Town of Markham Waterworks

Water and Wastewater Infrastructure Report 2008

Presentation to General Committee

May 4, 2009

Purpose of Report

Inform CAO/Commissioners/Committee and senior management of

- **Waterworks Services**
- **Water and Sanitary Sewer Systems Overview**
  - **Drinking Water and Sanitary Sewer Systems Inventory**
  - **Water Main Length Distribution**
  - **Sanitary Sewer Length Distribution**
- **Waterworks Infrastructure Capital Programs**
  - **Cement Lining Program status**
  - **Cathodic Protection Program**
  - **Impact Of Corrosion Remedial Strategies**
  - **Corrosion Impact On Water Main Break Without Remedial Protection**
  - **Corrosion Remedial Program Savings**
  - **Cast Iron Water Main Replacement Program**
  - **Water Main Dead Ends Improvement Program**
  - **Water Meter Programs**
  - **Sanitary Sewer Mains, Laterals & Trunk Sewers Inspection Programs**
  - **Sanitary Sewer Mains & Laterals Rehab Programs**
  - **Sanitary Sewer Emergency Repairs**
- **Waterworks Future Programs & Activities**
- **Questions?**

Waterworks Services

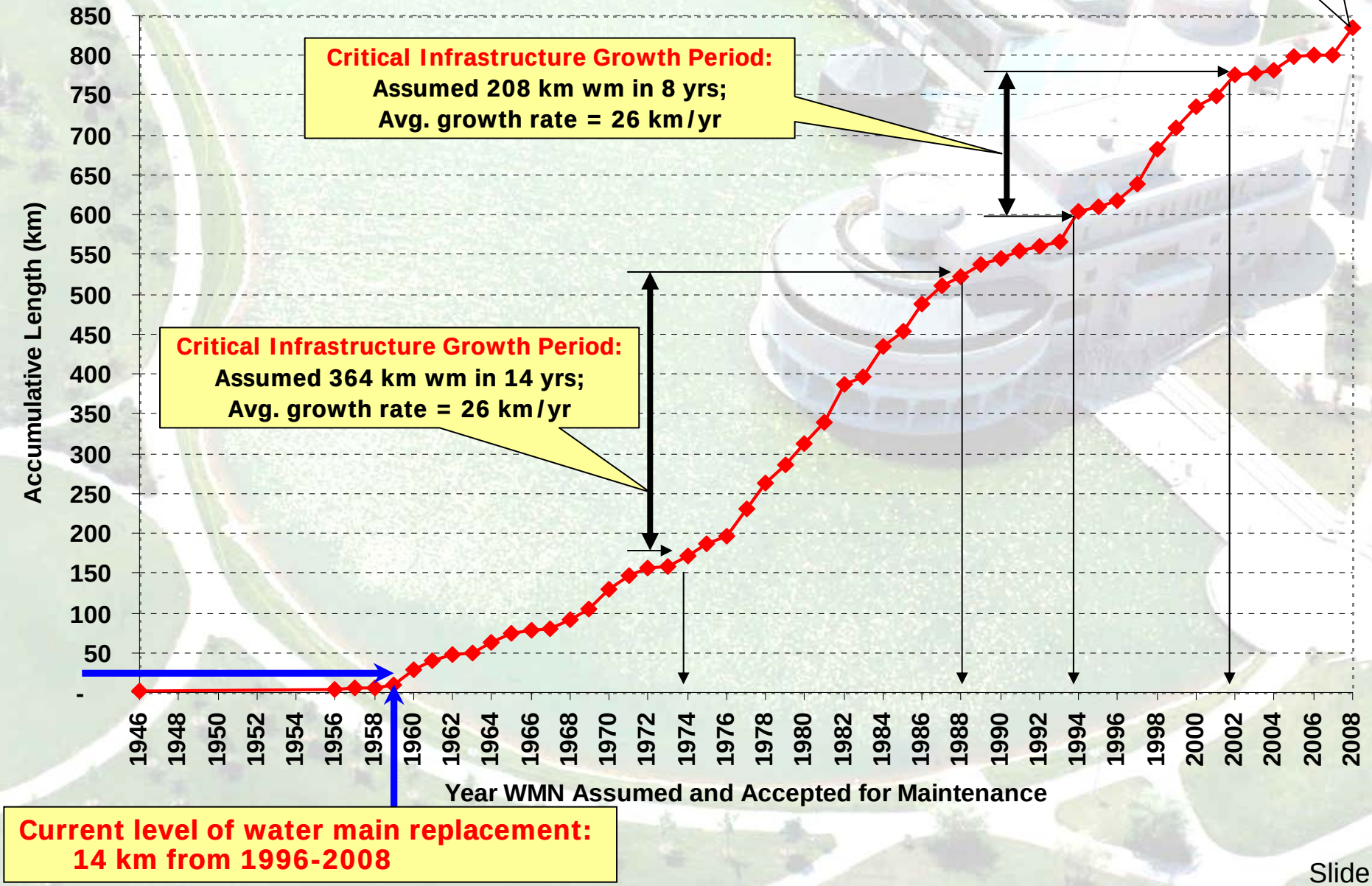
- **Operation and maintenance of drinking water distribution and sanitary sewage collection systems.**
- **Maintenance, repair, rehabilitation and replacement of water and wastewater infrastructures.**
- **Response to customer service requests and concerns regarding water and wastewater services.**

Drinking Water & Sanitary Sewer Systems Inventory

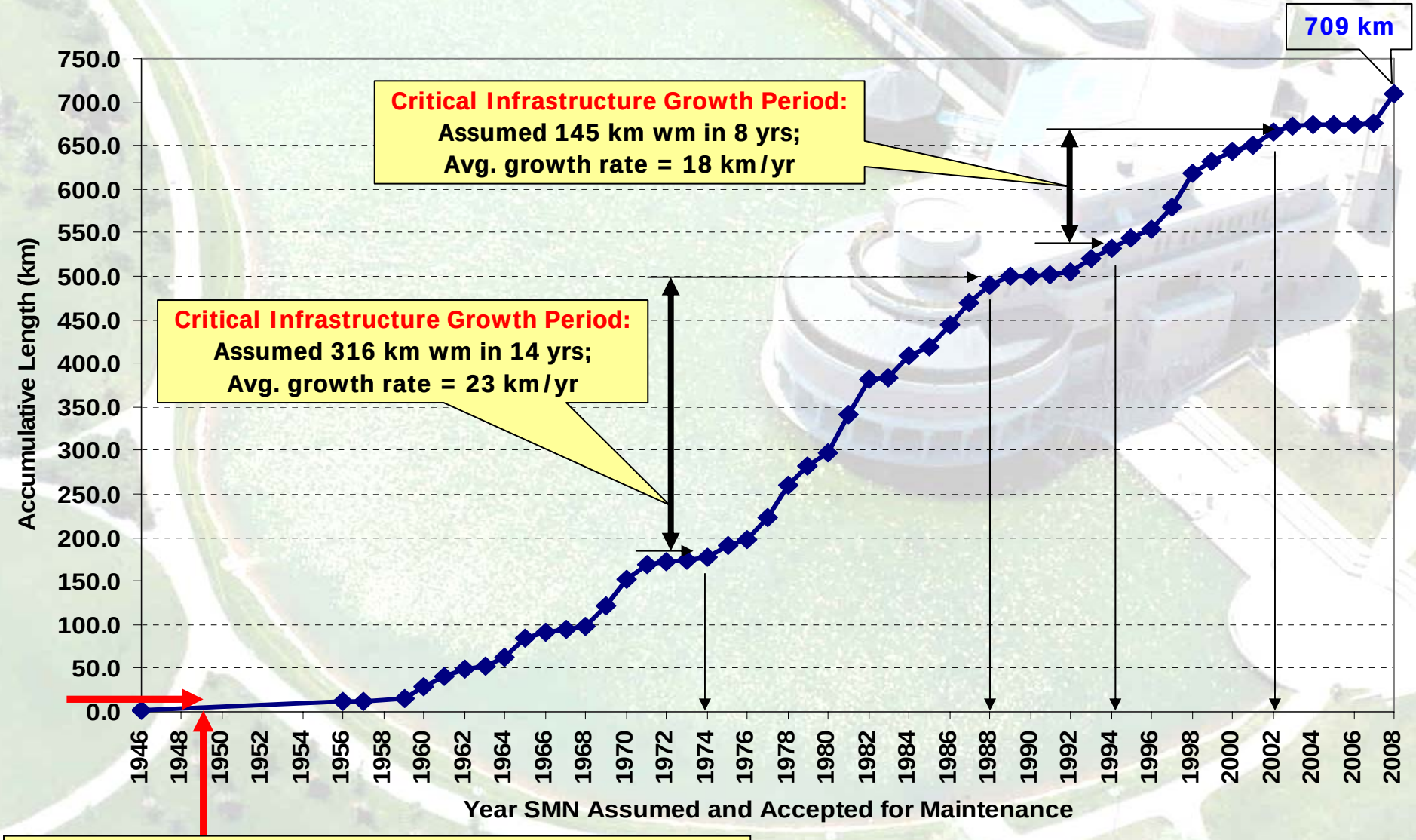
Asset Category	Life Expectancy * (years)	Era / Avg. Age (years)	Inventory Count (Assumed & Accepted for Maintenance by Dec 31, 2008)
Water Main Total	**Varies (65~100)**	**1946 ~ 2008**	**834 km**
Cast Iron	90	1946 ~ early 1970s	75 km
Ductile Iron	70	late 1960s ~ mid 1980s	232 km
PVC and Others	65 ~100	1946~2008	527 km
Sewer Main Total	**Varies (65~120)**	**1946 ~ 2008**	**709 km**
Sanitary Sewage Pumping Station	**15 ~ 100 varies by components**	**Assumed: 13~43 Un-assumed: 1~3**	**6 Stations: Assumed: Cachet Woods; Carlton Road; Kennedy Road; Rougecrest; Un-assumed: Fairtree; Milliken Park**

* **Based on consultant's report**

Water Main Length Distribution (1946-2008)



Sanitary Sewer Length Distribution (1946-2008)



Current level of sewer replacement:

<1 km by 2008, mostly for corrective replacement

Waterworks Infrastructure Capital Programs

Focus:

- **Maintain drinking water quality, protect public health and safety**
- **Conformance to the Drinking Water Quality Management Standards (DWQMS)**
- **Sustain and extend infrastructure life expectancy**
- **Reduce risks and liabilities**
- **Improve customer services**
- **Reduce maintenance costs**

Cement Lining Program Status

Focus:

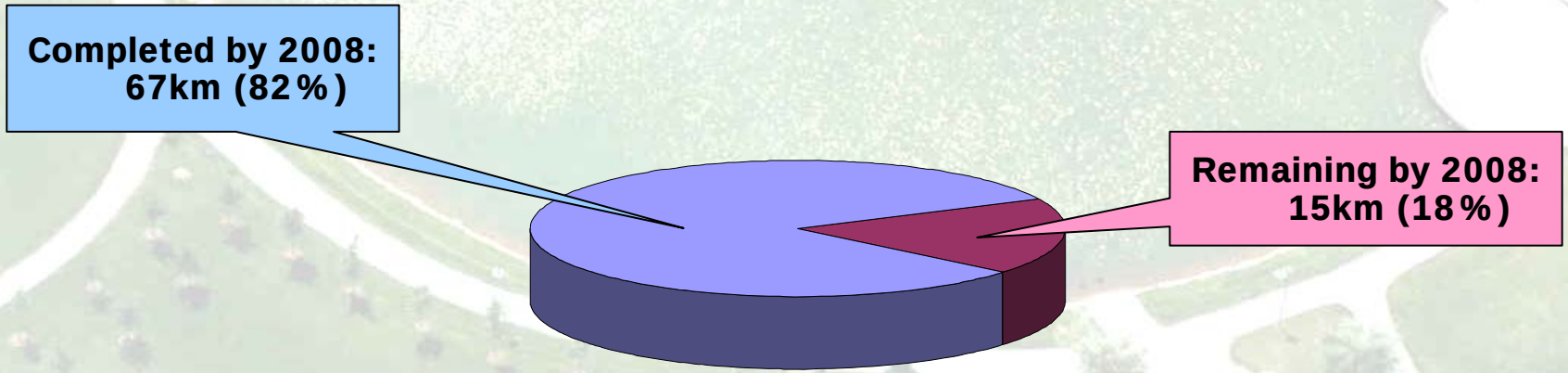
- 82 km unlined ductile iron water mains installed up to 1972

Benefits:

- Water quality improvement
- Corrosion reduction
- Life expectancy extension

Accomplishments:

- 20-year cement lining program started in 1996
- Program expected completion by 2011 (5 years ahead of schedule)



Cathodic Protection Program

Focus:

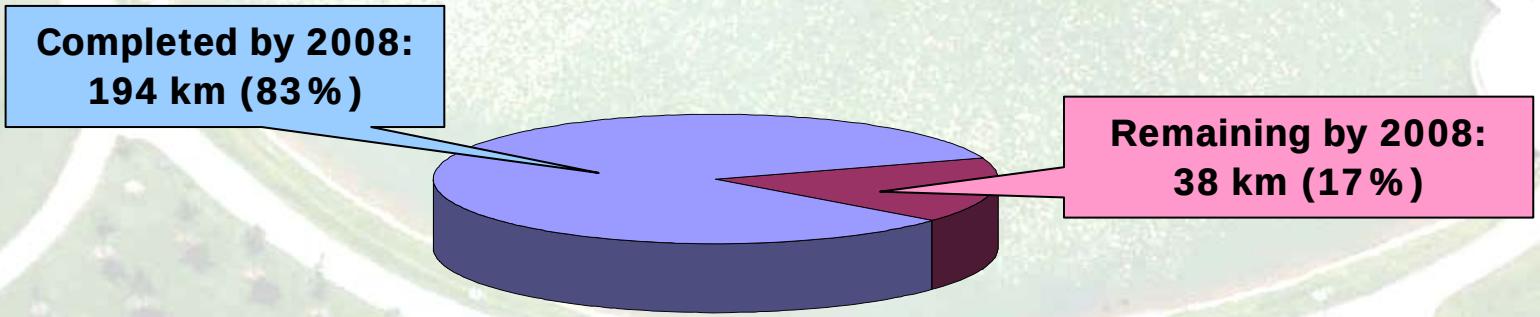
- Ductile iron pipes (232 km) to control external corrosion

Benefits:

- Reduced water main breaks
- Reduced service interruption
- Reduced maintenance cost

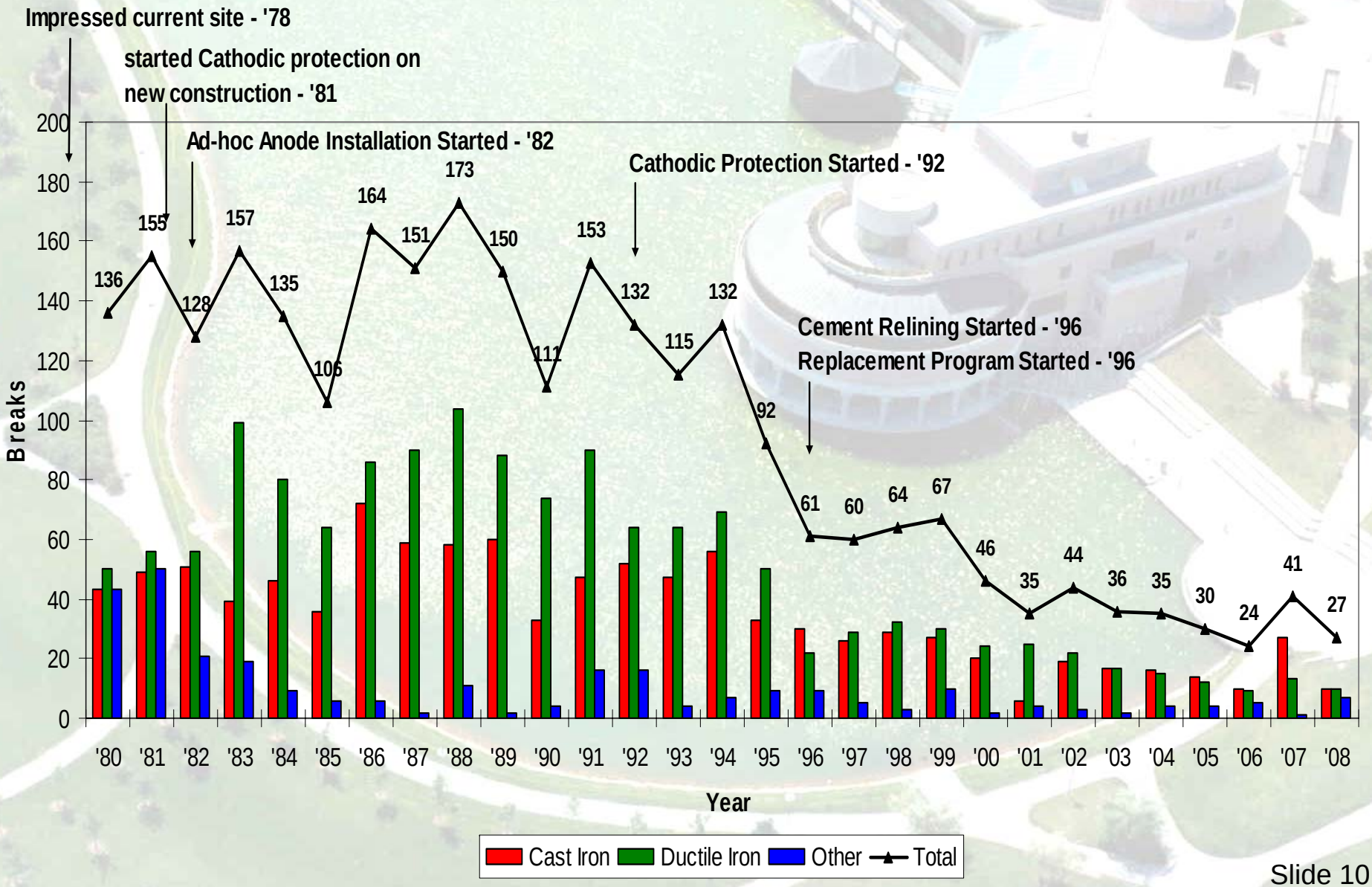
Accomplishments:

- 20-year renewal cycle program started in 1992
- First cycle completion by 2012

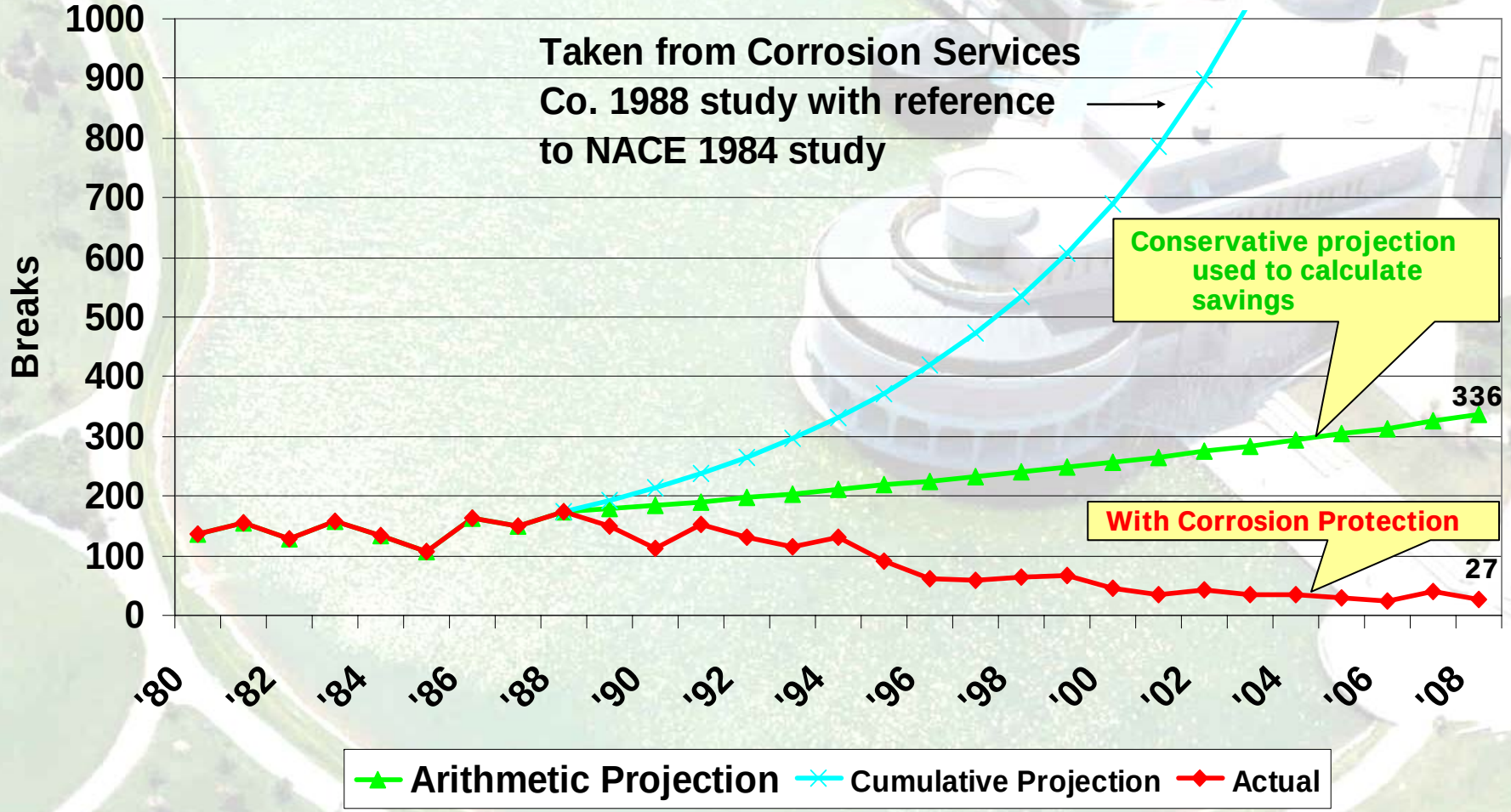


Remaining service life of installed anodes due for assessment

Impact of Corrosion Remedial Strategies
– Water Main Breaks Reduction



Corrosion Impact on Water Main Break without Remedial Action



AWWA ACE'07, June 27, 2007

AWWA ACE - American Waterworks Association, Annual Conference & Exhibition

NACE - the National Association of Corrosion Engineers

Corrosion Remedial Programs Savings

Year	Savings: Projected Water Main Breaks (WMB) cost vs. Actual WMB cost	Cost of Corrosion Remedial Strategies	Net Savings: Funds Available for Other Projects
2001	$1,865,087	$980,800	$884,287
2002	$1,903,217	$1,106,004	$797,213
2003	$2,052,211	$1,246,859	$805,352
2004	$1,627,570	$1,316,542	$311,028
2005	$2,265,713	$1,183,308	$1,082,405
2006	$2,674,959	$1,326,779	$1,348,180
2007	$2,865,542	$1,511,095	$1,354,447
2008	$3,609,735	$1,243,653	$2,366,082
Total	**$18,864,034**	**$9,915,039**	**$8,948,995**

From AWWA ACE '07, June 27, 2007

Cast Iron Water Main Replacement Program

Focus:

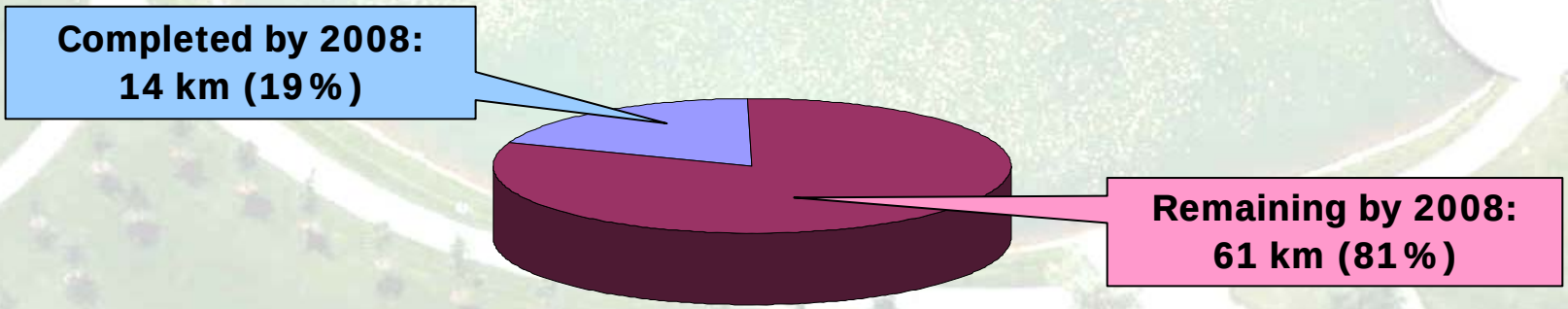
- Replacement of aged, capacity or performance deficient pipes

Benefits:

- Improve water quality and pipe capacity
- Reduce risk, financial burden and liabilities

Accomplishments:

- 14 km CI pipes replacement completed
- Accelerated plan for 20-yr CI pipes replacement starting in 2012
- CI pipes replacement status by end of 2008



Water Main Dead Ends Improvement Program

Focus:

- Dead ends or unlooped water mains (236)

Benefits / Purposes:

- Restore water quality to meet regulatory requirements
- Reduce labour intensive flushing and conserve water
- Reduce risk and liabilities associated with adverse water quality
- Better customer service

Accomplishments:

- Identified viable improvement solutions
  - dead end looping, termination, abandonment, automatic flushing stations installation, etc.
- Installed 8 auto-flushing stations (2005-2007)
- Phase I design on going, tender in Spring of 2009

Water Meter Programs

Focus:

- **Residential & ICI (Industrial, Commercial and Institutional) water meters testing, repair and replacement**

Benefits:

- **Reduce revenue loss**
- **Support user pay principle**
- **Better customer service**

Accomplishments:

- **Up to 2008, 120 ICI high user water meters were tested and upgraded**
  - **Estimated revenue recovery $270,000 / yr, payback in 3 months**
- **60% of residential meters (40,800) were replaced (1993~2008)**
  - **Estimated payback in 2~5 years based on annual consumption**

Sanitary Sewer Mainlines, Laterals & Trunk Sewers Inspection Programs

Focus:

- **Inspection of internal physical conditions of sanitary sewer system by CCTV & zoom camera**

Benefits:

- **Proactive identification and prioritization of pipe deficiencies**

Accomplishments:

- **Continuous annual Closed Circuit Television (CCTV) inspection program**
  - **Inspection cycle of approx. 5 years**
- **Trunk sewers Zoom Camera inspection, started in 2005**
  - **5 trunk systems completed**
  - **4 trunk systems to be completed**
- **Lateral CCTV inspection initiated in 2007**
  - **Roots intrusion and infiltration identification**

Sewer Mainlines & Laterals Rehab Programs

Focus:

- Structural & service repairs of sanitary sewer mainlines & laterals
- Capacity restoration by calcite removal, exfiltration & infiltration control, etc.

Benefits:

- Maintain pipe capacity by reducing exfiltration, infiltration
- Increase pipe service life cycle
- Improve customer service – reduction of sewage backups
- Cost savings

Method of Rehab:

- Majority of sewer rehab are completed with trenchless technology (no-dig method) – cured in place pipe (CIPP)

Accomplishments:

- Sewer spot repairs completed between year 2005~2007 = 885 spots.
- Estimated saving of CIPP against open - cut excavation method = $6.6 million

Sanitary Sewer Emergency Repairs

Focus:

- Emergency repairs of sewers due to environmental concerns
- Sewer damaged from corrosive effluent or with structural failure
- Cured-in-place pipe (CIPP) trenchless technology repair methods utilized to reduce environmental impact

Benefits:

- Reduce repair costs
- Minimize disruption to traffic, road and community daily life
- Sustain and extend service life of sewer
- Reduce adverse environmental impact

Accomplishments:

- CIPP repairs from corrosive effluent & savings vs. open-cut
  - Don Park Road 250 mm dia. sewer repair (2008) - Savings $200,000
  - Steelecase Road West 250 mm dia. sewer repair (2001) - Savings $270,000
- CIPP Repairs for structural failure & savings vs. open-cut
  - East Don River (Almond Creek) 450mm~525mm dia. CIPP trunk sewer repair, savings $950,000
- Total savings from 1995 to 2008: $2.7 million

Waterworks Future Programs & Activities

	Programs / Activities	Start	Completion
1.	Develop 5-year capital plan and assess impact of life cycle funding	2009	2009 / 2010
2.	Develop and implement infrastructure condition assessment system	2009	2013
3.	Develop and implement Cathodic protection system assessment program	2009	2012
4.	Develop strategy plan (feasibility study) for Automated Meter Reading (AMR) system	2009	2010
5.	Address resources needs to facilitate expanded programs and future infrastructure needs	2009	2010
6.	Develop Financial Plan under the Safe Drinking Water Act	2009 / 2010	2010
7.	Implement Cast Iron watermain replacement program (20-year program)	2012	2032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Questions?