
	2005 Budget	43,636.9

Utility Financial Planning

Policies that guide the financial management of the Utility and the development of rates include:

1. **Establishing Rates** – In 1995, the objectives established for the Utility's rate structure were:

    - **Financial Self Sufficiency** – Utility rates must generate revenue adequate to meet all operating and capital costs of the Utility in both the short and the long-term.

    - **Conservation** – Utility rates should encourage customers to use water responsibly.

    - **Reduction of Peak Demand** – The Utility rates should encourage water conservation during summer months, reducing the need for infrastructure investment and higher rates.

    - **Equity** – The Utility rates should result in a charge to customers according to the cost of services they utilize.

2. **Utility Surplus** – Annually the Utility generates a surplus, with the surplus intended for the following purposes:

    - **Transfer to the General Operating Fund** – For 2005, the transfer is the total of the following amounts:

        – 7.5% of the previous years budgeted revenues for billed water consumption, wastewater charges and drainage infrastructure levy; and,

        – An amount ($675,400) estimated to be the additional GST rebate received by the Utility.

    - **Transfer to the General Capital Fund** – For 2005, the transfer is the total of the following amounts:

        – An amount ($2,500,000) equal to the Canada Saskatchewan Infrastructure Program grants received by the Utility, and,

        – An amount ($1,700,000) equal to the Municipal Rural Infrastructure Fund grants received by the Utility.

    - **Transfer to the General Utility Reserve** – The balance of the Utility's surplus, after the transfer to the General Operating Fund and General Capital Fund, is transferred to the General Utility Reserve. The purpose of the reserve is to provide a source of financing for capital projects. In the event that the Utility incurs an operating deficit in a given year, the deficit would also be funded from the reserve.

The City maintains a long-term (20-year) financial model for the Utility. The purpose of the model is to project future operating revenues and expenditures along with capital requirements and capital funding. The major decisions in generating the projections for the Utility are:

- **Utility Rates** – While the objective is to minimize the need for rate increases, a parallel objective is to ensure required rate increases are gradual, rather than having large increases when major capital expenditures are required.

- **Capital Expenditures** – There are service goals for each component of the utility that determine the long-term capital requirements. There is some flexibility in planning for capital expenditures. The utility model can be used to evaluate the financial implications of alternate schedules for capital expenditures.

- **Capital Funding** – Historically, capital funding has been provided through the issuing of debt or the use of internal reserves. The utility model can be used to evaluate the implications of the use of debt.

The utility model is based on the following assumptions:

- **Water Consumption** – The model uses an annual billable water consumption figure of almost 24.0 million cubic metres. The model is based on the current trend for water consumption and the assumption that total consumption will not change significantly in the future.

- **Operating Costs** – The model uses the 2005 operating budget and applies an inflation rate of 3% per year to forecast costs for the next 20 years. The cost of water supplied by the Buffalo Pound Water Treatment Plant is projected to increase at a rate of 5% per year. Actual costs will differ from the projected costs over time, but the assumptions are considered reasonable for the purpose of the model.

- **Utility Rates** – The utility rates approved for 2005 – 2007 are used in the model. In future years, based on the projections of operating and capital expenditures, average annual rate increases of about 4% would be required for water, wastewater and drainage rates.

- **Capital Expenditures** – The model accommodates the capital expenditures in the proposed 2005 – 2009 Utility Capital Program, along with future capital requirements based on a 20-year capital expenditure plan. The current version of the utility model has projected capital costs (based on current dollars) of about $307 million from 2010 to 2024.

- **Capital Funding** – The model includes projections for capital funding from the General Utility Reserve and Utility Development Charges. Capital funding beyond that available from the reserve or development charges must be provided through external financing. **Capital financing requirements in the 2005 – 2009 Utility Capital program are $30.0 million in 2008 and $20.0 million in 2009. Debt financing will be required every year from 2010 to 2020 based on current projections of rates, operating costs, and capital requirements.**

Utility Rates and Customers

City Council's practice since about 1990 has been to establish utility rates every three years, with a three-year schedule of rates adopted. In 2004 (Bylaw 2004-35), rates were set for the 2005 – 2007 period.

As part of the rate review in 2001, City Council (Report CR01-189 and Bylaw 2001-74) approved a new rate structure for water, wastewater and drainage rates, effective January 1, 2002. The rate structure includes the following components:

- A base fee for water and wastewater that varies according to the size of the water meter. The variation in the base rate by meter size is consistent with the schedule recommended by the American Water Works Association (AWWA). The ratios for the base rate based on meter size are shown in the following table.

Water and Wastewater Base Fee Ratios

Meter Size	AWWA Standard Ratio	Meter Size	AWWA Standard Ratio
15 mm	1.0	75 mm	11
18 mm	1.0	100 mm	14
25 mm	1.4	150 mm	21
40 mm	1.8	200 mm	29
50 mm	2.9		

- A uniform rate for each cubic metre of water consumption and each cubic metre of deemed wastewater flow. For water, the uniform rate is applied to all consumption. For wastewater, the deemed volume is a percentage of the water consumption. The percentages are:
  - For residential customers, the wastewater volume is 82% of the water consumption;
  - For multiple unit residential properties, the percentage is 95% of the water consumption; and,
  - For institutional, commercial and industrial properties, the percentage is 98% of the water consumption.
- The rate structure for the storm drainage infrastructure levy is based on the size of the property, with larger properties paying a higher levy. The drainage levy applies irrespective of whether the property is connected to the water or wastewater systems. The long-term objective is that the drainage infrastructure levy is sufficient to cover drainage capital and operating costs, and the drainage share of other utility costs. The current projections in the utility model shown, on average, a 90% recovery for the 2005 – 2009 period, with the recovery rate increasing in subsequent years and reaching 100% within ten years.

The utility rates for 2004 through 2007 are shown in the following tables.

Water Rates

(Billed Every Two Months)

	2004	2005	2006	2007
Base Fee per Billing Period:				
15 mm/18 mm water meter	$ 19.50	**$ 20.50**	$ 21.50	$ 22.50
25 mm water meter	27.30	**28.70**	30.10	31.50
40 mm water meter	35.10	**36.90**	38.70	40.50
50 mm water meter	56.55	**59.50**	62.40	65.30
75 mm water meter	214.50	**225.50**	236.50	247.50
100 mm water meter	273.00	**287.00**	301.00	315.00
150 mm water meter	409.50	**430.50**	451.50	472.50
200 mm water meter	565.50	**594.50**	623.50	652.50
Volume Charge:				
Charge per Cubic Metre	$ 0.81	**$ 0.83**	$ 0.85	$ 0.88

Wastewater Rates

(Billed Every Two Months)

	2004	2005	2006	2007
Base Fee per Billing Period:				
15 mm/18 mm water meter	$ 14.50	**$ 15.50**	$ 16.50	$ 17.50
25 mm water meter	20.30	**21.70**	23.10	24.50
40 mm water meter	26.10	**27.90**	29.70	31.50
50 mm water meter	42.05	**45.00**	47.90	50.80
75 mm water meter	159.50	**170.50**	181.50	192.50
100 mm water meter	203.00	**217.00**	231.00	245.00
150 mm water meter	304.50	**325.50**	346.50	367.50
200 mm water meter	420.50	**449.50**	478.50	507.50
Volume Charge:				
Charge per Cubic Metre	$ 0.69	**$ 0.72**	$ 0.75	$ 0.78

Drainage Infrastructure Levy Rates

(Billed Every Two Months)

Area of Property	2004	2005	2006	2007
0 to 1,000 m^2	$ 12.00	**$ 13.00**	$ 14.00	$ 15.00
1,001 to 3,000 m^2	24.00	**26.00**	28.00	30.00
3,001 to 5,000 m^2	48.00	**52.00**	56.00	60.00
5,001 to 7,000 m^2	72.00	**78.00**	84.00	90.00
7,001 to 9,000 m^2	96.00	**104.00**	112.00	120.00
9,001 to 11,000 m^2	120.00	**130.00**	140.00	150.00
11,001 to 13,000 m^2	144.00	**156.00**	168.00	180.00
13,001 to 15,000 m^2	168.00	**182.00**	196.00	210.00
15,001 to 17,000 m^2	192.00	**208.00**	224.00	240.00
17,001 to 19,000 m^2	216.00	**234.00**	252.00	270.00
19,001 to 21,000 m^2	240.00	**260.00**	280.00	300.00
21,001 to 23,000 m^2	264.00	**286.00**	308.00	330.00
23,001 to 25,000 m^2	288.00	**312.00**	336.00	360.00
25,001 to 27,000 m^2	312.00	**338.00**	364.00	390.00
27,001 to 29,000 m^2	336.00	**364.00**	392.00	420.00
29,001 to 31,000 m^2	360.00	**390.00**	420.00	450.00
Over 31,000 m^2	384.00	**416.00**	448.00	480.00

The Water and Sewer Utility provides services to a population of over 190,000. The Utility also provides water and wastewater service to customers and communities outside of the city limits. These customers are adjacent to the city or located along the City's water supply lines. The following tables provide summaries of the utility customers.

Water and Sewer Utility Customers

	Water Customers	Wastewater Customers	Drainage Customers
Residential	55,460	55,449	55,094
Multi-Unit Residential	757	746	730
Commercial	3,084	2,907	3,126
Summer Service	201	24	-
Total	59,502	59,126	58,950
Within City Limits	59,354	59,091	58,950
Outside City Limits	148	35	-
Total	59,502	59,126	58,950

Water Customers

Size of Connection	Residential	Multi-Unit Residential	Commercial	Summer Service	Total
15 mm - 5/8"	52,886	12	1,207	10	54,115
18 mm - 3/4"	2,472	232	1,069	20	3,793
25 mm - 1"	14	320	358	41	733
40 mm - 1.5"	2	99	137	39	277
50 mm - 2"	-	37	159	80	276
75 mm - 3"	-	56	115	7	178
100 mm - 4"	-	-	16	4	20
150 mm - 6"	-	-	6	-	6
200 mm - 8"	-	-	3	-	3
Unmetered	86	1	14	-	101
Total	55,460	757	3,084	201	59,502

Wastewater Customers

Size of Connection	Residential	Multi-Unit Residential	Commercial	Summer Service	Total
15 mm - 5/8"	52,885	12	1,170	6	54,073
18 mm - 3/4"	2,465	227	1,014	2	3,708
25 mm - 1"	12	320	334	3	669
40 mm - 1.5"	1	96	121	7	225
50 mm - 2"	-	35	126	6	167
75 mm - 3"	-	56	109	-	165
100 mm - 4"	-	-	13	-	13
150 mm - 6"	-	-	5	-	5
200 mm - 8"	-	-	2	-	2
Unmetered	86	-	13	-	99
Total	55,449	746	2,907	24	59,126

Drainage Customers

Area of Property	Residential	Multi-Unit Residential	Commercial	Number of Properties
0 to 1,000 m^2	55,093	324	1,293	56,710
1,001 to 3,000 m^2	-	296	820	1,116
3,001 to 5,000 m^2	-	40	314	354
5,001 to 7,000 m^2	-	26	158	184
7,001 to 9,000 m^2	-	9	110	119
9,001 to 11,000 m^2	-	10	75	85
11,001 to 13,000 m^2	1	7	52	60
13,001 to 15,000 m^2	-	4	50	54
15,001 to 17,000 m^2	-	1	40	41
17,001 to 19,000 m^2	-	2	26	28
19,001 to 21,000 m^2	-	6	30	36
21,001 to 23,000 m^2	-	2	17	19
23,001 to 25,000 m^2	-	1	13	14
25,001 to 27,000 m^2	-	1	9	10
27,001 to 29,000 m^2	-	-	12	12
29,001 to 31,000 m^2	-	-	7	7
Over 31,000 m^2	-	1	100	101
Total Properties	55,094	730	3,126	58,950

The following tables detail the history of utility rates since 1991 (1992 for the Drainage Infrastructure Levy), and the annual cost and annual cost increase for a sample residential customer with 360 cubic metres of water consumption a year.

Water Rate History

Year	Consumption in Minimum Charge (Cubic Metres)	Minimum Charge	Volume Charge (Per Cubic Metre)	Cost for Sample Customer	
				Annual Charge (360 m^3)	Per Cent Increase
1991	28.3	15.57	0.565	200.80	5.1%
1992	28.3	16.40	0.593	211.20	5.2%
1993	28.3	17.70	0.643	228.48	8.2%
1994	28.3	19.20	0.693	247.02	8.1%
1995	28.3	20.20	0.728	259.68	5.1%
1996	25.0	20.85	0.740	280.50	8.0%
1997	22.0	21.90	0.750	302.40	7.8%
1998	19.0	23.00	0.750	322.50	6.6%
1999	16.0	23.00	0.750	336.00	4.2%
2000	13.0	23.00	0.750	349.50	4.0%
2001	10.0	23.00	0.750	363.00	3.9%
2002	none	17.50	0.770	382.20	5.3%
2003	none	18.25	0.790	393.90	3.1%
2004	none	19.50	0.810	408.60	3.7%
2005	**none**	**20.50**	**0.830**	**421.80**	**3.2%**
2006	none	21.50	0.850	435.00	3.1%
2007	none	22.50	0.880	451.80	3.9%

Wastewater Rate History

Year	Consumption in Minimum Charge (Cubic Metres)	Minimum Charge	Volume Charge (Per Cubic Metre)	Cost for Sample Customer	
				Annual Charge (360 m^3)	Per Cent Increase
1991	28.3	14.58	0.558	149.10	5.0%
1992	28.3	15.80	0.601	169.44	13.6%
1993	28.3	17.10	0.650	183.36	8.2%
1994	28.3	18.50	0.700	197.94	8.0%
1995	28.3	19.10	0.721	204.18	3.2%
1996	25.0	17.50	0.690	204.36	0.1%
1997	22.0	17.65	0.660	212.82	4.1%
1998	19.0	17.75	0.630	219.90	3.3%
1999	16.0	17.75	0.630	231.24	5.2%
2000	13.0	17.75	0.630	242.58	4.9%
2001	10.0	17.75	0.630	253.92	4.7%
2002	none	12.75	0.650	268.38	5.7%
2003	none	13.50	0.670	278.78	3.9%
2004	none	14.50	0.690	290.69	4.3%
2005	**none**	**15.50**	**0.720**	**305.54**	**5.1%**
2006	none	16.50	0.750	320.40	4.9%
2007	none	17.50	0.780	335.26	4.6%

Drainage Infrastructure Levy Rate History

Year	Property Category	Annual Levy	Percentage Increase
1992	All	24.00	n/a
1993	All	30.00	25.0%
1994	All	36.00	20.0%
1995	All	42.00	16.7%
1996	1,000 square metres or less	42.00	-
1997	1,000 square metres or less	43.20	2.9%
1998	1,000 square metres or less	44.40	2.8%
1999	1,000 square metres or less	45.60	2.7%
2000	1,000 square metres or less	46.80	2.6%
2001	1,000 square metres or less	48.00	2.6%
2002	1,000 square metres or less	49.20	2.5%
2003	1,000 square metres or less	60.00	22.0%
2004	1,000 square metres or less	72.00	20.0%
2005	**1,000 square metres or less**	**78.00**	**8.3%**
2006	1,000 square metres or less	84.00	7.7%
2007	1,000 square metres or less	90.00	7.1%

Utility Rate Comparisons

Sample Residential Customer

Water Consumption: 360 cubic metres
Meter Size: 15 mm

This water consumption would be typical for a household consisting of two adults and two children, living in a home with two bathrooms, a dishwasher and washing machine, on a 500 m^2 lot with typical landscaping for Regina.

Sample Residential Customer - 2005 Rates

Utility Bill Details	Regina	Calgary	Edmonton	Saskatoon	Winnipeg
Water:					
Basic Charge	**$ 123.00**	$ 124.80	$ 52.56	$ 45.60	$ 55.00
Volume Charge	**298.80**	340.13	422.32	193.24	349.61
Total Water	**421.80**	464.93	474.88	238.84	404.61
Wastewater:					
Basic Charge	**93.00**	80.57	54.96	45.60	-
Volume Charge	**212.54**	219.59	314.60	142.39	430.98
Total Wastewater	**305.54**	300.16	369.56	187.99	430.98
Drainage or Infrastructure Levy	**78.00**	-	77.30	120.78	-
Total Annual Utility Charges	**$ 805.34**	$ 765.09	$ 921.74	$ 547.61	$ 835.59

Sample Commercial Customer

Water Consumption: 500 cubic metres
Meter Size: 40 mm

This water consumption would be typical for a retail store of 4,500 m^2 with a paved parking lot, minimal landscaping, bathrooms for customers and employees, and no food services.

Sample Commercial Customer - 2005 Rates

Utility Bill Details	Regina	Calgary	Edmonton	Saskatoon	Winnipeg
Water:					
Basic Charge	**$ 221.40**	$ 275.40	$ 183.00	$ 540.00	$ 85.80
Volume Charge	**415.00**	385.89	383.13	247.20	485.58
Total Water	**636.40**	661.29	566.13	787.20	571.38
Wastewater:					
Basic Charge	**167.40**	184.52	54.96	540.00	-
Volume Charge	**352.80**	258.55	436.95	256.03	598.58
Total Wastewater	**520.20**	443.07	491.91	796.03	598.58
Drainage or Infrastructure Levy	**312.00**	-	695.68	178.34	-
Total Annual Utility Charges	**$ 1,468.60**	$ 1,104.36	$ 1,753.72	$ 1,761.57	$ 1,169.96

Water

Initiatives for 2005

- Complete the installation of new pumps and modifications to existing pumps at the Buffalo Pound Water Treatment Plant. This work is being done in conjunction with the twinning of the Buffalo Pound to Regina water supply pipeline that was completed in 2003. Three new pumps are required to replace existing pumps originally installed in the 1950s and the 1960s. Two existing pumps installed in the early 1990s are being modified to achieve peak pumping efficiency, while one new pump is being installed to increase the peak day pumping rate by approximately 33%. Once the new pumps are operational annual pumping costs will decrease by approximately 50%. When this work is complete **all water supply for the City will come from the Buffalo Pound Water Treatment Plant** and the City will only use its ground water supply in an emergency.

- Complete the Long Term Water Utility Study Update which was started in 2004 to identify required improvements and upgrades. The original study was completed in 1993 and recommended numerous improvements to the water supply, water pumping and water distribution system, many of which have been completed. The Study Update will review portions of the water system that are affected by changes to water demand trends, water quality regulations and other factors. **A Waterworks System Assessment as required by the 2002 Water Regulations will also be completed.** Upgrade and improvement alternatives will be identified which will be refined and become the basis for future capital improvements.

- Complete the assessment of the performance of asbestos cement (AC) watermains. This work will be done in conjunction with the National Research Council's Centre for Sustainable Infrastructure Research in Regina, under the Communities of Tomorrow partnership. The number of breaks in AC watermains increases dramatically during dry weather conditions such as occurred in the summer and fall of 2003, resulting in high costs for repairs. The assessment will determine the cause of the failures, whether there are ways to minimize future breaks, and alternatives available for providing a long-term solution.

Status of 2004 Initiatives

- Completed the installation and commissioning of a new computer control and monitoring system at the Buffalo Pound Water Treatment Plant.

- The meter replacement and AMR project was completed resulting in the installation of 51,100 water meters and 56,600 automated meter reading units.

- 94.1 metres of cast iron water mains were replaced in intersections.

- 97.1 metres of watermains were constructed to eliminate 2 dead ends.

- 8 fire hydrants were replaced as part of maintenance, and 23 hydrants were replaced on roadways improvement projects.

Water System Overview

The water supply, pumping and distribution system provides water for residential and commercial use and fire protection. The system serves a population of over 190,000 including all residents and businesses in the city limits and a number of customers outside the city. Service goals include:

- Providing water that meets or exceeds Provincial water quality standards and objectives.

- Providing water at adequate pressure and in sufficient quantity to satisfy the requirements for domestic and commercial use, irrigation and fire protection.

- Identifying and implementing improvements to the water system through long range planning, monitoring, improved operation, capital works and new technology.

Components of the water system shown in the map on the next page include:

- **Buffalo Pound Lake and Wells** – Approximately 99% of the annual water needs are provided from Buffalo Pound Lake, with the remainder drawn from ground water wells in and around the city. There are currently 12 wells in use and another six used for backup purposes. The well water is chlorinated, but does not require further treatment to meet health standards.

- **Buffalo Pound Water Treatment Plant** – Water from Buffalo Pound Lake is drawn from the lake and pumped three kilometres to the Buffalo Pound Water Treatment Plant, a facility owned jointly with the City of Moose Jaw. At the plant, the water is mixed with coagulants that cause algae, bacteria and other impurities to clump together so that they settle out of the water. The water is then filtered and chlorinated. During warmer weather, the water is passed through granular activated carbon to improve the taste and odour.

- **Supply Pipelines** – From the Buffalo Pound Water Treatment Plant, the water is pumped through a 56 kilometre pipeline to the City's water distribution system. The pipeline has been twinned to provide increased capacity and reliability of the water supply. A number of other supply pipelines transport water from wells to reservoirs.

- **Reservoirs** – Five storage reservoirs are used to store water to meet peak demands and ensure that there is an adequate supply of water available for firefighting. The reservoirs have a combined usable storage capacity equal to about one and one-half days of average water use for the city.

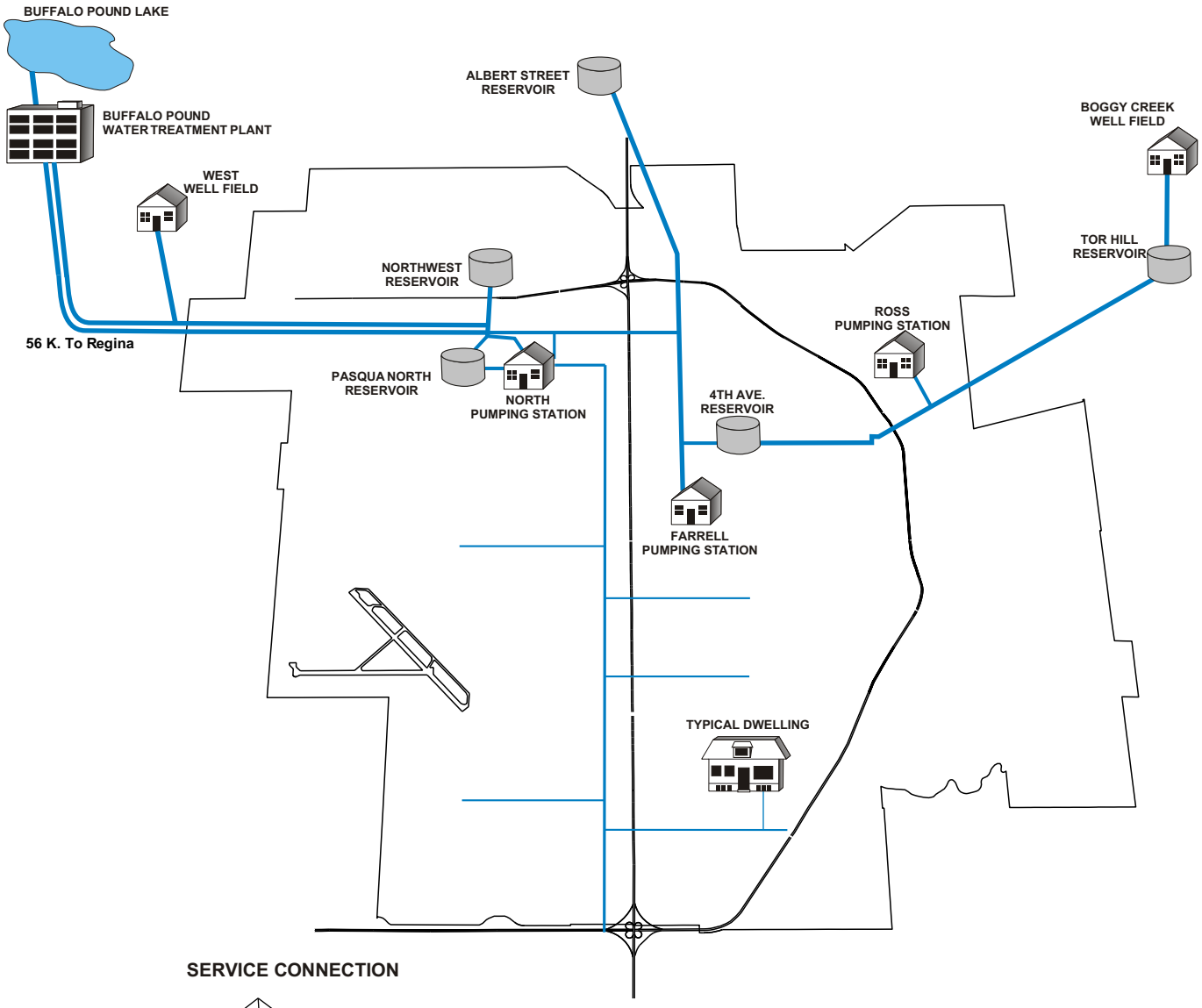
- **Pumping Stations** – There are three pumping stations (North, Farrell and Ross) that are used to pump the water from reservoirs into the distribution system as necessary.

- **Distribution System** – The distribution system consists of over 785 kilometres of pipelines ranging in size from large 1,067 mm diameter trunk mains to 100 mm distribution pipes. The pipelines are made of various materials – asbestos cement, coated steel and polyvinyl chloride (PVC). The distribution system also includes over 6,000 valves that allow the water to be turned off to facilitate repairs and maintenance.

- **Service Connections** – Distribution pipes are connected to a customer's water lines through a service connection.

- **Water Meters** – Water meters measure water consumption. A water meter replacement program was completed in 2004. The project includes the installation of automated meter reading (AMR) equipment to provide meter readings to a mobile data collection unit.

WATER SYSTEM



1. Service Connection (Curb Box)
2. Watermain

Water System Objectives

The Long Term Water Utility Study, completed in 1993, covered all aspects of the water system, including projected future water requirements, the condition of the existing system components, and a review of the system operations. The study was adopted by City Council as the City's long-term water supply plan. In 1998, a portion of the study was updated and resulted in a decision to improve the Buffalo Pound supply pipeline rather than construct a ground water treatment plant. A further update will be completed in 2005.

As part of the study, a number of objectives were established. These objectives continue to guide the water system operations today, and include:

- **Water Quality** – The City adopted the *Guidelines for Canadian Drinking Water Quality, 4th Edition* published by Health Canada as the basis for its water quality objectives. These are the most complete guidelines established in Canada. The standards, adopted by Saskatchewan Environment, regulate the operation of all waterworks in Saskatchewan.

  For parameters not included in the *Guidelines*, the City has adopted the most stringent level listed by other authorities. Some parameters are for substances for which there are aesthetic concerns rather than health concerns, such as iron, manganese and hardness. Other parameters are for substances to which health concerns have been linked but not proven, such as aluminum and trihalomethanes.

- **Water Conservation** – An enhanced Water Conservation Program was initiated in 1991 to reduce the per capita water consumption and the short-term peak water demand. Reduction of water demand was recognized as a strategic means for postponing capital expenditures for the expansion of both water and wastewater treatment facilities. Targets for reduction of average day and peak day water consumption (as compared to the projections in 1992 for specific future years) were a 5% reduction by 1996, a 10% reduction by 2001 and a further 15% reduction by 2011. These targets were confirmed in the Long Term Water Utility Study.

  Water consumption figures indicate that since 1991, average water consumption has decreased 9.9% while the population has increased approximately 5%. The reduction for average day and peak day per capita water use in 2003 (as compared to 1991) was 23% and 12.5% respectively.

- **Security and Reliability** – The City established an objective for the security of delivery, defined as ensuring the water will be available within the limits of minimal local disruptions for system maintenance and rare large-scale disruptions due to unforeseen catastrophe. Specific objectives are:

  - Mandatory water rationing should occur less than one year in ten.

  - Service should be restored within 24 hours in the event of local service disruptions such as water main breaks and connection problems. This objective is being achieved for 99% of incidents.

  - All reasonable steps should be taken to ensure that large-scale disruptions do not occur. These steps include ensuring that there is sufficient redundancy in the system so that alternate facilities can be used in the event of a failure in part of the system.

  - Alternate power sources must be available in the event of a main power failure.

  - Hydrants should be installed and maintained to meet the requirements of the National Fire Code.

- **Water Pressure** – Water must be delivered to customers under pressure. It is desirable to maintain pressure standards between a minimum and maximum range. The pressure under which water is delivered to a customer depends upon many factors, including the consumption by other customers, pumping capabilities, pipe size, velocity of the water through the system, and the design of the water system.

Water pressure can be controlled to a certain extent through the operation of pumps and other components of the system. However in some instances, system changes may be necessary to meet pressure standards.

As part of the Long Term Water Utility Study, desirable ranges for pressure and velocity were identified and system improvements were recommended where conditions fell outside of these ranges.

- **Efficiency of Operations** – Electricity used in pumping water is a significant cost within the Water Supply, Pumping and Distribution budget. This cost is a factor of the efficiency of the pumps as well as the hydraulics of the system. Pumping operations are regularly reviewed to identify where system improvements or operational changes could reduced electrical costs. Changes are pursued when cost-effective.

Water Supply

Buffalo Pound Lake provides over 99% of Regina's water needs. The water is treated at the Buffalo Pound Water Treatment Plant, which is jointly owned by the cities of Regina and Moose Jaw. It was built in the 1950s in order to provide water for those two cities. The facilities are administered by the Buffalo Pound Water Administration Board, which consists of two members appointed by the City of Regina and one member appointed by the City of Moose Jaw.

Although the plant is operated as a separate entity, there is a high degree of communication and cooperation between the plant operators and the two cities.

On an annual basis, the Board establishes a general water rate. The rate is established on a cost-recovery basis. The 2005 rate has been set at $154.81 for one million litres, a 2.62% increase over the 2004 rate. The increase is due primarily to increases in labour, energy and chemical costs.

Since Buffalo Pound Lake is shallow and prone to the growth of algae and other organic materials, treatment of the lake water is challenging. Over the last ten years, the lake water has shown a trend of progressively higher levels of organic materials, which require higher levels of chemicals and carbon filtration in order to provide water that meets the City's water quality objectives.

The City's estimated 2005 cost of water purchased from Buffalo Pound will total approximately $5.1 million, or about 44% of the total costs of the Water Supply, Pumping and Distribution Program.

Buffalo Pound's operating costs have been impacted by the cost of chemicals for treating the water, increased maintenance requirements and compliance with new regulations. Higher quantities of chemicals, primarily powdered activated carbon, have been needed for taste and odour control. Maintenance costs are rising due to the age of the plant and new regulatory requirements for testing and quality control resulting in increased demands on the plant's laboratory.

In recent years Regina has changed its water supply strategy to use the higher quality water from the Buffalo Pound Plant rather than using wells, thereby avoiding the cost of providing water treatment for well water. This change has resulted in a heavier loading on the plant than anticipated when the plant was upgraded in the 1980s. Plant processes are capable of handling the loading but some parts of the system, such as the sludge management system, were not designed with this capacity in mind. Maintenance and operating requirements are now closer to the plant's capacity.

Future planning for the plant must address the continually increasing knowledge and anticipated regulations related to health effects. In 2005 the City will complete a review and update of its Long Term Water Utility Plan. This review will include a study of the Buffalo Pound Water Treatment Plant. Areas requiring study and attention include:

- Disinfection practises – The plant uses chlorine for treatment and disinfection. Levels of chlorinated disinfection by-products measured in the distribution systems of the two cities, while within current guidelines, will not be acceptable when anticipated higher standards come into effect. An alternative disinfection process, chloramination, has the potential to replace chlorination significantly and reduce the level of chlorination by-products. In recent years, the health risks associated with cryptosporidium have become better recognized. An additional disinfection barrier, perhaps employing ultraviolet light, could be introduced to further reduce risks associated with cryptosporidium.

- Taste and odour control – The plant uses granular and powdered activated carbon for taste and odour control. The treatment capacity of this process has been taxed in recent years.

- There is insufficient capacity of the wastewater residuals systems, and sludge management is difficult particularly in warmer winters when proper de-watering of the sludge in the lagoons cannot be achieved.

- Treated water corrosivity – High coagulant dosages and enhanced coagulation processes often leave the treated water pH lower than what may be desired, and sometimes near the lower water quality guideline.

- The treated water storage reservoir capacity at the plant is small compared to the current treatment rate.

The Long-Term Utility Study will provide recommendations to address these, and potentially other, aspects of the Plant.

A Waterworks System Assessment (WSA) will also be completed for the Buffalo Pound Water Treatment Plant and Regina's Water System in 2005. WSA's are required every five years in accordance with Saskatchewan Environment's 2002 Water Regulations. The WSA will evaluate current performance, level of optimization, functionality, capability, efficiency and sustainability of the waterworks and identify required improvements.

As part of the total water purchase costs the two cities also contribute an amount equal to 10% of the general water charges to a Capital Replacement Reserve used to pay for replacement and upgrading of equipment in the plant.

Costs for major improvements to the plant are shared with the City of Moose Jaw. The cost-sharing ratio is determined by the percentage ownership of each City, which at the present time is approximately 73% for Regina and 27% for Moose Jaw.

Water Purchase Statistics	**2000**	**2001**	**2002**	**2003**	**2004**
Purchases (mega litres)	26,696	29,709	27,180	29,828	27,021
General Rate ($/mega litre)	122.84	133.89	136.16	138.88	150.87
Capital Replacement Program (10% of General Rates) ($/mega litre)	12.28	13.39	13.62	13.89	15.09
Power ($/kwh)	0.0511	0.05261	0.05471	0.05581	0.05748
Power (kwh) (000's)	4,887.9	5,955.1	4,887.3	5,449.0	4,939.3

Regina also draws water from 18 wells located in and around the city. Although the wells currently provide annually less than 1% of the city's water, they are used to help meet peak demands on hot summer days. During those times, wells provide as much as 30% of the water used by residents.

The well water meets safety standards but has levels of iron, manganese and hardness that exceed the City's water quality objectives. These minerals can cause staining on fixtures, as well as the appearance

of “discoloured” water. The minerals also cause problems by forming deposits in the water system, requiring more frequent maintenance.

Over the past few years, concerns about well water quality have been managed by using lower volumes of well water and higher volumes of water from Buffalo Pound. However, the wells play an important role in maintaining the reliability of the city’s water supply. The wells can provide the city’s minimum essential water needs in the event of a failure in the Buffalo Pound water supply.

Water Supply by Source (in mega litres)	2000	2001	2002	2003	2004
Well Fields:					
Mound Springs (sold, no longer in operation)	113	220	-	-	-
Regina Wells	-	-	-	-	-
West Wells	4	1	-	59	-
Boggy Creek	47	1	-	233	-
Subtotal	164	222	-	292	-
Buffalo Pound Water Treatment Plant	26,696	29,709	27,180	29,828	27,021
Total City Water Supply	26,860	29,931	27,180	30,120	27,021
Percentage of Supply By Source:					
Wells	0.6	0.7	-	1.0	-
Buffalo Pound	99.4	99.3	100.0	99.0	100.0
Total	100.0	100.0	100.0	100.0	100.0

A number of tests are carried out to ensure that the water meets the water quality objectives. Tests include:

- At the Buffalo Pound Water Treatment Plant, over 25,000 tests are performed each year to check for over 65 different substances. On-line analyzers and laboratory staff conduct the tests. In addition, some testing is done by outside labs. The cost of these procedures is included in the general water rate for water purchased from Buffalo Pound.

- Tests are also carried out at various points in the City’s water supply and distribution system. Regular sampling and testing is done in order to comply with provincial government requirements for the operation of the water system, as well as to ensure the City’s water quality objectives are met.

Test results show that the water supply meets all health and safety guidelines. Instances have occurred where water quality did not meet the water quality objectives for iron and manganese from well water. Customer complaints also indicated the presence of discoloured water.

In addition to carrying out testing of treated water, steps are taken to safeguard the water supply. Identification and prevention of possible sources of groundwater contamination is an ongoing process. The City participated in a review of the Upper Qu’Appelle River watershed started by Saskatchewan Watershed Authority in 2004.

Water Pumping

Three pumping stations are used to pump water from reservoirs into the distribution system. The operation of all stations must be coordinated along with supplies from Buffalo Pound and other components of the supply system such as the reservoirs. Since electrical costs are a major component of this operation, it is important that the pumps are operated in an efficient manner. Water pumping must also be provided when electrical power failures occur.

In order to coordinate the operation of each station and to operate the pumps in an efficient and reliable manner, system data is required. This information is obtained from a computerized Supervisory Control and Data Acquisition (SCADA) system.

Water Distribution

The water distribution system consists of buried pipelines made of cast iron, asbestos cement (AC), or polyvinyl chloride (PVC). Steel is used for large supply mains exceeding 500 mm in diameter. Cast iron pipe was installed from 1904 until the 1940's. Asbestos cement was used throughout the 1950s, 60s and 70s. AC and PVC pipe comprise 70% and 30% respectively of the 790 kilometre distribution system. Approximately 107 kilometres of cast iron pipe has been replaced with PVC pipe since 1980. Some cast iron will remain due to location and size considerations (intersections, 600 mm diameter and over) and will be replaced as the need and opportunity arises. PVC pipe repair costs are virtually nil. The replacement of cast iron pipe with PVC pipe has allowed for significant savings in maintenance repairs.

Watermain breaks are a primary cause of water service disruptions, water losses and discoloured water. The frequency of breaks is a function of the pipe materials. The distribution of each material in the system and its failure rate is as follows:

Type of Pipe	Length in Kilometres	Percentage of Total	Failure Rate[(1)]
Cast Iron	2	0.2	1.8
Asbestos Cement	535	67.9	0.2
PVC	215	27.2	-
Steel	37	4.7	-
Total	789	100.0	0.2

Note: - The failure rate is calculated as the number of breaks per kilometre of pipe per year. The failure rate for each type of pipe is the average failure rate for the years 1980 through 2001.

Watermain Statistics	2000	2001	2002	2003	2004
Main Leaks Repaired (#)	108	245	92	341	98
Average Unit Repair Cost ($)	7,900	7,168	7,051	6,962	7,311

Note – The increase in the average per unit cost in 2004 is the result of more locations requiring pipe replacements rather than clamp repairs.

Full circle stainless steel repair clamps can be used to repair small holes and cracks. Larger breaks are more costly to repair, as the damaged section of the main must be removed and new pipe installed. Both types of repairs require the water to be shut off to that section of the main. Customers are notified of the disruption in service.

Prior to 1998, an annual watermain flushing program was carried out to remove iron deposits from the water distribution system in order to reduce discoloured water complaints. The program was carried out in the spring of each year over 13 nights. The process was carried out again in the fall if required.

A new watermain flushing process was successfully applied to the distribution system in 1998 and 1999, and has proven to be considerably more effective in removing iron deposits. The new process involves closing valves to ensure the water flowing to the one isolated hydrant is coming from only one direction. This uni-directional flushing process increases the flow velocity to the point where all removable iron deposits are

flushed from the pipes. Although uni-directional flushing cost is greater on a unit cost basis, it can be applied less frequently.

The existing water distribution system has a number of “dead ends”, which cause problems in the operation of the system. In order to maintain uniform pressures in the system, ensure high water quality, and provide adequate flow to fire hydrants, dead ends should be avoided. Where possible, the watermains should be “looped”, or connected to another line. This is possible in fully developed areas where there are other lines with which to connect. However, it is not practical to do this in areas on the edge of the city or cul-de-sac’s. The City has an ongoing capital program that addresses the reduction of the number of dead ends, thereby increasing the security of the overall system.

The water distribution system includes over 6,000 valves. The valves should be in working order to shut off the water for repair and when flushing watermains. The valves are checked periodically and repaired or replaced as necessary. In many cases, the valve is functioning properly but the casing surrounding the rod used to turn the valve is damaged or filled with dirt. A new method of excavation, called hydro-excavation, uses high pressure water and vacuum to loosen and remove soil for repair access. The method is quicker and leaves a smaller excavation. Traditional excavation methods are applied where the entire valve requires replacement.

Watermain Valve Statistics	**2000**	**2001**	**2002**	**2003**	**2004**
Valves Replaced (#)	54	27	38	40	20
Unit Replacement Cost ($)	6,000	6,430	5,475	5,636	5,833
Valves Repaired (#)	185	105	89	80	83
Unit Repair Cost ($)	1,600	1,499	1,607	2,393	1,359

The City operates a system of over 3,800 fire hydrants in order to provide water for firefighting purposes. The National Fire Code sets out standards for fire hydrants, and indicates that regular maintenance is required. The City uses *Water Supply for Public Protection – A Guide to Recommended Practice (1981)* published by the Fire Underwriters Survey as its standards for fire hydrant inspection and maintenance. These standards include checking hydrants on a regular basis to ensure they are functioning properly and available for use in the event of a fire; repairing and replacing any malfunctioning hydrants; repainting each hydrant every five years; and installing hydrants in new areas to ensure a hydrant is available within the specified distance of all buildings. The parts from damaged or obsolete hydrants taken out of service are salvaged and reused whenever possible.

Hydrant Statistics	**2000**	**2001**	**2002**	**2003**	**2004**
Hydrants in Service (#)	3,810	3,829	3,861	3,898	3,949
Hydrant Replacements (#)	25	27	19	16	11
Unit Replacement Cost ($)	7,200	8,072	8,492	8,505	8,356

The unit cost is for an emergency replacement, and does not include the cost of a hydrant lead pipe, or temporary water supply to customers while the water is turned off. When hydrants are replaced during planned work (capital – replacing an obsolete hydrant) the cost is approximately $10,000 which includes a new lead pipe, valve and temporary water supply.

Work done on service connections range from minor repairs at the curb box, to the repair or replacement of the entire service connection. Water must be turned on and turned off at the customer site for reasons such as transfer of ownership of a home, new customers, breaks in waterlines on the customer’s property and unpaid accounts. The water is turned on and off by turning a rod attached to the valve beneath the soil surface. At times, these rods and valves (curb boxes) may first have to be repaired. One 24-hour

emergency service crew handles water leaks, complaints and other trouble calls. Lower unit costs for curb box repairs have been possible since 1998 with the introduction of hydro excavation.

Service Connection Statistics	2000	2001	2002	2003	2004
Connection Leak Repairs (#)	257	365	298	438	385
Unit Repair Cost ($)	4,000	4,330	3,788	4,111	3,708
Curb Box Repairs (#)	649	654	553	714	627
Unit Repair Cost ($)	1,200	991	793	799	824

Customer complaints or meter readers identify problems with water meters. The problems are typically investigated in the field by meter shop staff. New meters are installed to replace malfunctioning meters, as well as for new customer sites. Meter interface units are installed on all meters so that readings can be obtained with the AMR system.

Meter Installation and Repair Statistics	2000	2001	2002	2003	2004
Meters in Service (#)	58,522	58,849	60,200	59,716	60,158
Meters Installed - City (#)	514	425	446	475	813
Meters Installed - Contractor[(1)]	-	-	-	32,500	18,800
AMR Units Installed - Contractor[(1)]	-	-	-	36,300	20,800
Meters Overhauled (#)	450	600	600	365	601
Service Calls (#)	4,403	4,459	5,082	4,331	6,162

Note: The 2003 number of meters and AMR units installed by the contractor is for the period from November 2002 to December 2003.

Water Consumption

The 2005 budget is based on an estimate of billable water consumption of almost 24 million cubic metres. About 62% of the consumption (14.8 million cubic metres) is for residential properties, 11% (2.5 million cubic metres) for multi-residential properties, and 27% (6.5 million cubic metres) is for non-residential properties.

The City has had a Water Conservation Program since 1985 and initiated an enhanced program in 1991. The primary goals of the program are to reduce the average per capita water consumption and the peak day water use. The following table provides information on the total water supplied and water use.

Water Supply and Use	2000	2001	2002	2003	2004
Total Water Supplied (mega litres)	26,860	29,931	27,180	30,120	27,021
Average Water Use per capita per day (litres)	385	423	387	426	395
Winter Water Use per capita per day (litres)	379	372	351	353	367
Summer Water Use per capita per day (litres)	421	496	437	528	435
Peak Day Water Use (mega litres)	137	152	133	149	121

The Water Conservation Program continues to be successful. The average water consumption has been reduced by approximately 8.8% since 1991. The population of the city has increased by approximately 5% over the same period. Annual water consumption has decreased from a high of 35 million cubic metres in

1988 to an average of 24 million cubic metres since 1993. The following table provides the history of metered water consumption.

Metered Water Consumption
(Million Cubic Metres)

Year	Metered Water Consumption	Year	Metered Water Consumption
1992	26.2	1999	23.9
1993	23.9	2000	23.3
1994	23.1	2001	24.3
1995	23.4	2002	24.0
1996	24.9	2003	25.0
1997	25.5	2004	22.4
1998	24.4		

Note: Water from Buffalo Pound is measured in mega litres (millions of litres). Water consumption for customers is measured in cubic metres. (thousands of litres).

Water Quality Monitoring

Water quality monitoring activities include:

- Administering the Permit to Operate Water Works for operation of the water system, including water quality monitoring of all water sources and the distribution system, and maintaining records related to the safety and operation of the water system.
- Carrying out supplemental testing to gather water quality data from the water distribution system.
- Communicating information about water quality to the public.
- Efforts to protect the city's water source at Buffalo Pound Lake and the Regina area aquifers.

Water Loss Reduction

All water utilities experience a certain amount of water loss. Water loss is water usage that is not metered and thus not billed to a customer. Water used to suppress fires and some irrigation is not metered. Water is also lost through watermain leaks and maintenance activities. Unaccounted-for water can also result from inaccurate meters.

A water loss goal of 10% is considered to be good practice for water utilities in North America. An objective has been established to reduce the water loss rate below 10%.

Water Volumes (million cubic metres)	2000	2001	2002	2003	2004
Total Water Supplied	26.9	29.9	27.2	30.1	27.0
Billed Consumption	23.3	24.3	24.0	25.0	22.4
Water Loss	3.6	5.6	3.2	5.1	4.6
Water Loss as a Per Cent of Total Water Supplied (%)	13.3	18.7	11.8	16.9	17.0

Note: In 2005, Water Engineering and Utility Billing will be working together to develop an approach that reports a more accurate water loss percentage, taking into account consumption billed outside the Utility Billing System and unmetered consumption from various sources that can be estimated, so as to better isolate true water loss.

A study of intermediate (25 mm to 50 mm) sized water meters was completed in 1999. 105 water meters were removed from service and tested for accuracy. Of those tested, 27% were within acceptable limits, while 73% were either over or under registering. Based on these test results, approximately 1,800 water meters greater than 15 years old were replaced in 2000 – 2001. The result is an improvement in metering accuracy.

A study of residential (15 mm and 20 mm) water meters was started and completed in 2001. The average weighted accuracy of this group of meters was 91.6%. A residential meter replacement project was implemented, with the project completed in 2004. The project also included the implementation of an automated meter reading (AMR) system.

Water Conservation Program

The Water Conservation Program consists of identifying information that should be provided to the public on methods of conserving water, and communicating the information by means such as:

- Brochures.
- Web page information.
- Appearances on local television and radio shows.
- School visits.
- Appearances at local trade shows, such as the Home and Garden Show.
- Xeriscape landscaping workshops.

A survey of Regina residents to determine levels of awareness and participation in water conservation was carried out in late 1998. The survey indicated that nearly three-quarters of Regina residents practice water conservation, over half recall promotion of water conservation, and a significant number felt water conservation advertising made them more likely to conserve water. Awareness of and adherence to the outdoor watering schedule fell somewhat from the previous survey.

Water conservation efforts have been effective to date. As part of the Long Term Water Utility Study, water consumption was predicted both with and without the impacts of a Water Conservation Program. The next table shows the impact of conservation efforts has been more successful than predicted.

Water Consumption	Study Predictions for 2001 with Water Conservation	Study Predictions for 2001 without Water Conservation	2004
Annual Average Per Capita[(1)] (litres per capita per day)	513	564	395
Annual Average Day (million litres)	98	109	76
Peak Day (million litres)	244	271	121
Peak 3-Day (million litres per day)	191	212	116
Population Estimates	200,408	200,408	193,700

Note: Per capita water consumption is the entire volume of water used by all customers, including industrial and commercial, divided by the population.

A portion of the decrease can be attributed to factors such as reduced industrial water use, revised population figures, increases in water rates and weather conditions; however, water conservation is a significant factor.

Cross Connection Control and Backflow Prevention Program

Water quality can be compromised by the introduction of contaminants into the distribution system. This can occur wherever there is a cross connection, which is a link between the drinking water supply and the source of contamination such as a pesticide container on a garden hose or a boiler filled with anti-corrosion chemicals. Various conditions can cause backsiphonage and/or backpressure in the water supply system. This can cause the domestic water to move in the opposite direction and take with it any materials it is in contact with or mixed with. The result is the water supply to a building or neighbourhood becomes polluted or contaminated.

The Cross Connection Control and Backflow Prevention Program was established in 1996 to reduce the possibility of contamination from such causes. Since the program was established, all new facilities have been reviewed for backflow prevention requirements through the building permit process. The 3,000 existing commercial, institutional and industrial facilities are being inspected by City staff. Any backflow requirements are identified and a one-year time frame given to become compliant.

The four primary components of the program are:

- Public education and awareness.
- Inspections of 3,000 commercial, industrial and institutional facilities.
- Administration of the annual testing of testable backflow prevention assemblies.
- Review of appropriate building permits for new facilities.

Cross Connection Control and Backflow Prevention Statistics	Program Inception to December, 2004
Existing Facilities Inspected	1,726
New Facilities (Building Permits)	680
Existing Facilities Inspected and Compliant	1,573
Existing Facilities Inspected and Non-Compliant in the Current Year	100
Existing Facilities Inspected and Still Non-Compliant after One Year	733
Testers Licensed	80

Wastewater

Initiatives for 2005

- A major study to examine the wastewater collection system consisting of wastewater mains, lift stations and manholes was completed in 2004. A work plan with recommendations to address the findings will be developed and presented. The work plan will address issues such as the remaining service life of system components, sustainability of the wastewater collection system, potential bylaw changes and the need for an overall asset management plan.

- Two wastewater lift stations in the Dieppe area require replacement due to age and condition. Land acquisition is required for relocation of one lift station. Detailed design was completed in 2004 with construction planned for 2005.

- Initiate a project to upgrade screening at the McCarthy Pump Station.

- Initiate a pre-design study for wastewater forcemain expansion and replacement.

- Replace the Walker Street wastewater lift station with a new facility. The present lift station is in poor condition and at the end of its service life.

- Initiate an engineering drawing conversion project.

- A sewer and water inspection and repair policy is being developed that will address requirements for the frequency of inspection and repair of utility assets. Once complete, the policy will assist in settling claims arising from breaks or backup from sewers and water lines and interruption of service. The sewer line cleaning and frequency would be stated in the policy to ensure the community that this asset is in reasonable operating condition, relative to industry standards and other maintenance operations.

- Conduct a study of inflow and infiltration of drainage water into the wastewater collection system in the downtown area. This is a follow-up to the Wastewater Collection System Study that identified high inflows into old sewers during rainfall events.

Status of 2004 Initiatives

- Completed new lift station construction for Glencairn and Arens Road locations.

- Completed the Wastewater Collection System Assessment Study.

- A long range planning study of sewage treatment requirements was completed in late 2004. Findings will be reviewed and assessed and plans developed to implement the recommendations.

- A project to upgrade the heating system at the McCarthy Pump Station was undertaken. This station pumps all the wastewater in the city to the Wastewater Treatment Plant.

- A project to implement improvements to increase the reliability and security at the McCarthy Pump Station was initiated.

- Remedial or preventative maintenance improvements on forcemains were initiated. Design on a replacement forcemain will commence in 2005.

- Continued to develop and implement an improved sludge removal, storage/disposal program. Biosolids to agricultural land was placed on hold pending regulatory approval of annual application.

- Design was initiated for a control and service building addition to the Wastewater Treatment Plant administration building. The building will incorporate change rooms and lockers and replace temporary trailer office space for plant supervisory and technical staff.

- A project to refurbish the tertiary treatment process clarifiers in 2004/2005 was deferred after an assessment indicated that deterioration was less than expected.

- A Receiving Environment Study was started in 2004. This study is to assess water quality and aquatic biology and habitat in the downstream water bodies that accept the treated wastewater. This study will provide information useful in the design of the wastewater treatment plant expansion.

Wastewater System Overview

The wastewater collection and treatment system collects sewage from residential, institutional, commercial and industrial customers in the city. Wastewater treatment and final effluent meets provincial environmental standards. Service goals include:

- Collecting residential, commercial and industrial wastewater in the city and delivering it to wastewater treatment facilities.

- Producing a treated wastewater effluent that is biologically and physically safe for the environment and which meets the provincially issued operating permit.

- Ensuring solids removed from the wastewater are treated and disposed of in an appropriate manner.

Components of the wastewater system shown in the map on the next page include:

- **Service Connections** – Building plumbing systems are attached to the wastewater collection system by a service connection pipe. The City owns and is responsible for the maintenance of the service connection pipe on the "City side" of the property line.

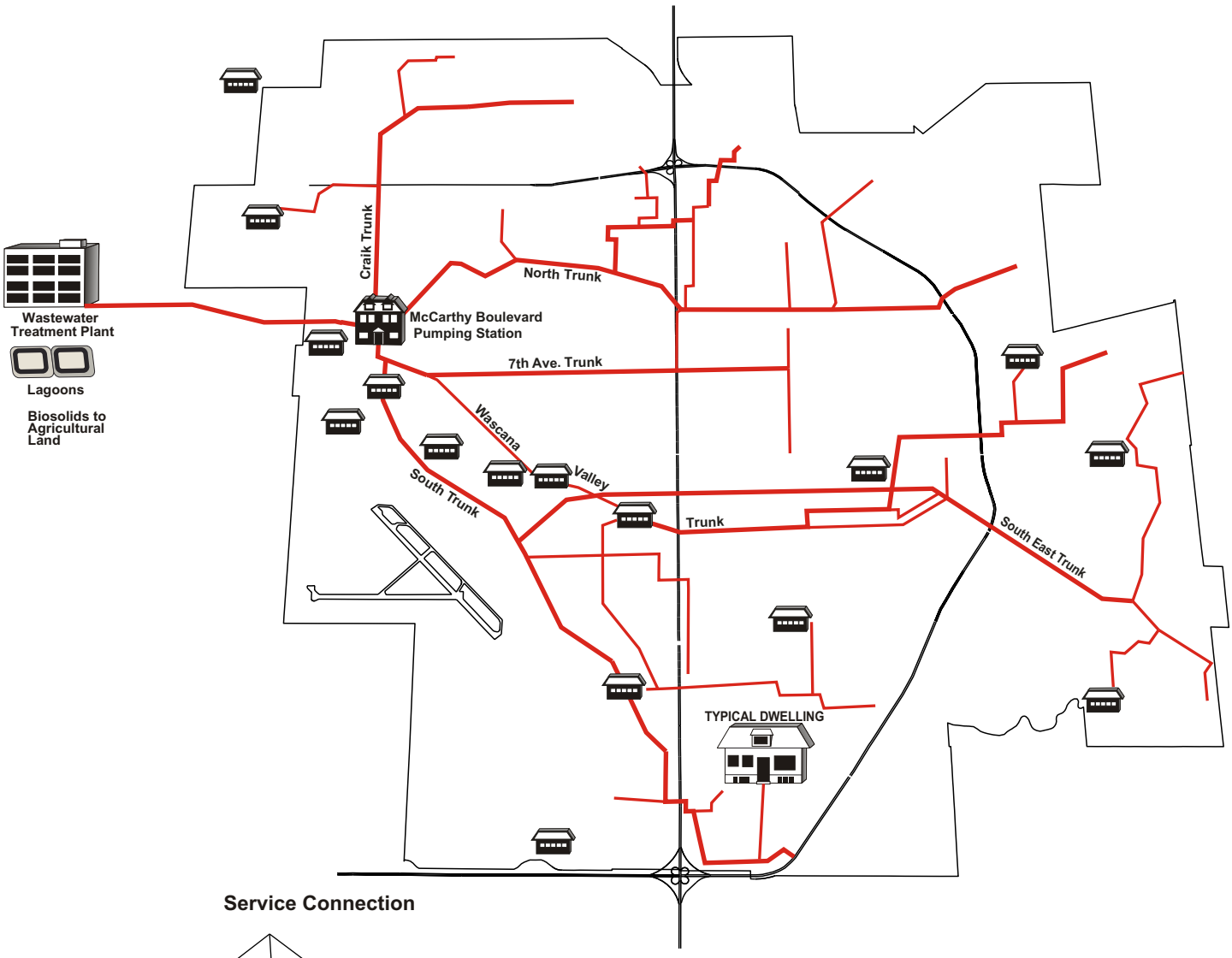
- **Collection Mains and Trunk Mains** – The service connection pipes are attached to wastewater collection mains which are typically 200-250 mm in diameter. The connection mains drain into trunk mains which are 300 mm or more in diameter.

- **Manholes** – Over 15,000 manholes provide access to the wastewater collection system for maintenance and repair.

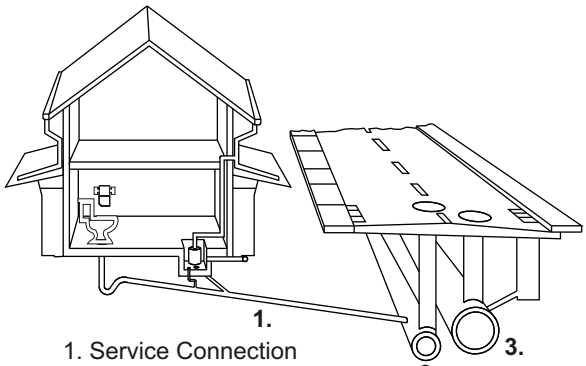
- **Lift Stations** – Wastewater flows through the collection system by gravity. In low-lying areas in the city lift stations must be used to pump the wastewater to collection and trunk mains at a higher elevation. Wastewater then continues to flow by gravity from that point eventually reaching the McCarthy Boulevard Pumping Station. There are 16 lift stations in the wastewater collection system.

- **McCarthy Boulevard Pumping Station** – All wastewater collected in the city flows to the McCarthy Boulevard Pumping Station. The station provides screening and continuous transfer of wastewater from the collection system to the wastewater treatment facilities five kilometres west. The McCarthy facility is capable of transferring wastewater at up to five times the average daily rate. The station is also the location where commercial septic tank haulers offload into the wastewater system.

WASTEWATER SYSTEM



Service Connection



1. Service Connection
2. Wastewater Collection Line
3. Drainage Line (Storm Sewer)

Wastewater Sewer Main

Lift Station

Much of the material dumped at the McCarthy Station is hauled from outside the City. This traffic and odour from the station are a concern. The City and the Rural Municipality of Sherwood are in continuing discussions with the goal of phasing out the McCarthy station dump site and providing a new location, easily accessible to rural haulers.

- **Wastewater Treatment Plant** – The plant processes wastewater through four stages of treatment:
  - Primary treatment removes, sand, grit and organic material from the sewage.
  - Secondary treatment reduces dissolved organic material through the use of aerated lagoons.
  - Tertiary treatment removes phosphorus, algae and suspended solids by using aluminum sulphate and polymer.
  - Ultraviolet light is used to disinfect the effluent before it is released into Wascana Creek.

Wastewater System Objectives

The provision of wastewater collection and treatment services is critical to the health and environment of the citizens of Regina and surrounding area. Objectives for wastewater collection and treatment are:

- **Quality of Sewage Effluent** – Treated wastewater from the City's wastewater treatment plant is discharged into Wascana Creek, which flows into the Qu'Appelle River upstream from the town of Lumsden. Saskatchewan Environment establishes criteria for sewage effluent that each wastewater facility in the province must follow. The major criteria are total phosphorus, fecal coliform bacteria, biological oxygen demand and suspended solids in the treated effluent discharged to Wascana Creek.

- **Reliability of the Collection System** – Improperly functioning wastewater collection systems cause inconvenience, and health and safety concerns. Problems such as blockages and leaks can result from deterioration of pipes, sags and breaks in wastewater collection lines and connections caused by shifting soil, tree roots and foreign materials in the lines. To prevent these problems regular inspection and maintenance programs are carried out.

- **Separation of the Drainage System from the Wastewater Collection System** – The wastewater collection and treatment system is adequate to handle the day-to-day wastewater flows from the city. During rainfall and snow melt events, drainage water enters the wastewater collection system through basement sump pits connected to weeping tile drainage, catch basins inadvertently connected to the wastewater collection system, and infiltration through pipe cracks and openings such as wastewater manhole covers.

  Reducing the amount of drainage water entering the wastewater collection system can postpone large expenditures required for trunk mains and treatment plant expansions. Work is being done to reduce infiltration to both new and existing wastewater mains and trunks.

- **Odour Control** – One of the by-products of wastewater treatment and collection is odour. Such odours are unpleasant for nearby residents and staff. Reduction of effective odours is accomplished by the use of containment, chemicals and aeration lagoons. The chemicals are used to tie up the dissolved sulphide that causes odours. The aeration equipment injects oxygen into the wastewater, preventing a septic environment that produces strong odours.

- **Efficiency of Operations** – Electricity is primarily required to operate pumps and aeration blowers at the wastewater treatment plant. Chemicals such as aluminum sulfate and polymer used to remove phosphorus are a significant cost of operating the wastewater treatment plant. To minimize costs, it is important to make effective use of chemicals required to meet effluent targets. The most efficient use of

electricity, chemicals and other inputs is accomplished by dynamic automatic process control and laboratory based performance information at all stages of the treatment process.

- **Maintaining Treatment Capacity** – Regina uses five aeration lagoons in its secondary treatment process. Over the years, as solids settle to the bottom of the lagoons and aeration systems deteriorate, capacity is diminished. To maintain treatment capacity, new lagoons must be built or old lagoons must be refurbished.

Wastewater Collection

To identify and prevent problems in the wastewater collection lines, the lines are cleaned and inspected, on average, once every seven years. Locations with chronic problems are cleaned more frequently with high-pressure water to dislodge grease and other matter and move this material into a holding tank. In conjunction with jet cleaning, lines are inspected through closed circuit television.

Sewer Maintenance Statistics	2000	2001	2002	2003	2004
Lines Cleaned - Jet Cleaning Program (metres)	65,594	36,337	70,170	68,223	65,770
Average Cost ($/metre)	1.38	1.08	0.93	1.10	1.03
Main Repairs (#)	9	11	10	4	12
Average Cost ($/repair)	6,900	3,739	4,705	3,515	3,647
Manhole Repairs (#)	61	74	103	80	57
Average Cost ($/repair)	895	538	623	810	725

Service connections that breakdown or block too frequently are either repaired or replaced.

Wastewater Connection Statistics	2000	2001	2002	2003	2004
Connection Repairs (#)	35	36	28	34	37
Average Cost ($/repair)	4,400	3,956	4,923	3,833	4,770
Connection Replacements (#)	80	90	60	83	107
Average Cost ($/replacement)	5,800	5,854	5,162	5,936	6,118

The wastewater collection system includes the operation of 16 lift stations. Electricity is a significant cost in operating the lift stations. Ongoing electrical and mechanical equipment maintenance is required, in addition to general maintenance on the station buildings and grounds. A project to equip every wastewater lift station with Supervisory Control and Data Acquisition (SCADA) equipment was implemented in 2002.

Wastewater Treatment

The McCarthy Boulevard Pumping Station pumps all wastewater to the Wastewater Treatment Plant. High reliability and capacity are critical to ensure this facility does not cause sewer collection system backup. One of two electric pumps handles normal daily flows while three high capacity diesel pumps handle extreme flow events, which happen when storm water infiltrates the sewer system during rainstorms or sudden snow melts. Screenings removed at the station are disposed of at the sanitary landfill.

McCarthy Boulevard Pump Station Statistics	2000	2001	2002	2003	2004
Total Annual Flow (Million Litres)	25,841	26,062	26,354	25,801	27,015
Bypass Flows (Million Litres) (Target: 0)	0	0	0	0	0
Screening Removal (Tonnes)	164	191	207	215	172

All wastewater is treated at the **primary treatment** plant. The plant uses settlement to remove solids from sewage. The City has established a target of 60% for suspended solids removal.

Treated sludge from the primary treatment process is stock piled on site for subsequent application to agricultural land. A target of >30% of solids in the sludge has been set. A higher number means drier sludge, reducing hauling costs.

Primary Treatment Statistics	2000	2001	2002	2003	2004
Suspended Solids Removals (%) (Target >60.0)	67.0	53.0	64.2	57.2	62.0
Biological Oxygen Demand Removals (%) (Target >35.0)	38.0	26.0	39.4	27.6	35.0
Solids in Cake Sludge (%) (Target >30.0)	34.9	31.9	29.3	32.5	34.0
Tonnes of Sludge (Dry Weight)	1,230	1,329	1,834	1,382	1,646

The **secondary treatment** process that removes sewage organics measured as biological oxygen demand involves the use of aerated lagoons. Large blowers are used to force air through diffuser pipes and into the wastewater. Electricity is a major cost of this function. To prevent septic conditions and thereby reduce odours, a minimum of three parts per million dissolved oxygen is maintained in the lagoons. Higher oxygen transfer efficiencies reduce energy costs.

Secondary Treatment Statistics	2000	2001	2002	2003	2004
Oxygen Transfer Per Cent Efficiency					
Lagoon 1 South	3.1	5.4	4.1	5.1	3.8
Lagoon 2A	8.7	7.9	7.2	6.8	5.9
Lagoon 2/3	8.1	5.4	3.9	4.0	7.3
Lagoon 4	1.0	2.6	1.2	-	-
Average Lagoon Dissolved Oxygen Level mg/l	5.3	5.3	4.1	4.9	5.8

The **tertiary treatment** plant removes phosphorous, algae, suspended solids, bacteria and biological oxygen demand (BOD) from the lagoon effluent prior to disinfection and release of the treated effluent to Wascana Creek. The major expenditure is for liquid alum.

It is desirable to maintain a low alum to phosphorus ratio, as this is an indicator of how much alum is used in order to remove phosphorus as required to meet criteria established by Saskatchewan Environment. In wet years, plant flow capacity limitations degrades performance. The average effluent phosphorus requirement is $\leq$1.00 parts per million.

Tertiary Treatment Statistics	2000	2001	2002	2003	2004
Alum to Phosphorus Removal Ratio (Target <33.0)	33.27	35.65	43.50	33.05	39.21
Average Effluent Phosphorus (Target $\geq$0.90 & $\leq$1.00)	0.87	0.95	0.91	0.96	0.94
Bypass Flows (Target 0) ML	-	-	100	612.4	419

Disinfection of final effluent water prior to its release to Wascana Creek is performed by ultra violet light to reduce health risks to downstream water users.

Disinfection Statistics	2000	2001	2002	2003	2004
Average of Fecal Coliform Geometric mean counts/100 ml (weekly geometric mean permit is 100/100 ml) *Includes TTP Bypass	8.5	9.2	16.8	36.2	40.7

The wastewater treatment plant laboratory does regular daily, weekly, and monthly tests at all stages of treatment to ensure effectiveness. Research and pilot treatment projects are also carried out. Testing is routinely carried out for over 50 different parameters. Samples are taken from 20 different sites on Wascana Creek and the Qu'Appelle River system. Records of all tests and plant performance are maintained and distributed.

Test and Plant Record Performance	2000	2001	2002	2003	2004
Lab Analyses (#)	23,000	23,541	25,648	27,001	26,463
Treatment $/Million Litres	147.21	153.62	172.15	186.29	167.36
Treatment $/Tonne of Contaminants Removed	250.32	312.20	333.42	494.80	384.82
Treatment $/Capita	20.08	21.36	24.08	26.12	23.14
Overall Contaminants Removed (%) Target > 90%	95.3	94.8	88.2	88.7	90.4

Wastewater Service Connection Refund Program

When customers report problems such as slow draining fixtures, they are instructed to contact a sewer service company to determine the nature of the problem, remedy it, and bill the customer directly. Upon presentation of the paid bill from the customer, with a complete description of the problem from the sewer service company, the City will provide partial or full reimbursement if a connection obstruction or back up occurred as a result of:

- A breakdown or severe sag in the service connection pipe on the City side of the property line.
- Blockage due to tree roots from trees on City property.
- Blockage due to tree roots from privately owned and City owned trees.
- A blocked wastewater collection main.

The total cost of reimbursements for 2004 is $113,534 (2003, $131,393). In recent years, City staff service connections when the problem is the City's responsibility to remedy.

Wastewater Service Refund Statistics	2000	2001	2002	2003	2004
Reimbursements (#)	2,162	2,055	2,002	1,524	1,366
Average Reimbursement ($)	86	87	87	86	83

Note: City Staff serviced 1,042 connections in 2004.

Drainage

Initiatives for 2005

- Complete the Drainage Master Study. The Study will focus on the adequacy of the creeks, drainage channels and detention/retention ponds in handling runoff from the 17 subdrainage areas in the city.

- Continue with Phase III of the Riverside Dyke Upgrade, associated landscape improvements and Wascana Creek dredging between Albert Street and Elphinstone Street.

- Continue the Home Flood Protection Education Program. This program educates homeowners on why basement flooding occurs and how to make improvements on their property to reduce the risk of flooding. Completing drainage improvements on private property is vital for reducing the risk of flooding and damage to buildings.

- Construct Phase I of the drainage system improvements in the Dieppe area.

Status of 2004 Initiatives

- Completed Drainage Studies for Areas 9 and 16.

- Started Drainage Study for Area 12.

- Completed construction of the Dr. Ferguson Park Drainage Detention project in Glencairn.

- Provided drainage system renewal/rehabilitation at roadway renewal locations.

- Continued the Home Flood Protection Education Program.

- Completed detailed design for drainage system improvements in the Dieppe area.

- Completed construction of the first two phases of the Riverside Area Wascana Creek Dyke Upgrading.

Drainage System Overview

The drainage system collects water from rainfall and melting snow in and around the city and leads it to Wascana and Pilot Butte Creeks. The system serves over 58,000 residential and commercial properties. Service goals include:

- Collecting and controlling drainage water within the city to minimize inconvenience, property damage and danger to the public.

- Monitoring the potential for flood conditions in Wascana Creek and the drainage channels and carrying out flood control measures as required.

The **Minor Drainage System** consists of the underground piping system that collects and transports small to medium amounts of drainage from rainfall, snow melt and minor storms. Components of the minor system include:

- Catch Basins – Over 25,000 catch basins located in streets and open space areas collect water and direct it into the drainage lines. Catch basins are designed to keep sand, silt and other matter out of the piping system by causing it to settle to the bottom of the catch basin.

- Lines, Mains and Trunks – There are approximately 700 kilometres of drainage lines located beneath streets. Lines and mains range from 200 mm to 1,200 mm in diameter, with trunks over 1,200 mm.

- Manholes – Over 15,000 manholes provide access to the system for maintenance and repair.

- Lift Stations – Drainage water flows through the system by gravity. There are low-lying areas where lift stations are used to pump the drainage water to a higher elevation. The water flows into a lift station at a low elevation, and is pumped to a higher level where it continues to flow through a pipe or channel. There are 11 lift stations in the drainage system.

The **Major Drainage System** is used when drainage water exceeds the capacity of the minor system and must flow over land. The major system is designed so that water will flow down roadways and land easements. Components of the major system include:

- Graded Roadways, Land Easements, Swales, and Lots – In order for the runoff water to flow over land to a point where it can be collected, the surface area must be properly sloped.

- Dry Bottom Detention Facilities – These are lower land areas constructed in open space areas such as parks. The detention facility contains outlets to and from the minor system. During periods of heavy rainfall, water that would otherwise overload the minor system enters the detention facility and is stored temporarily. The water from the detention facility then flows back into the minor drainage system at a later time when flows have gone down.

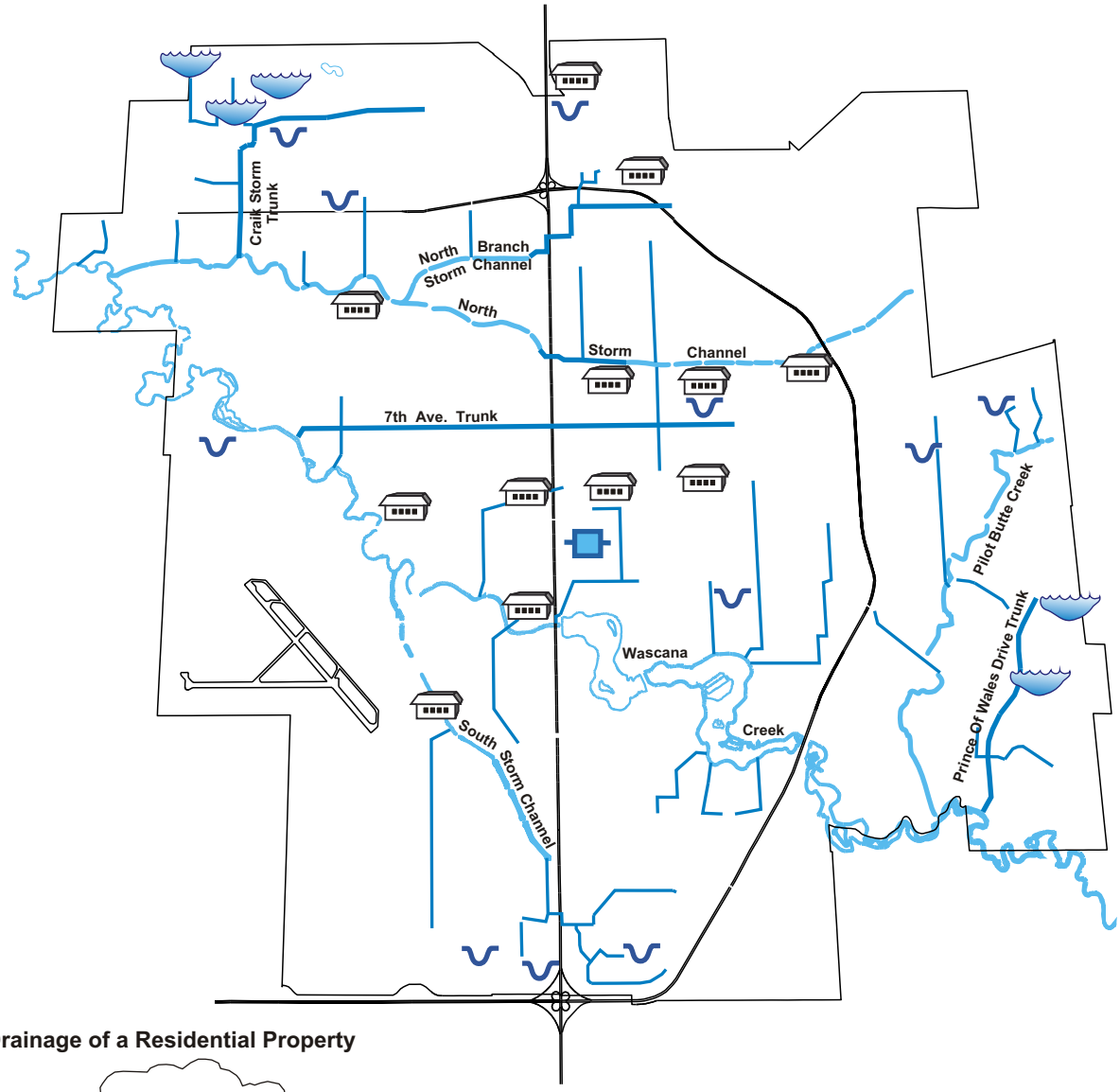
- Lake (or Wet) Retention Facilities – Lakes such as the ones in Lakeridge and Windsor Park are similar to dry bottom detention facilities, except they normally contain water all year for aesthetic reasons. When the minor system is overloaded, the water in these ponds rises, and then drops when the excess water flows back into the minor drainage system.

- Underground Detention Tanks – Underground detention tanks are also used, particularly in some of the downtown areas, to store excess water temporarily until it can be accommodated by the minor drainage system.

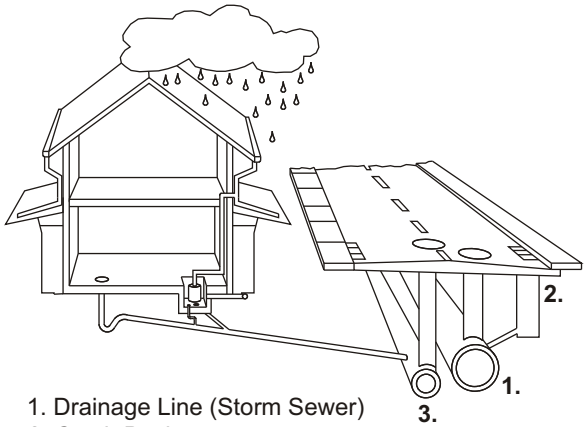
- Drainage Channels and Creeks – Drainage water empties into the drainage channels or Wascana Creek. The drainage channels function as very large drainage lines, with earthen banks used to control the water rather than enclosed pipelines. The drainage channels carry the runoff to Wascana Creek. Drainage from the Rowatt Flood Control Project south of Regina flows to Wascana Creek through constructed channel within the city limits.

Although the major and minor systems are described as separate systems, they are part of an overall drainage system and must work in conjunction with each other. The systems are depicted in the map on the next page.

DRAINAGE SYSTEM



Drainage of a Residential Property



1. Drainage Line (Storm Sewer)
2. Catch Basin
3. Wastewater Collection Line

Lift Station

Retention Pond

Dry Bottom Detention

Underground Detention

Storm Sewer Main

Storm Channel

Drainage System Standards

Standards for drainage system design are normally expressed in terms of the size and type of storm a system can theoretically handle. For example, a drainage system may be designed to handle a 1:5 year storm, which means that it can handle the size of storm that statistically only occurs once in five years in the area. A drainage system designed to handle a 1:100 year storm would be able to handle the size of storm that statistically occurs once in 100 years in the area.

Statistical information is obtained from the Atmospheric Environment Service of Environment Canada to determine storm sizes. In the past, rainfall data was only available from the airport, but three new data collection points have been added around the city since rainfall can vary significantly by area. Computer modelling is then done to determine the size of other storms.

The following are some of the major rainstorms that have occurred in Regina over the past 30 years:

June 1975	1:25 year storm
July 1983	1:100 year storm (108 mm of rain in four hours)
June 1994	1:25 year storm
August 1995	1:25 year storm (severe hail)
July 2001	1:100 year storm (50 mm in one hour)
August 2004	1:100 year storm (76 mm in one hour)

Factors examined in determining the “size of storm” include:

- Total rainfall volume.
- Intensity of rainfall – a storm that drops 100 mm of rain in one hour is much more difficult to handle than one that drops 100 mm over six hours.
- Previous rainfall – if the ground is saturated before the storm, no additional water can soak in. Flows in the drainage system are therefore greater.

Standards for drainage systems have been raised over time, and have been applied to new developments. However, it is very costly to retroactively apply higher standards to existing development. Details of the standards include:

- **New Development Standards** – The “minor” drainage system consists of catch basins and underground lines that quickly collect and transport water. The “major” drainage system, consists primarily of aboveground facilities such as roadways, easements, swales, and detention and retention facilities that can handle larger volumes of water.

  For new developments in the city, minor systems must be designed to handle a 1:5 year rainfall event. This corresponds with the general standard used across North America. While a higher standard would provide a higher level of service, the cost to construct underground facilities to handle larger storms is prohibitive. The major systems must be designed to handle a 1:100 year event. Until recently, the City had a minimum standard of 1:25 year event, but encouraged developers to target the 1:100 year event. This standard is now used in most larger prairie cities. The difference in costs between the two targets is not significant. As well, past experience has shown it is much more cost effective to design a new development to a high standard initially. Raising the standards in an area after it has been developed is very costly.

- **Existing Development Standards** – The City has adopted a target of 1:5 year events for existing minor systems, and 1:25 year events for existing major systems. Some areas of the city do not meet these targets. In the early 1980s, a program to study the drainage problems was initiated to identify solutions and carry out remedial measures to mitigate drainage issues. A Drainage Master Plan designating 17 areas was adopted. Conditions in each area are assessed, problems identified and

potential solutions proposed. Over time, work required to address the problems is carried out through the capital program. The status of the studies is shown in the following table. A map showing the 17 areas is on the next page.

Drainage Studies

Study Area	Study Status
1. 7th Avenue	Completed
2. South Regina	Completed
3. Riverside	Completed
4. Uplands	Completed
5(a) Glencairn - South Section	Completed
5(b) Glencairn - North Section	Completed
6. Argyle Park	Completed
7. Walsh Acres	Completed
8. Arnheim/Assinboia/Douglas Park	Completed
9. Rochdale/Sherwood/McCarthy	Completed
10. Old 33/Wascana Addition	Completed
11. Cathedral/CPR Annex	Completed
12. Ross Industrial/Landfill	To be completed in 2005
13. Old 33/Industrial Park/Regent Park	Completed
14. Lakeview/Hillsdale/Wascana Centre	Completed
15. Mount Royal/Dieppe/Normanview	Completed
16. University Park/Gardiner Park	Completed
17. Pioneer Village/Exhibition Grounds/Old 33	Completed
City Wide Study - Receiving Streams & Channels	To be completed in 2005

Most of the property damage caused in Regina during intense rainstorms has been the result of basement flooding. The flooding was caused by runoff water entering the wastewater collection system, resulting in sewer overload and back up into basements. Although the drainage system is separate from the wastewater collection system, there are a number of ways storm water can enter the wastewater collection system. These include:

- A few older buildings still have roof downspouts connected to the wastewater collection system.

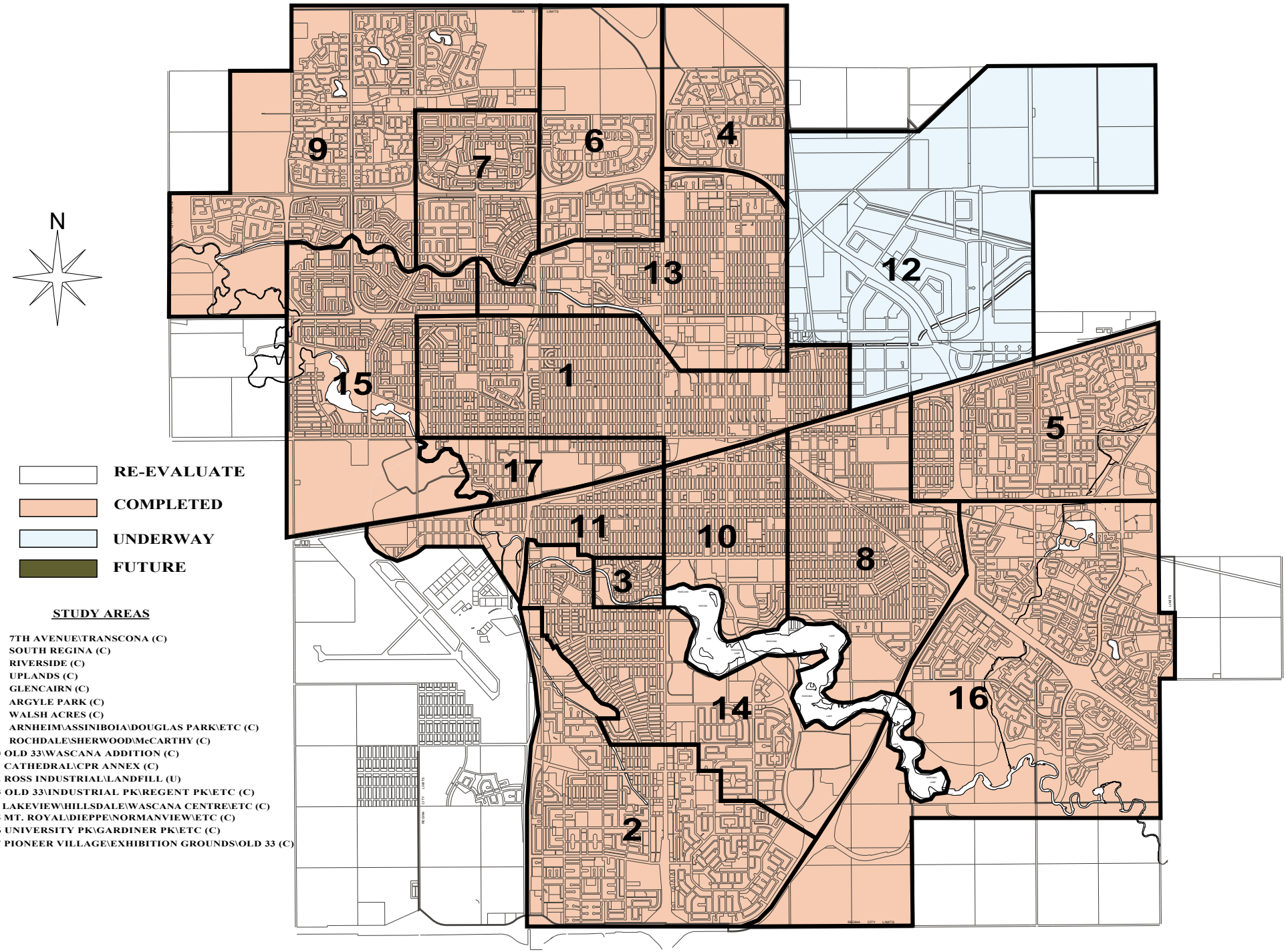
- Runoff water on lots with poor grading adjacent to the building enters weeping tiles and collects in basement sump pits, which then drain into the wastewater collection system.

The City has established an objective to eliminate any direct connections between drainage and the wastewater collection system. An objective has also been established to reduce the runoff water entering the wastewater collection system from basement sump pits by educating homeowners about steps they can take to prevent such problems. In addition, a bylaw amendment that would prohibit weeping tile drainage discharge to the wastewater system in new development areas is under consideration.

The most well designed system cannot function effectively unless it is properly maintained. To ensure the system functions as designed, the following objectives have been established:

- Drainage lines over 450 mm are regularly inspected and cleaned as required.

- Catch basins in areas where leaves are a problem are typically cleaned every two years and outlying areas are cleaned on a seven-year cycle.



STUDY AREAS

1 7TH AVENUE\TRANSCONA (C)
2 SOUTH REGINA (C)
3 RIVERSIDE (C)
4 UPLANDS (C)
5 GLENCAIRN (C)
6 ARGYLE PARK (C)
7 WALSH ACRES (C)
8 ARNHEIM\ASSINIBOIA\DOUGLAS PARK\ETC (C)
9 ROCHDALE\SHERWOOD\McCARTHY (C)
10 OLD 33\WASCANA ADDITION (C)
11 CATHEDRAL\CPR ANNEX (C)
12 ROSS INDUSTRIAL\LANDFILL (U)
13 OLD 33\INDUSTRIAL PK\REGENT PK\ETC (C)
14 LAKEVIEW\HILLSDALE\WASCANA CENTRE\ETC (C)
15 MT. ROYAL\DIEPPE\NORMANVIEW\ETC (C)
16 UNIVERSITY PK\GARDINER PK\ETC (C)
17 PIONEER VILLAGE\EXHIBITION GROUNDS\OLD 33 (C)

Dykes along Wascana Creek have been constructed and flood plains are maintained to contain creek flooding. The City's objective is to prevent major damage to property and maintain public safety in the event of flood conditions. Toward that end, monitoring is carried out during spring runoff to determine the risk of flood conditions and appropriate action is taken as necessary. The City has established an objective and capital plans to upgrade dykes to meet a 1:500 flood event level, the provincial standard. The upgrading of the dykes in Riverside will be completed in 2004 and those in the Dieppe area in 2006.

Drainage System Maintenance

To identify and correct problems in the drainage lines, they are cleaned and inspected, on average once every seven years. In conjunction with jet cleaning some lines are inspected by a closed circuit television camera.

Jet Cleaning Program Statistics	2000	2001	2002	2003	2004
Lines Cleaned (metres) (objective 54,987 m/yr)	46,256	56,626	73,410	58,605	60,620
Average Cost ($/metre)	1.35	1.32	1.01	1.31	1.07

Drainage system lines requiring repairs are mostly identified as a result of the TV camera condition surveys.

Drainage System Maintenance Statistics	2000	2001	2002	2003	2004
Main Repairs (#)	1	16	8	4	4
Average Cost ($/repair)	6,290	2,234	3,915	2,745	3,834
Manhole Repairs (#)	34	45	81	62	54
Average Cost ($/repair)	907	740	596	728	678

Since catch basins are designed to keep sand and other materials out of the drainage system, they require regular cleaning. Repairs to catch basins consist of raising or lowering the grates, replacing bricks and blocks, as well as replacing broken or missing covers. In addition, broken leads between the catch basin and the drainage lines are also replaced.

Catch Basin Statistics	2000	2001	2002	2003	2004
Catch Basin Repairs (#)	117	104	133	85	92
Average Cost ($/repair)	600	730	656	766	767
Lead Repairs (#)	16	30	30	28	31
Average Cost ($/repair)	2,900	2,220	2,676	2,905	3,077
Catch Basins Cleaned (#)	3,458	3,178	4,323	4,255	3,960
Average Cost ($/catch basin)	36	42	31	27	24

Forecasting and Controlling Floods

Flood conditions on Wascana Creek are relatively rare. In 1996, high snowfall caused flood conditions along the creek. Creek flows were projected to be 85 cubic metres per second, or a 1:30 year flood. Although the actual peak levels were not as high as the initial predictions, it was necessary to take preventative action. Costs were incurred for labour and equipment for sandbagging and pumping water out of flooded areas, as well as repairs for some City owned structures damaged along the creek, such as the Pinkie Road Bridge. In

1999, flood control costs were incurred as a result of a large snow accumulation late in the winter, followed by a very quick spring thaw. The estimated creek flow was 40 cubic metres per second, or a 1:10 year event.

Forecasting flood conditions involves communicating with provincial agencies regarding snow volumes and predictions for spring thawing. Early in the year, Saskatchewan Watershed Authority conducts assessments of the snow cover in the Wascana Basin, as well as other areas around Saskatchewan. If the conditions warrant further concern, additional monitoring takes place. As the spring thaw begins, water flows are measured throughout the creek system.

Budgets are prepared assuming spring runoff levels of an average year, where no special flood control measures are required like sand bagging and pumping behind the dykes when drainage line outlets are closed. The budget covers the cost of monitoring conditions on Wascana Creek and the drainage channels, as well as putting up barricades in areas where thin ice and water levels could pose a danger to the public.

Home Flood Protection Education Program

This program informs homeowners about the causes of basement flooding and the measures they should undertake on their property to prevent flooding damage from intense summer rainstorms. The program involves media advertising, door to door contact, an information trailer, display of a physical model of a typical home illustrating flood protection measures, flood protection classes, a mail out home flood protection education kit and City Page internet flood proofing information. Flood proofing measures on private property are the parallel component of the storm drainage upgrading program. Mitigation measures are required on both City and private property to accomplish neighbourhood service level improvements for managing large summer storm events and minimizing property damage and risk.

The program is concentrated between June and September during the time when most severe summer rainstorms occur and the public interest in drainage mitigation measures is greatest.

In 2004, direct contact was made with 309 homeowners and program information was provided to 758 other homes. The Home Flood Display was presented and manned at three home supply centres. Over 220 Home Flood Protection Information Kits were requested and mailed out to Regina residents. The survey undertaken in 2003 indicates awareness of the program and home flood protection measures have risen from 31% to 40%. Program awareness remained high in 2004.

Engineering and Operations Administration

The majority of the information regarding water, wastewater and drainage services is provided in the preceding sections. The operating budget summary includes costs related to Engineering and Operations Administration.

Objectives for the planning, design, operations and maintenance engineering include:

- **Long Range Planning** – In order to meet customer demands, water, wastewater and drainage systems require high levels of capital investment. It is necessary to anticipate and plan for future requirements so that the necessary future investment can be provided. To accommodate this, the following objectives have been established:

  - Long range plans (20 to 25 years) should be carried out regularly for each of the three major utility systems.

  - Ongoing conditions should be monitored and the long range plans updated as new information becomes available.

- **Effective Management of Capital Program** – The Engineering and Works Department provides planning and design engineering services for the Utility. All capital projects should be completed within their established timelines and budgets.

- **Establishment of Construction Standards** – Standards are developed for all infrastructure construction, including those relating to the utility systems. These standards are applied to construction carried out by City crews, contractors and developers. Over time, standards evolve as new construction techniques and materials become available. The objective of these standards is to optimize performance and minimize the life cycle cost for the provision of the services.

- **Public Education** – There are a number of areas within the utility operations where customer actions can collectively affect service and costs. Areas where it is desirable to change customer behaviour, such as the manner in which they use the systems, are regularly identified. Public education is then carried out in an effort to change customer behaviour. General awareness is also considered part of public education and is run as a program when required. Current programs include:

  - Water Conservation
  - Cross Connection Control and Backflow Prevention
  - Home Flood Proofing
  - Creekwatch
  - Wastewater Discharge Practices

Engineering and Project Management

The Water Engineering, Environmental Engineering and Development and Technical Services Divisions of the Engineering and Works Department and operations engineering staff are responsible for planning, designing and supervising construction of the Utility systems infrastructure. A primary responsibility is overseeing the annual capital program. Projects carried out range from annual infrastructure renewal projects to less frequent major projects such as water treatment or wastewater treatment plant expansions. Engineering and design work may be done in-house or by an external engineering firm. Construction work may be done by Engineering and Works Department crews or by external contractors. The resources used for projects depend upon the nature of the project, the availability of resources, and the expertise required.

Environmental Monitoring

Environmental monitoring activities include:

- Ground water monitoring at the sewage treatment plant.
- Surface water quality monitoring in the City's four retention lakes.
- Stormwater quality monitoring of urban drainage discharge to Wascana Creek and Wascana Lake.
- Snow dumpsite runoff monitoring.

Review of Development Proposals

Much of the City's water, wastewater and drainage systems are constructed by City forces, or by contractors under the direction of City staff. In the case of new development and re-development of existing areas, developers are responsible for constructing infrastructure including water, wastewater and drainage systems. This construction forms part of the utility systems, and the City assumes responsibility for operation and maintenance of the systems.

Development proposals are reviewed by Engineering and Works to ensure design and construction meets City standards. Installations that do not meet City standards are identified and corrected by the developer.

Technical and Engineering Support

Engineering and Works Department technical and engineering staff provide support to the field personnel responsible for maintaining the water, wastewater and drainage systems, and for carrying out capital construction work for projects done in-house.

In addition, staff provide construction scheduling, construction coordination and administrative and technical construction management services, which includes:

- Establishing, monitoring, and updating construction schedules.
- Coordinating construction with utility companies.
- Tracking and monitoring expenditures of various capital projects.
- Estimating the costs of water and sewer construction projects.
- Reviewing and analyzing unit cost information.

Customer Billing and Collection

Initiatives for 2005

- **Utility Billing Restructuring** – The implementation of AMR has provided a number of opportunities. In 2005, staff will work on optimizing the new AMR system and changes to the charging/billing process.

  The major initiatives that will be undertaken in the area are:

  - Severances and amalgamation of lots.
  - Development of procedures for managing irrigation services with the Meter shop.
  - Development of new routes to take advantage of capabilities of the new AMR system.
  - Development of benchmarks for performance with the AMR system.
  - Shift from cycle-driven bill processing to "ready" driven bill processing.
  - Review of monthly billings resulting in a recommended strategy.

- **Utility Billing and Customer Service System** – The City's utility billing system will require upgrading within one to two years in order to be compliant with database upgrades to ensure that the version is supported. Because of the significant changes in the billing area, the opportunity exists to review the different software options available to determine whether the current system should be upgraded, or whether a new system should be selected.

- **Collection Module** – In order to more effectively manage the City's collection process, a new collection module will be developed for the utility billing system. While the current module performs the basic tasks such as applying interest charges, selecting accounts to receive delinquency letters based on different delinquency codes, and processing bad debts, it does not allow flexible and automated management of accounts, based on City procedures.

  Some of the components to be developed as part of this module are:

  - Automated screening for outstanding issues, complaints and service requests.
  - Improved Payment Arrangement processing.
  - Improved transfer functionality of outstanding changes to the tax system.

  Full implementation of this module will help increase collections by enabling collection staff to make better use of time. It will also minimize errors in the handling of collection accounts.

- **Database Upgrades** – In order to comply with corporate data management standards, it is necessary to attach existing Access databases to the data warehouse, or where this is not feasible, to replace the Access database with new functionality within the CIS system. In addition, CIS system bypasses need to be replaced by procedural changes, or by new system functionality. This work was started in 2004 and will continue into 2005.

- **ExpressAddress Phase II** – The number of applications being received through ExpressAddress is rising significantly. While some staff intervention will always be required, methodology developed during the AMR project can be adapted relatively easily to automate a significant portion of the process, saving staff time and improving accuracy. This upgrade will be added to the existing ExpressAddress module, developed in Oracle.

Status of 2004 Initiatives

- **Meter Inspection** – During the course of the Automated Meter Reading project, it was determined that approximately 32,000 of the installations required additional checking and, in some cases, corrections to the wiring. The vendor did this work. In some cases, this work had an impact on meter readings in the Utility billing system, and as a result, it was necessary to build a process to track the work and identify instances where additional investigation was required.

  An automated process was built that records the necessary information in the billing system, and identifies the exceptions that require investigation. This process has resulted in significant time savings and improvement in accuracy in making the necessary corrections.

- **Completion of AMR Implementation** – As of October 15, 2004, there were fewer than 1,000 meters remaining to be upgraded to Automated Meter Reading (AMR). As a result of AMR, the number of corrections processed to accounts has been reduced from approximately 250 per month in 2002 to less than 100 per month in 2004. A significant portion of those correction service orders resulted from concerns directly associated with the AMR meter change out program. It is anticipated that, once the AMR implementation is complete, there will be fewer than 50 requests for correction per month.

  In addition, the number of meter readings processed manually as a result of a call or e-mail from a customer has been reduced from over 10,000 in 2002 to 1,600 in 2004, with the number decreasing each month. At the end of 2004, this service will be discontinued completely.

- **Automated Out-bound Calling – Final Bills** – During 2003, the collection area ran a pilot project to test the effectiveness and customer acceptance of out-bound calling for collections. The pilot was very successful, with over 40% of the customers contacted taking a payment action, and with very little negative feedback.

  The next group of customers that have been selected to receive out-bound calling is customers who have not paid their final bills before the deadline. If the finalized customer has moved into another city billing location, the outstanding balance is simply transferred; however if the customer is no longer in billing, these outstanding balances often remain unpaid. Mail sent to final bill customers is often returned because of problems with forwarding addresses. In many cases, however, the customer's phone number has not changed.

  Feedback from customers suggests that a phone reminder would be an effective solution to obtain payment. As well, this process has a low "per account" charge, making it a cost-effective alternative to a collection agency, which charges 25% of the outstanding balance on collections.

  The call campaign was developed with additional system development required in order to implement the project. Implementation is planned for early 2005.

- **Collection Module** – In 2004, efforts were focussed on moving the delinquency and payment arrangement letter generation processes out of satellite Access databases and into the billing system. This change streamlines the process, saving significant amounts of staff time, and ensuring more consistent and accurate results.

- **Rate Review** – A new set of rates was proposed and approved as part of the 2004 budget process. These rates were developed in coordination with the City's 20 year Utility Model to meet the four objectives set out to guide rate setting for the utility. These objectives are:

  - Financial Sufficiency – Water and sewer utility rates must generate revenues adequate to meet all operating and capital costs of the utility in both the short and long-term.
  - Conservation – Water and sewer utility rates should encourage customers to use water responsibly.

- Reduction of Peak Demand – The water and sewer utility rates should modify peak demand, reducing the need for infrastructure investment.
- Equity – The water and sewer utility rates should result in a charge to customers according to the cost of services they utilize.

The new set of rates will go into effect as of January 1, 2005, for all accounts billed after that date.

- **Utility Bill Redesign** – The City's utility bill has not been changed for a number of years. The bill was re-designed to be more readable and informative to the customer.

- **Equalized Payment Module** – In the past, the equalized payment settle-up process has been handled through a satellite Access database. The process has been very cumbersome and time-consuming. As well, because of the combination of daily billing and payment dates, the customers' new payment amounts were not calculated based on identical criteria in all cases.

  As a part of an ongoing initiative to move processes from Access databases to Oracle, the equalized process was reviewed and selected to be moved. During this process a more effective, consistent and streamlined method of calculating the new equalized amounts was developed and implemented. This method has resulted in a more simplified process that requires less staff time and is more understandable for the customer.

- **Credit File Audit Process** – When customers pay their bills electronically – either by internet or phone banking through their bank or by an electronic payment program, such as equalized or direct debit – they also prefer to receive any refunds electronically. In the past, overpayment or payments made in error had to be refunded through a paper cheque. While this process has been significantly streamlined through the use of CPOs, it is still somewhat cumbersome, and results in a delay in getting the refund to the customer. In order to deal more effectively with refunding credit balances to customers who pay by electronic means, a module was built allowing refund requests to be submitted, the transaction to be created for the bank, and an audit record to be stored.

- **AMR Implementation** – In November, 2002, the City began installing new AMR meters. As of September 30, 2004, approximately 58,500 radio-read units – most of them with new meters – have been installed. Meter change-outs frequently result in questions and concerns from customers, especially when they occur during the high use period in the summer. Customers often misinterpret the increased consumption from summer use as a problem with the new meter. As well, many customers are seeing an increase in their bills because their old meter was under-recording consumption.

  Processes implemented in 2003 to deal with these issues have proven very effective through 2004 in reducing the number of issues raised to management level.

- **Bank Transition** – In 2004, the City selected a new bank. As a result of this change, a significant testing process was undertaken, in conjunction with other groups in the City, including Taxation, Customer Service, Accounting Services, Payroll, and Community and Leisure Services. This transition process took place in a very short timeframe, and required significant resources both from the vendor and from the City. As a result of a strong commitment to managing the transition, the changeover took place with only minor issues and all of the deadlines were met.

Customer Service

The Revenue Administration Division's priority is providing customers with an exceptional level of service. This priority is applied to all aspects of operations, especially in contact with external customers, but also in dealings with internal customers and in responses to questions and requests for information. Objectives for customer service include:

- Customer applications for water services and disconnections are handled accurately.
- Customers can access information about their bill and receive prompt responses to their inquiries.
- Payments can be made using convenient payment methods.
- All service requests are processed within a reasonable time frame, given the nature of the service required.

Customer call centre volumes are monitored to ensure key performance indicators (KPI) are being met. The two primary KPIs are that calls are answered within 25 second, 75% of the time and that abandoned calls are kept below 5%.

Customer service is accessible by telephone, mail, fax, in-person and electronically via the City website. Internet requests and e-business inquiries continue to increase and this continues to be an area of focus. Continued awareness of customer needs to access information and services quickly and efficiently in the manner of their choosing is the focus of customer service efforts.

The Division's one stop shop approach provides customers with information relating to the Division's services through one central contact number. By directing customer calls to the area concerned, staff ensure that the customer is dealt with effectively and efficiently at their first point of contact.

The Division strives to ensure customer satisfaction on every occasion in the five essential elements of service: timeliness, knowledge and competency, courtesy, fair treatment and final outcome. When all five of these elements are in place, customers rate the services provided highly. The goal of the customer service area is to ensure satisfaction in every one of these areas with every customer.

The Division concentrates on establishing, exceeding and reviewing the needs and expectations of customers. The goal is to ensure that appropriate access to service is provided and that customers are informed of how and where to find the services they need. The Division is committed to "getting it right the first time, every time".

Customer Service Statistics	**2000**	**2001**	**2002**	**2003**	**2004**
Calls Offered (#)[1]	111,349	105,954	101,367	100,943	94,358
Calls Answered (#)	100,805	101,048	95,875	93,907	89,243
Calls Abandoned (%)	8%	3%	4%	5%	4%
Cashier Utility Transactions (#)	53,718	48,115	45,727	46,043	45,269

Note 1: Total calls offered cover the services of Utility Billing, Property Assessment, Property Taxation, Parking Tickets, Animal Control and any other services provided by the Revenue Administration Division.

Administration, Billing and Collection

Objectives for billing and collection include:

- Customers are billed every two months.
- Customers receive accurate and timely bills.
- New payment methods are introduced where they can provide convenience to the customer, and where they are cost effective.
- Collection action is taken as required.
- Percentages of overdue accounts and uncollectible accounts are at a reasonable level.

The administration of customer accounts and the billing and collection function includes:

- Managing customer accounts, including setting up new customers, discontinuing accounts and transferring accounts from one individual to another. There is also a requirement to manage contracts with out-of-town water users who receive water from the City.

- Managing activities related to water meters includes obtaining meter readings and handling turn ons or turn offs of water lines. Customers are divided into automated meter-reading routes so the meters are read accordingly to a bi-monthly schedule.

- Water services must be connected and disconnected in response to customer requests and as a result of collection efforts. The following table provides information on the number and reasons for turn offs and turn ons.

Turn On/Turn Off Statistics	2000	2001	2002	2003	2004
Daytime Turn Ons (#)	1,582	1,833	1,682	1,511	2,035
Daytime Turn Offs (#)	2,193	2,110	1,973	1,997	2,486
Turn Offs Due to Arrears (#)	531	281	447	612	893
Total	4,306	4,224	4,102	4,120	5,414

- Generating customer bills – Customers are divided into billing cycles so each customer is billed every two months on average. One billing cycle is processed each working day.

- Collection efforts take many forms. Interest is added to outstanding balances which encourages timely payment. When accounts remain outstanding, payment arrangements are negotiated where possible. This includes maintaining a post-dated cheque database, as well as providing equalized payment options for utility accounts.

  Collection efforts are not always successful. Provincial legislation provides the authority to enforce payment. There are a variety of options available which include: discontinuing utility service, transferring outstanding utility balances to the tax roll if the account is with the property owner or external collection agencies.

	As of December 31, 2004	
Analysis of Receivables	Amount Outstanding	Per Cent of Total
0-30 Days	$ 4,215,872	69.1
31-90 Days	1,071,633	17.6
91-150 Days	191,575	3.1
151-365	335,009	5.5
> 365 Days	288,838	4.7
Total	$ 6,102,927	100.0

Accounts are subject to a variety of collection efforts with differing rates of success. Virtually all the active owner accounts will be collected through the tax transfer. Most active renters with outstanding balances are living at premises where the service cannot be discontinued, usually because the water line provides service to two or more meters. The only means available to collect these accounts is through a collection agency. It is expected to collect between 25-30% of the amounts placed at the collection agency.

The majority of the accounts transferred to collection agencies are rental properties. Of those accounts, typically 60% are customers receiving Social Assistance. Changes to procedures for dealing with Social Services accounts has improved the record of payments for inactive accounts for Social Services customers. Initial results suggest that it is possible to significantly reduce the outstanding renter amounts.

Some accounts previously written off are collected when the customer moves to an active account.

Debt Costs

This program includes the cost of principal and interest for debt issued to finance utility capital projects, along with the cost of the debt issue. Debt charges are made up of two elements:

- Interest – This is the cost of interest payments on all outstanding serial debentures.

- Principal repayments – These payments represent the cost to redeem the principal portion of a serial debenture that matures each year. A serial debenture does not remain outstanding in full for the life of the debt issued. As with a mortgage, a portion of the principal amount of the debt matures and is paid each year until the debt is fully mature.

The following table shows the existing annual debt charges and debt maturities.

Schedule of Debt Charges and Debt Maturities ($000's)

		Debt Maturities		
Year	Annual Debt Charges	Debt Maturing	Per Cent of Total	Cummulative Percentage Reduction
2005	12,699.7	10,200	19.1%	19.1%
2006	10,906.7	8,900	16.6%	35.7%
2007	10,438.8	8,900	16.6%	52.3%
2008	7,132.5	5,900	11.0%	63.4%
2009	5,582.7	4,600	8.6%	72.0%
2010	5,353.4	4,600	8.6%	80.6%
2011	5,113.2	4,600	8.6%	89.2%
2012	4,866.0	4,600	8.6%	97.8%
2013	642.1	600	1.1%	98.9%
2014	611.2	600	1.1%	100.0%
	Total	53,500	100.0%	

The 2005 – 2009 Utility Capital Program requires external debt financing of $30.0 million in 2008 and $20.0 million in 2009. Debt financing for capital projects is projected to be required every year starting in 2008. The utility model includes funding for debt issuance costs and the repayment of projected debt issues based on a ten-year term and an interest rate of 6%.

Utility Capital Program

Capital Program Summary

	2005	2006	2007	2008	2009	Five Year Total
Capital Expenditures ($000's)						
Water Supply, Pumping & Distribution	**1,240**	1,890	1,590	1,690	1,690	8,100
Wastewater Collection & Treatment	**6,305**	5,990	5,540	34,340	24,390	76,565
Drainage	**5,250**	3,450	2,950	3,800	4,050	19,500
Total Expenditures	**12,795**	11,330	10,080	39,830	30,130	104,165
Capital Funding ($000's)						
General Utility Reserve	**5,016**	9,580	8,310	6,930	9,080	38,916
New Debt	**-**	-	-	30,000	20,000	50,000
Debt Issued in Prior Years	**6,000**	-	-	-	-	6,000
Municipal Rural Infrastructure Fund	**1,700**	1,700	1,700	1,700	-	6,800
Utility Development Charges	**79**	50	70	1,200	1,050	2,449
Total Funding	**12,795**	11,330	10,080	39,830	30,130	104,165

Infrastructure Overview

Regina has a substantial investment in utility infrastructure and, like all municipalities, investing sufficient funds to adequately maintain these assets is a challenge. The gap between the annual requirement to sustain the infrastructure and the annual investment is referred to as the "Infrastructure Deficit". Regina is a relatively young city and has to some extent been shielded from the full impact of its utility infrastructure deficit because until recently much of the buried infrastructure was still within its expected service life.

In recent years there has been increased discussion of the infrastructure deficit faced by cities, and the need for additional funding from the senior governments and/or alternate revenue sources for cities. The Federal Government has committed to a “new deal” for cities. Components of the new deal include the full rebate of GST, funding for infrastructure programs and a sharing of the federal gas tax. In 2004, the Federal Government revised the policy for GST rebates to provide a full rebate to municipalities. The Municipal Rural Infrastructure Fund (MRIF) starts in 2005. In Saskatchewan, the MRIF is $76 million in total of federal and provincial funding over four years. Regina and Saskatoon will share 20% of the total funding, with Regina’s share being about $7.6 million in total or about $1.9 million per year over the four years. It is expected that the 2005 Federal Budget will include provisions to provide a share of the federal gas tax to municipalities. There is no indication of the amount of funding that will be available to Regina, or the conditions, if any, that might be attached to the funding. Issues related to the funding include:

- Funding received by Regina through the Canada Saskatchewan Infrastructure Program (CSIP) was directed to general and utility capital projects. To the extent that funding was used for utility capital projects, an equivalent amount was transferred from the Water and Sewer Utility to the General Operating Budget to be used to fund transportation infrastructure initiatives. Decisions will be required with respect to future funding, as to whether the funding is used for utility capital projects, and if so, whether an equivalent amount will be transferred to the General Operating Budget.

- Through the “new deal” there will be increased funding available for transportation infrastructure, including roadways. Most of the utility infrastructure is under roadways. When roadways are re-developed, utility infrastructure is evaluated and upgraded if necessary. Increased funding for roadways will result in increased funding requirements for the Water and Sewer Utility.

- In 2004, City Council decided that the benefit of the additional GST rebate related to utility expenditures would be transferred to the General Operating Budget. City Council also passed a resolution asking for a further review of this additional transfer as part of the 2005 budget considerations. The 2005 budget is based on the additional GST rebate being retained by the Water and Sewer Utility. On an annual basis the amount is about $675,000.

In 2004, City Council approved the Residential Growth Study (Report CR04-196). Implementation of the Residential Growth Study will require integration of infrastructure requirements into sector and concept plans. These plans will detail the physical and engineering aspects of the new infrastructure along with funding and phasing of the work. Current development policies are based on the provision of trunk services uniformly throughout the city, with development charges, levied pursuant to *The Planning and Development Act*, the same for all newly developed land, irrespective of location. The development scenarios adopted in the Residential Growth Study result in significantly different trunk infrastructure requirements, and hence infrastructure costs, for each of the growth areas. The intent, in 2005, is to implement changes in development charge rates that address the differences in infrastructure costs.

Infrastructure requirements are being addressed through a series of studies. Studies recently completed or underway include:

- The Wastewater Collection System Assessment Study, completed in 2004, estimated the replacement value of the sanitary sewer system as $635 million. The study defined requirements for the long-term sustainability of the wastewater collection infrastructure. In 2005, further work will be undertaken to investigate inflow and infiltration to the wastewater collection system.

- The review of the Long Term Water Utility Plan, started in 2004 and to be completed in 2005, will provide information for the water supply and distribution system, comparable to the information generated for the wastewater collection system. A rough estimate of the replacement value for the water distribution system is $250 to $300 million, with a further $350 to $400 million for the supply system, including the City's share of the Buffalo Pound Water Treatment Plant.

- The proposed 2005 budget includes funding for the development of an Asbestos Cement Watermain Repair Strategy. Approximately two-thirds of the water distribution and sewage collection systems was constructed in a thirty-year period between the early 1950s and the late 1970s. In this period, almost all of the water distribution system construction used asbestos cement pipe. Asbestos cement pipe has a reliable service life, under the conditions that prevail in Regina, of 50 years. In recent years, there has been an increasing frequency in breaks in asbestos cement pipe. This pattern will likely continue as the system ages.

- The value and infrastructure requirements of the sewage treatment plant will be documented through the Sewage Treatment Planning Study to be completed in 2005. The Wascana Creek Receiving Environment Study will also be completed in 2005. The study is to conduct an environmental impact on the Wascana Creek from the City to the Qu'Appelle River.

Once the studies are completed, the full scale of the infrastructure deficit can be determined. The program presented in the 2005 – 2009 Utility Capital Program does not address infrastructure renewal requirements that are likely to be identified in these studies.

With appropriate maintenance, the useful life of utility infrastructure ranges from 10 years for instruments and controls to over 100 years for robust concrete structures. An average service life of 50 years implies that, on average, 2% of the system will require replacement every year. The annual capital replacement or renewal cost for the utility is in excess of $25 million. Recent capital budgets have typically provided up to $4 million for annual infrastructure renewal programs plus significant contributions for major capital investment and replacement such as water meter replacement, Wastewater Treatment Plant upgrading, Buffalo Pound expansion and pipeline twinning. **The total invested falls short of that required to preserve and replace the system as it ages.**

Water Supply, Pumping and Distribution

Capital Summary ($000's)	2005	2006	2007	2008	2009
Capital Expenditures					
1. Water Supply - System improvements	**-**	300	-	-	-
2. Water Pumping - Pumping station improvements	**-**	50	-	50	-
3. Water Distribution:					
- Water infrastructure renewal	**500**	1,050	1,100	1,150	1,200
- Watermain upgrades and improvements	**290**	100	100	100	100
- Hydrant replacement	**150**	150	150	150	150
4. Other Capital Projects:					
- Trench settlement remediation	**100**	100	100	100	100
- Capital project deficiency	**140**	140	140	140	140
- New Equipment - Service Repair Van	**30**	-	-	-	-
- New Equipment - Automatic Meter Reading Vehicle	**30**	-	-	-	-
Total Expenditures	**1,240**	1,890	1,590	1,690	1,690
Capital Funding					
General Utility Reserve	**1,240**	1,890	1,590	1,690	1,690
Total Funding	**1,240**	1,890	1,590	1,690	1,690

Water Supply

- **Water Supply System Improvements** – $300,000 is provided in 2006 for decommissioning wells and pipelines that are no longer required.

Water Pumping

- **Pumping Station Improvements** – $50,000 is provided in 2006 and 2008 for the addition of new equipment and replacement of obsolete equipment to improve the operation of the pumping stations.

Water Distribution

- **Water Infrastructure Renewal** – $500,000 is provided in 2005 and $4.5 million for the balance of the five-year program. This program is for replacement of deteriorated watermains and associated fire hydrants. Work is scheduled in conjunction with other infrastructure replacement and upgrading projects. Following a detailed review to be completed in 2005, asbestos-cement watermains with chronic break problems will be addressed. A high frequency of breaks in old watermains results in high maintenance costs, deterioration of streets and sidewalks and inconvenience to affected water customers. The cast iron watermain replacement program was adopted by City Council in 1979. This program significantly reduced the number of watermain breaks experienced each year. Replacement of full blocks of cast iron watermains was completed in 2001. Cast iron watermains in intersections are being replaced in conjunction with roadway renewal projects. Deficient fire hydrants at the intersections are replaced at the same time.

- **Watermain Upgrades and Improvements** – $100,000 is provided in each year of the five-year program to eliminate, where possible, dead-ends on watermains. Where dead-ends cannot be eliminated, a flush out is provided to allow thorough flushing of the watermain. The project is

intended to eliminate water quality problems caused by dead-ends and ensure the best practical water flows to fire hydrants for fire protection. At the present rate of funding this initiative will be completed in approximately ten years. In 2005, $40,000 is required for the City share of watermain construction costs on Pasqua South of Ryan Road, $100,000 for the replacement of a watermain on Albert Street South and $50,000 for a watermain at Victoria Avenue and Prince of Wales Drive.

- **Hydrant Replacement** – $150,000 is provided each year to replace old fire hydrants at locations where streets and sidewalks are being replaced, and to replace hydrants that can no longer be repaired. Fire hydrants are also replaced through the water infrastructure renewal program. If required, emergency replacement of malfunctioning hydrants is funded as a maintenance expense in the operating budget.

  There are 3,918 fire hydrants in the city. Malfunctioning hydrants beyond repair are replaced immediately. Old style slide gate hydrants are replaced with compression style hydrants. In some locations, old fire hydrants are repaired with used parts until they can be scheduled for replacement. At this time, 658 hydrants have been identified for replacement. Wherever possible, fire hydrant replacements are coordinated with other infrastructure improvements. Fire hydrant replacements will be escalated when an asbestos cement watermain replacement program is implemented.

Other Capital Projects

- **Trench Settlement Remediation** – $100,000 is provided each year to correct settlement at watermain replacement locations. Cracking and settling of sidewalk, curb, gutter and pavement occur as a result of backfill settlement at watermain work locations, resulting in drainage problems for abutting property owners.

- **Capital Project Deficiency** – $140,000 is provided each year to address deficiencies in past capital works. Of the total, $35,000 is allocated for Drainage, $35,000 for Wastewater Collection and Treatment and $70,000 for Water Supply, Pumping and Distribution. The funding is used to repair asphalt and concrete deficiencies that result from underground utility construction. The deficiencies are repaired between two and five years after the project is complete. Typical deficiencies are sidewalk settlement, pavement failures, landscape problems and drainage problems. In conjunction with the trench settlement remediation project, the City undertakes about 17 repairs each year. Approximately 160 locations have been identified as requiring work.

- **New Equipment Service Repair Van** – $30,000 is provided in 2005 to purchase a service repair van. Two electricians often share a vehicle to service the water pumping stations and well fields when two employees are needed. A second vehicle would allow the electricians to work independently, with a helper when necessary. More service calls would be performed, including work on the storm and domestic lift stations. These stations require increasing electrical maintenance and inhouse dedicated staff are preferred over contractors as the work is highly specialized.

- **New Equipment Automatic Meter Reading Vehicle** – $30,000 is provided in 2005 to purchase a vehicle to be used for obtaining water meter readings.

Wastewater Collection and Treatment

Capital Summary ($000's)	2005	2006	2007	2008	2009
Capital Expenditures					
1. Wastewater Collection:					
- Wastewater collection trunk upgrading	**70**	570	70	570	70
- Wastewater lift station upgrading	**500**	50	500	50	500
- Wastewater collection manhole upgrading	**20**	120	20	120	20
- Southeast wastewater collection trunk	**35**	-	-	-	-
- Pasqua Street south sewer main	**10**	-	-	-	-
- Wastewater collection infrastructure renewal	**2,000**	2,200	2,400	2,600	2,800
2. Wastewater Treatment:					
- McCarthy Pump Station upgrading	**1,500**	-	-	-	-
- Upgrade forcemain - McCarthy Pump Station to Sewage Treatment Plant	**450**	-	-	7,000	-
- Wastewater treatment plant expansion	**500**	1,700	1,000	24,000	21,000
- Wastewater treatment plant improvements	**870**	1,000	1,400	-	-
- Wastewater treatment plant refurbishing	**250**	350	150	-	-
3. Other Capital Projects:					
- CCTV Equipment	**100**	-	-	-	-
Total Expenditures	**6,305**	5,990	5,540	34,340	24,390
Capital Funding					
General Utility Reserve	**2,376**	5,090	4,620	2,290	3,340
New Debt	**-**	-	-	30,000	20,000
Debt Issued in Prior Years	**3,000**	-	-	-	-
Municipal Rural Infrastructure Fund	**850**	850	850	850	-
Utility Development Charges	**79**	50	70	1,200	1,050
Total Funding	**6,305**	5,990	5,540	34,340	24,390

Wastewater Collection

- **Wastewater Collection Trunk Upgrading** – $1,350,000 is provided in the five-year capital program to undertake wastewater trunk system upgrading and refurbishing capital works that result from capacity and condition investigations conducted on the collection system trunks.

- **Wastewater Lift Station Upgrading** – $1,500,000 is provided over three years, 2005, 2007 and 2009 for lift station rehabilitation. In addition, $50,000 is provided in each of 2006 and 2008 for a new supervisory control and data acquisition system (SCADA) for the lift stations.

- **Wastewater Collection Manhole Upgrading** – $300,000 is provided in the five-year capital program. The funding provides for manhole infiltration control ($20,000 per year) and manhole separation ($100,000 in 2006 and 2008). Combined manholes that allow access to both the wastewater collection and drainage systems exist in a number of locations around the city. Such manholes allow drainage water to enter the wastewater system causing overloading of the sewers, potentially resulting in basement sewer backup. Under this project, combined manholes are reconstructed to prevent the drainage water from entering the wastewater system. Infiltration control involves implementing measures, such as new covers and seals, at wastewater manholes to prevent drainage water from entering. This capital expenditure will result in reduced operating expenses in treating drainage water.

- **Southeast Wastewater Collection Trunk** – $35,000 is provided in 2005 for wastewater trunk extension to meet developer requirements. **The funding is from Utility Development Charges.**

- **Pasqua Street South Sewer Main** – $10,000 is provided in 2005 for the City's share of the costs to extend the wastewater main to meet developer requirements.

- **Wastewater Collection Infrastructure Renewal** – $12 million is provided in the five-year capital program to fund renewal of the wastewater collection system, including collection lines, catch basins, manholes and connections. This program will rehabilitate wastewater collection lines in conjunction with scheduled roadway renewal projects and at chronic repair locations to reduce the need for emergency repairs. Collection lines are surveyed by camera and the condition rated so that a program can be developed each year according to the needs. The general and utility capital budgets fund the renewal of their respective infrastructure components. This program rehabilitates wastewater infrastructure in conjunction with roadway infrastructure renewal and will require additional funding in future years as funding for roadway renewal is increased. **Funding of $850,000 per year for the years 2005 to 2008 is projected from the Municipal Rural Infrastructure Program.**

Wastewater Treatment

- **McCarthy Pump Station Upgrading** – $1,500,000 is provided in 2005, for upgrading and expanding the capacity of the City's main wastewater pumping station. An allocation of $1,250,000 is for screening upgrade and $250,000 for water supply and integrity improvements. All sewage from the wastewater collection system is pumped to the Wastewater Treatment Plant through this facility.

  The McCarthy Pump Station also serves as a dumping station for sewage collected by commercial sewer service companies. The pumping station is adjacent to residential neighbourhoods and odour from the pumping station and the dumping facility results in frequent complaints, both for the odour and truck traffic. A review of the odour problem was undertaken. Pending completion and review of the Sewage Treatment Long Range Planning Study currently underway and determination of the probable phase out timing of the hauler dumping at McCarthy Station, a predesign level engineering study on odour abatement level of control and process options is planned.

- **McCarthy Pump Station to Sewage Treatment Plant Forcemain Upgrade** – $300,000 is provided in 2005, for a study and design related to the forcemain. Funding of $7,000,000 is included in 2008 for replacement of the forcemain. While the funding is provided in 2008, the timing and extent of work is subject to change based on continuing analysis of requirements and options. $150,000 is provided in 2005 to modify piping to reduce grit deposits and drain down capability.

- **Wastewater Treatment Plant Expansion** – Expansion projects include major treatment plant changes to meet new regulatory requirements as well as provide expanded hydraulic and process capability to meet larger wastewater flows associated with future city growth. The regulatory requirements of the Province requires the City to meet nitrogen reduction requirement by the end of 2011. The Federal requirements under *The Environmental Protection Act* and *The Fisheries Act* require the City to develop and implement a pollution prevention plan that will result in reduction of ammonia toxicity in the final effluent discharged to the Wascana Creek/QuAppelle River system. The increased treatment requirements result in a need to replace the biological treatment plant. The schedule is for pre-design work to commence in 2006 with final delivery and commissioning of an expanded and enhanced treatment plant in 2010/11. The total estimated projected cost is $73.2 million allocated as follows:

  – Minor plant expansions – An allowance of $500,000 is provided in 2005 for several smaller projects including cold storage building, HVAC, lab specialty items and cathodic protection additions.

- Pre-design engineering will commence in 2005-2006. During this step the process options and treatment capacities criteria as well as more refined capital and operating costs are determined. The estimated cost for this phase of engineering is $500,000 in 2006.

- UV Disinfection Process Improvements. The plant uses ultraviolet light for final effluent disinfection prior to discharge to Wascana Creek. An allocation of $1,200,000 is provided in 2006 to increase the UV plant capacity for year round use.

- Detailed engineering for the expanded and enhanced treatment plant will commence in 2007. During this phase of engineering detailed civil, mechanical, electrical and control systems designs and construction drawings are completed in preparation for contract tendering. The 2007 allowance for initiating the phase is $1,000,000.

- Construction of the plant expansion is scheduled to commence in 2008 with completion and commissioning in 2010/11. The 2005 – 2009 capital program includes $24 million in 2008 and $21 million in 2009. A further $25 million will be required in 2010.

The estimated costs are preliminary and will be refined through the pre-design and detailed engineering stages. **Funding for the project includes $1,200,000 in 2008 and $1,050,000 in 2009 from Utility Development Charges.**

- **Wastewater Treatment Plant Improvements** – Funding of $3.27 million is provided over the 2005 to 2007 period. The projects and proposed schedule are as follows:

  - $300,000 in 2005 for control system improvements. The current wastewater treatment control system installed in 1996 requires software and control terminal upgrades. This is necessary to maintain reliable control systems for plant operation, monitoring and process control.

  - $300,000 in 2005 for digester gas pressure regulator, safety valve replacements, and improvements to the services building.

  - $200,000 in 2005 to complete the engineering drawing conversion project. A large number of the STP engineering drawings need to be updated and converted to digital format. Drawings for much of the plant were manual and have not been updated to an “as built” record. Records reliability and accessibility is poor, while knowledge retention is increasingly at risk. In order to operate, maintain, and upgrade this facility all drawing records must be in a workable format and accurate.

  - $20,000 in 2005 for improvements to the sludge dewatering building roof.

  - $50,000 in 2005 for a portable water supply in the plant.

  - $1,000,000 in 2006 for final design and implementation of additional methane gas utilization equipment to optimize energy capture from methane production. Methane gas can be utilized to provide energy needs for plant operation and reduce external gas/electricity purchases. This project will optimize utilization of methane gas generated in the sewage treatment solids treatment process (digesters). Currently about 50% of methane is utilized with the remainder flared.

  - $1,400,000 in 2007 for grit removal process improvements. The step in wastewater treatment that removes heavier particulates (sand, gravel, glass, etc) is called grit removal. The current grit removal process requires improvements to adopt newer more efficient and worker tolerant technology. The proposed improvement is to be engineered and constructed in 2007.

  Funding for the projects includes $44,000 in 2005, $50,000 in 2006 and $70,000 in 2007 from Utility Development Charges.

- **Wastewater Treatment Plant Refurbishing** – The program provides funding for major maintenance projects that are beyond the regular operating and maintenance budget. Over the five year capital program, $750,000 is provided as follows:

  - In 2006, $200,000 is provided to clear out the tertiary sludge storage lagoon which will be filled to capacity at that time. The material is excavated in the winter months and hauled to an on-site landfill.

  - An allocation of $150,000 is provided in 2005, 2006 and 2007 to undertake major maintenance work to refurbish corroded concrete, piping and valves.

  - An allowance of $100,000 is provided in 2005 to improve conveyance piping to aeration lagoon 1S.

Other Capital Projects

- **CCTV Equipment** – $100,000 is provided in 2005. Funding includes the purchase of a second camera unit that can pan and tilt to enhance inspection capabilities, mounted on a self-propelled crawler. Backup equipment and spare parts will also be purchased. Minimizing equipment breakdowns and using the camera crawler will significantly increase production and lower unit costs. The inspections follow the work done through the sewer maintenance/cleaning program. Additional CCTV inspection work will be considered in the 2006 budget to facilitate long range planning.

Drainage

Capital Summary ($000's)	2005	2006	2007	2008	2009
Capital Expenditures					
1. Drainage System Upgrading:					
- Glencairn	**-**	-	-	1,900	-
- Dieppe	**3,800**	1,400	-	-	-
- CPR Annex	**-**	-	-	-	800
- South Regina	**-**	-	-		1,200
- Catch basin installations	**50**	50	50	50	50
- Drainage lift station upgrading	**-**	-	1,200	-	-
- Drainage infrastructure renewal	**1,400**	1,550	1,700	1,850	2,000
- Dredging and lake shoreline maintenance	**-**	100	-	-	-
2. Wascana Creek Improvements:					
- Dieppe Reach	**-**	350	-	-	-
Total Expenditures	**5,250**	3,450	2,950	3,800	4,050
Capital Funding					
General Utility Reserve	**1,400**	2,600	2,100	2,950	4,050
Debt Issued in Prior Years	**3,000**	-	-	-	-
Municipal Rural Infrastructure Program	**850**	850	850	850	-
Total Funding	**5,250**	3,450	2,950	3,800	4,050

Drainage

- **Drainage System Upgrading** – Drainage system upgrading projects involve major improvements to reduce flooding caused by melting snow and large summer rainstorms. The upgrading of drainage systems is in accordance with the priority identified in Drainage Area Studies. Total remaining work exceeds $90 million. At current levels of funding completion of all remaining projects will take up to 50 years. Projects in the current capital program include:

  – Glencairn Area Upgrade Projects – $1.9 million is provided in 2008 for construction of drainage water detention facility, including relief trunks.

  – Dieppe Area Upgrade Projects - $5.2 million is provided for the Dieppe area upgrading projects. In 2005, $3.8 million is allocated for construction of a drainage pumping station to handle summer storm flows behind the Wascana Creek dykes and the construction of a new storm water detention facility in park open space adjacent the drainage pumping station. This station will also incorporate a wastewater lift station and shared standby power. In 2006, $1.4 million is allocated for construction of storm relief sewers upgrading the Wascana Creek Dyke and constructing the Courtney Street ditch from Dewdney Avenue to Wascana Creek. This two year project will provide an improved level of drainage service to the Dieppe area.

  – In 2009, $1.2 million is provided for a drainage improvement project in the South Regina area and $800,000 for a project in the CPR Annex area.

- **Catch Basins Installations** – $50,000 is provided in each year of the five-year capital program. The funding provides for the installation of catch basins at various locations on streets and in easements where severe ponding is a problem. Based on past construction, the average cost per location is $8,000. There are a number of locations on record where catch basins are required. Increasing the catch basin inventory will result in increased catch basin cleaning costs.

- **Drainage Lift Station Upgrading** – $1,200,000 is provided in 2007 for upgrading and renewal of a lift station at the Ring Road and North Storm Channel.

- **Drainage Infrastructure Renewal** – $8.5 million is provided in the five-year capital program. This program will replace substandard drainage system lines either in conjunction with scheduled reconstruction work or at chronic problem locations. Drainage lines are surveyed by camera and the condition rated so that a program can be developed according to the priorities in each year. The general capital and utility capital budgets fund the renewal of their respective infrastructure components. This program results in a reduction in the number of drainage system emergency repairs that must be completed each year.

- **Dredging and Lake Shoreline Maintenance** – $100,000 is provided in 2006 for dredging including shoreline improvements. Dredging of storm channels, small creeks and retention lakes is undertaken to remove sediment, restore hydraulic capacity and improve storm water quality.

- **Wascana Creek Improvements** – This is a program to enhance and upgrade flood protection for those areas of the city where buildings encroach upon the Wascana Creek plain and are protected by dykes. The program also provides for creek dredging of sediment accumulation. An annual dyke survey report and minor maintenance will be required. $350,000 is provided in 2006 for dyke upgrade and creek dredging in the Dieppe reach.

Utility Capital Funding

Funding for the Water and Sewer Utility Capital Program is primarily from the following sources:

- General Utility Reserve.
- Utility Development Charges.
- Federal Provincial Infrastructure Programs.
- Debenture Debt.

General Utility Reserve

The General Utility Reserve is funded through the net operating surplus of the utility. Each year the utility generates a surplus, a portion of which is transferred to the general operating budget, with the balance transferred to the General Utility Reserve. The reserve is primarily used to fund capital projects, but is available should there be an operating shortfall. The following table provides a projection for the General Utility Reserve.

General Utility Reserve ($000's)

	2005	2006	2007	2008	2009
Reserve Balance - Start of Year	**6,981.5**	**3,947.4**	**1,204.4**	**1,262.7**	**2,513.2**
Net Operating Surplus	1,981.9	7,175.4	8,977.9	11,762.5	12,070.7
Capital Program Requirement[(1)]	(5,016.0)	(9,918.4)	(8,919.6)	(10,512.0)	(12,729.8)
Reserve Balance - End of Year	**3,947.4**	**1,204.4**	**1,262.7**	**2,513.2**	**1,854.1**

Note 1: The Capital Program Requirement reflects an estimated inflation rate applied to capital requirements. The 2005 – 2009 Utility Capital Program is presented in current dollars (without inflation). The utility model incorporates projected increases in revenues and expenditures due to inflation. The net operating surplus reflects future projected increases and as such, the inflationary projection for capital program requirements is also used in this table.

Utility Development Charges

Utility Development Charges are pursuant to *The Planning and Development Act, 1983* and are collected when development agreements are entered into between the City and a developer. The agreements require a payment to the City of $21,824 per hectare of land within the development area. The payment of development charges is 30% upon execution of a servicing agreement, another 40% within nine months and the balance within a further nine months. As a result of the completion of the recent Residential Growth Study, the intent in future years is to introduce differential rates for development charges based on the differing costs of development. Eligibility for funding is by policy of City Council and includes:

- 100% of funding for the cost of trunk watermains.
- A portion of the cost to construct watermains larger than 250 mm in diameter.

- 100% of funding for wastewater collection trunks which are 300 mm or greater in size.
- 100% of funding for wastewater lift stations that are a component of a regional servicing plan.
- 5% of the funding for expansion to the wastewater treatment plant for capacity for new development.
- 5% of the funding for McCarthy Boulevard pump station expansions, for capacity for new development.
- 100% of the funding for servicing design criteria review studies for the servicing of new land development.
- 100% of funding for drainage trunks 1,350 mm or greater in size.
- 100% of funding for drainage lift stations that are an approved component of a regional drainage plan.
- 100% of funding for a dry bottom detention facility (or the equivalent for a dry facility if a wet retention pond is constructed) if the pond is an approved component of a regional drainage plan.
- 100% of funding for new or upgraded storm channels that are an approved component of a regional drainage plan.
- 100% of the funding for full urbanization of the Pilot Butte and Chuka Creek adjacent to undeveloped lands if the improvements are part of an approved regional drainage plan.
- 100% of the funding for master drainage studies which are part of an approved regional plan of undeveloped land.

Revenue from development charges is recognized when the funds are spent on an eligible project. Historically, capital projects eligible for development charge funding have been undertaken ahead of the funds being available resulting in a shortfall in development charge funding. The projections for Utility Development Charges are detailed in the following table. The funding projections have been based on the development of 25 hectares per year.

Utility Development Charges ($000's)

	2005	2006	2007	2008	2009
Balance - Start of Year	**(3,563.9)**	**(3,097.3)**	**(2,591.2)**	**(2,091.2)**	**(2,810.9)**
Utility Development Charges[(1)]	545.6	557.6	574.3	591.6	609.3
Capital Program Requirements[(1)]	(79.0)	(51.5)	(74.3)	(1,311.3)	(1,181.8)
Balance - End of Year	**(3,097.3)**	**(2,591.2)**	**(2,091.2)**	**(2,810.9)**	**(3,383.4)**

Note 1: The projected utility development charges incorporate the approved rates for 2005 and 2006, and increases in future years for inflation. The capital program requirements also incorporate projected increases due to inflation.

Federal Provincial Infrastructure Programs

The Canada-Saskatchewan Infrastructure Program (CSIP) was for the years 2002 to 2005. Although the program was over four years, the City received the total funding of about $12.2 million over two years. Details of the allocations and the receipt of funds are shown in the following chart.

Canada-Saskatchewan Infrastructure Program Grants ($000's)

CSIP Details	2003	2004	Total
General Capital Program:			
Energy Conservation and Facility Upgrade	1,425.0	793.7	2,218.7
Water and Sewer Utility Capital Program:			
Buffalo Pound Pipeline Twinning	3,760.0	4,091.8	7,851.8
Water Meters/AMR	1,079.0	1,087.2	2,166.2
Total CSIP Payments	6,264.0	5,972.7	12,236.7

There is a new four-year Municipal Rural Infrastructure Program (MRIF) starting in 2005, with $1.7 million in funding available each year for Regina. City Council has approved the allocation of the funding for 2005 and 2006 to Water and Sewer Utility projects. The utility capital program assumes that the MRIF funding for 2007 and 2008 will also be allocated to utility projects. As a result of the allocation of MRIF funds to the Water and Sewer Utility, there is a transfer of $1.7 million per year from the utility to the General Capital Program.

Debt Financing

Section 135 of *The Cities Act* creates the authority to issue debt to finance capital projects. While debt is a source of capital financing, ultimately the cost of the debt (principal and interest) has to be funded through the utility operating budget. The following table is a summary of the outstanding debt and the debt maturing each year. The $40 million issue in November 2002 provided funding for capital requirements in 2002, 2003 and 2004. The $6 million issued in 2004 was to fund capital requirements in 2005.

Schedule of Debt Maturities ($000's)

	Debt Issues						
Year	$13 Million May 1995	$30 Million Feb 1997	$13 Million May 1998	$40 Million Nov 2002	$6 Million May 2004	Total	Per Cent of Total
2005	1,300	3,000	1,300	4,000	600	10,200	19.1%
2006	-	3,000	1,300	4,000	600	8,900	16.6%
2007	-	3,000	1,300	4,000	600	8,900	16.6%
2008	-	-	1,300	4,000	600	5,900	11.0%
2009	-	-	-	4,000	600	4,600	8.6%
2010	-	-	-	4,000	600	4,600	8.6%
2011	-	-	-	4,000	600	4,600	8.6%
2012	-	-	-	4,000	600	4,600	8.6%
2013	-	-	-	-	600	600	1.1%
2014	-	-	-	-	600	600	1.1%
Total	$ 1,300	$ 9,000	$ 5,200	$ 32,000	$ 6,000	$ 53,500	100.0%

In the 2005 – 2009 Utility Capital Program, there is a debt requirement of $30 million in 2008 and $20 million in 2009. Based on current revenue and expenditure projections in the model, the Water and Sewer Utility will require debt financing each year beyond 2009.