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**BLACK & VEATCH**



# Madison Water Utility Infrastructure Management Plan



February 17, 2009

# Infrastructure Failure Can Have Serious Consequences !

**Free car wash**





# Madison is not immune!

Thursday, Jan. 29, 2004 The Capital Times

## Water main break leaves homeowners frazzled



Karen Moore and her husband, Allah, add a chair to the pile of furniture that was ruined after their house on Gannon Avenue was flooded early Tuesday morning.

## Flood mixed with mud

Residents unsure of insurance help

By Chuck Nowlin

Between 12 and 16 north side homeowners face five-figure losses and months of city and insurance red tape with no promise of relief after a water main broke Tuesday, flooding their basements with up to 18 inches of water and mud.



Carpeting and other belongings begin to fill a trash container after the mud and flood ruined them.

City officials on Wednesday were still debating why the mud broke.

Most of the affected residents were still cleaning up in Frigid temperatures as of Wednesday afternoon, with chest-high piles of soaked and muddy property stacked at the curbside for city collection.

Asked Cathy Koles, 814 Gannon Avenue, who asked to estimate her damages, "I don't have any idea yet, but I would think that we're talking \$20,000 at least. I mean, if you go inside my house, it looks like it has a floor made entirely of mud."

Few, if any, of the affected homeowners' insurance policies will cover the damage since the water main broke not on their property, but on city land at the intersection of Gannon and Lexington avenues.

And although the water main was re-

paired in a matter of hours, the city of Madison has not exactly been lightning quick with follow-up assistance, reimbursement and advice, an exasperated Koles and Moore said.

"They just said to write all the damages down, save the receipts and send a letter to the city clerk," Moore said.

Koles hurried, "The city is not really doing much about this at all. We pay bag-tax in Madison. I can't believe the city doesn't stand behind us on this."

Resident complaints have been forwarded to city Risk Manager Kevin Houshan, who told The Capital Times that the city's hands are tied in the matter, which will be left in the hands of Madison's municipal insurance company.

"I have experienced a basement flooded with water and sewage runoff, so the people who say we have no compassion on this one of Gannon and Lexington avenues. A lot of people think we should just come right

See FLOOD, Page 8A

## Flood

Continued

Houshan has private individual \$50,000 in insurance could be as low as \$10,000.

A special city's municipal insurance company, Wisconsin Municipal Mutual Co.

Such evidence would include signs of "structural failure" in the 6-inch water pipe that broke around 2:50 a.m. Jan. 27, Nelson said, as well as pipe "offsets" where affected water and sewer lines were joined together.

"And we're not finding any of that here so far," Nelson said, sending an almost palpable wave of frustration through a gathering of already frazzled homeowners coping with damage estimates of \$20,000 or more.

Jeff Saunders, who lives on Lexington Ave-

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By Jeff Saunders

Wisconsin State Journal

The Capital Times

## Rosas may ask city to pay for water damage

But engineer says city doesn't appear at fault

By Chuck Nowlin

After a discouraging report on potential insurance reimbursements to east side homeowners ravaged by a broken water main last week, Ald. Santiago Rosas said he might ask the city to make damage payments to the residents.

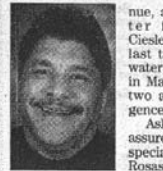
"I don't have a figure in mind yet," Rosas told about 50 homeowners at a neighborhood meeting Thursday night on widespread basement flooding and property damage near Lexington, Gannon, and Burke avenues. "But I would like the city to explore that possibility."

A few minutes earlier, City Engineer Larry Nelson had told the residents that a preliminary investigation so far had not turned up any evidence of city negligence that would justify damage reimbursements by Madison's municipal insurance company, Wisconsin Municipal Mutual Co.

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By Jeff Saunders

Wisconsin State Journal

Friday, Feb. 6, 2004

Friday, January 30, 2004 Wisconsin State Journal



Jeff Saunders and his son, Matthew, vacuum water Thursday from a plastic bin filled with clothing. A broken water main forced water through a basement drain early Tuesday, causing about \$20,000 damage to his home at 3338 Lexington Ave.

## Basement a wet, frigid zone

Broken water main meant headaches, hard work and thousands of dollars in damage for homeowner.

By Jeff Saunders

Wisconsin State Journal

Jeff Saunders was going behind Thursday night.

He needed a break and now that he had a new \$3,000 furnace, some of his water had been eliminated.

Of course, he still has to get a new water heater, washer and dryer, and clean and refinish his basement after a water main break. Tuesday forced water into a nearby steam sewer and it turned pooled water into his basement and other nearby houses.

Jeff Saunders also has to remove the chest freezer that was on its side and three-quarters full of clothing but unsustained roof. That will likely go into the dumpster in his driveway.

Some losses had just a few inches of water, but Saunders had almost 3 feet in the basement of his home he has lived in for 27 years at 3338 Lexington Ave., just a block off East Washington Avenue.

"I'm trying to keep the cost down as much as I can," Saunders said. "The important thing is we have been in the basement since the first day of the flood."

Most water main breaks cause surface flooding and don't cause damage to basements, said Jeff Saunders, an engineer for the city water utility.

The city has 600 miles of water pipe, some of which was installed in the 1930s, and replaces about three miles of pipe a year. It takes about four hours to repair a typical break with crews digging down to the pipe and pouring a collar of concrete around the damaged pipe.

Launders said he'll take next week off from his job as a mechanic at Sarah Lee Bakery to tend about a week, city not accepting and get his basement back in order. He spent much of Tuesday and Wednesday working through the frigid weather trying to salvage his floor drains.

His upstairs was heated by a newly purchased space heater Wednesday.

"I'll work for 12 months, then I'll go upstairs and thank God," Saunders said. "It was close."

## Frigid

Continued from Page 81

City risk manager Kevin Houshan said he had received more than a dozen calls from homeowners seeking information about how to file a claim.

Water main breaks aren't uncommon in the winter. The city has about 250 breaks a year, with most of those happening in winter. When it's cold, the ground can shift, causing pipe joints to fail.

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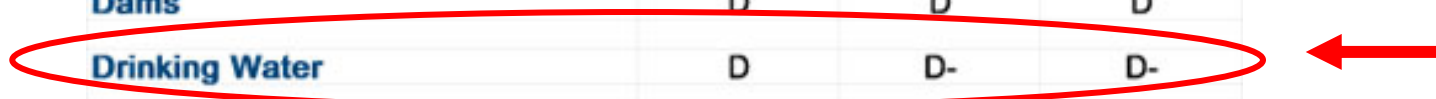


# Why an Infrastructure Management Plan?

- Aging Infrastructure
- Less Funding , Reduced Maintenance and Replacement Budgets
- More Public Scrutiny
- Increased Focus on Management of Assets and Maintaining Levels of Service

# ASCE Report Card Highlights Infrastructure Conditions

Category	2001	2005	2009
Aviation	D	D+	D
Bridges	C	C	C
Dams	D	D	D
<b>Drinking Water</b>	D	D-	D-
Energy (National Power Grid)	D+	D	D+
Hazardous Waste	D+	D	D
Navigable Waterways	D+	D-	D-
Public Parks & Recreation	--	C-	C-
Rail	--	C-	C-
Roads	D+	D	D-
Schools	D-	D	D
Solid Waste	C+	C+	C+
Transit	C-	D+	D
Wastewater	D	D-	D-



Source: ASCE Web Site



# Water Pipe Replacement Needs Will Increase

## Characteristics of the Clean Water and Drinking Water Industries

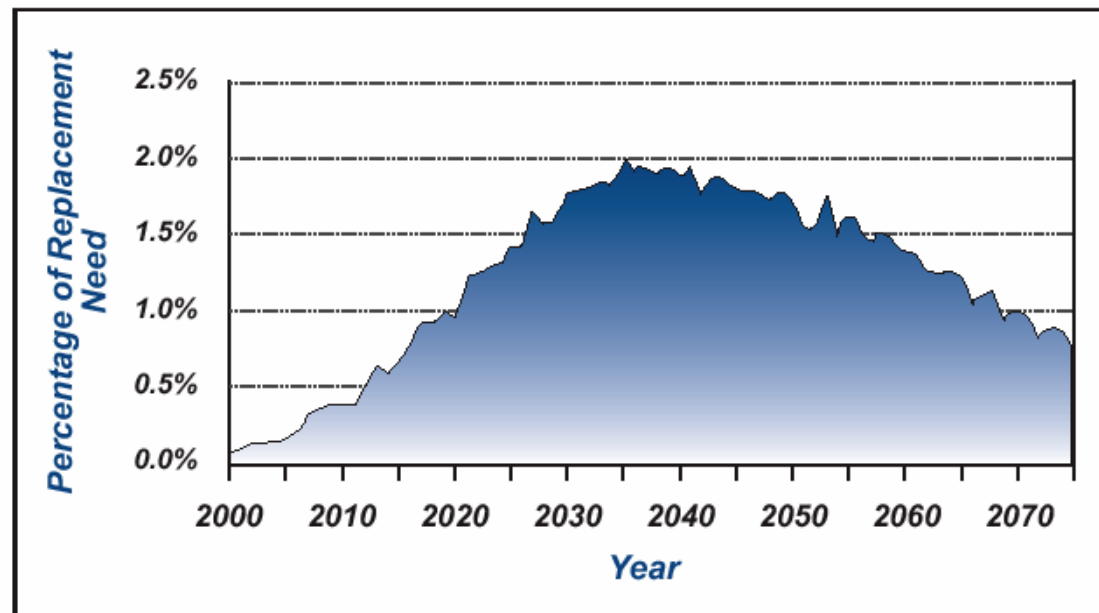


Figure 2-11: Projected Annual Replacement Needs for Transmission Lines and Distribution Mains, 2000-2075

Source: EPA Gap Analysis



# Questions

- What do we do?
  - How do we effectively manage our assets? Are we maximizing the value of the assets we have?
  - How do we predict failure?
  - What is the life expectancy of our piping system?
  - How do we minimize failure of a critical asset?
  - Do we repair, rehabilitate or replace?
- What do we budget for infrastructure reinvestment? How many \$\$\$ are required?
- What are the consequences of not planning?

## The No-plan Scenario

- 34 miles of mains 4-inch.
- 18 miles of pipe more than 100 years old.
- Have to deal with other pipes leaking and in need of replacement
- Currently replacing 4 to 6 miles per year.
- Assume 50% of replacement work is toward 4-inch pipe and >100 year old pipe. (52 miles)
- Takes 21 years to replace this pipe.
- During that time 95 miles of pipe has had its 100<sup>th</sup> birthday

# Objectives of Infrastructure Management Plan

- 1) Be proactive not reactive.
- 2) Make the most economical use of available resources.
- 3) Coordinate with other City Departments.
- 4) Maintain the current level of service to customers.

# Principal Elements of the Infrastructure Management Plan

- Facilities Assessment
  - Inspections
  - Condition and Valuation Databases
- Pipeline Assessment
  - Main Break History and Trends
  - Survivability Curves
- Long-term Annual Funding Levels
- 10-year Prioritized Improvements Program

# Existing System

- 23 Deep Wells
- 8 Interzone  
Booster Stations
- 8 Distribution  
Storage Facilities
- 850 Miles of Pipe



# Pumping Station Component Weighting

Component		Weight
1	Site – Drainage, Access Drive, Landscaping	10
2	Structure – Walls, Roof, Foundation	10
3	Mechanical – Piping, Valves, Meters	20
4	Mechanical – HVAC	5
5	Pumps and Motors	20
6	Electrical – MCC, Standby Power, General Interior	25
7	Instrumentation – Flow/Pressure/Temperature Instruments SCADA – RTU, CPU, Transmitter/modem	5
8	Security – Locks, Site Lighting, Surveillance Devices, Fencing	5
<b>Total</b>		<b>100</b>

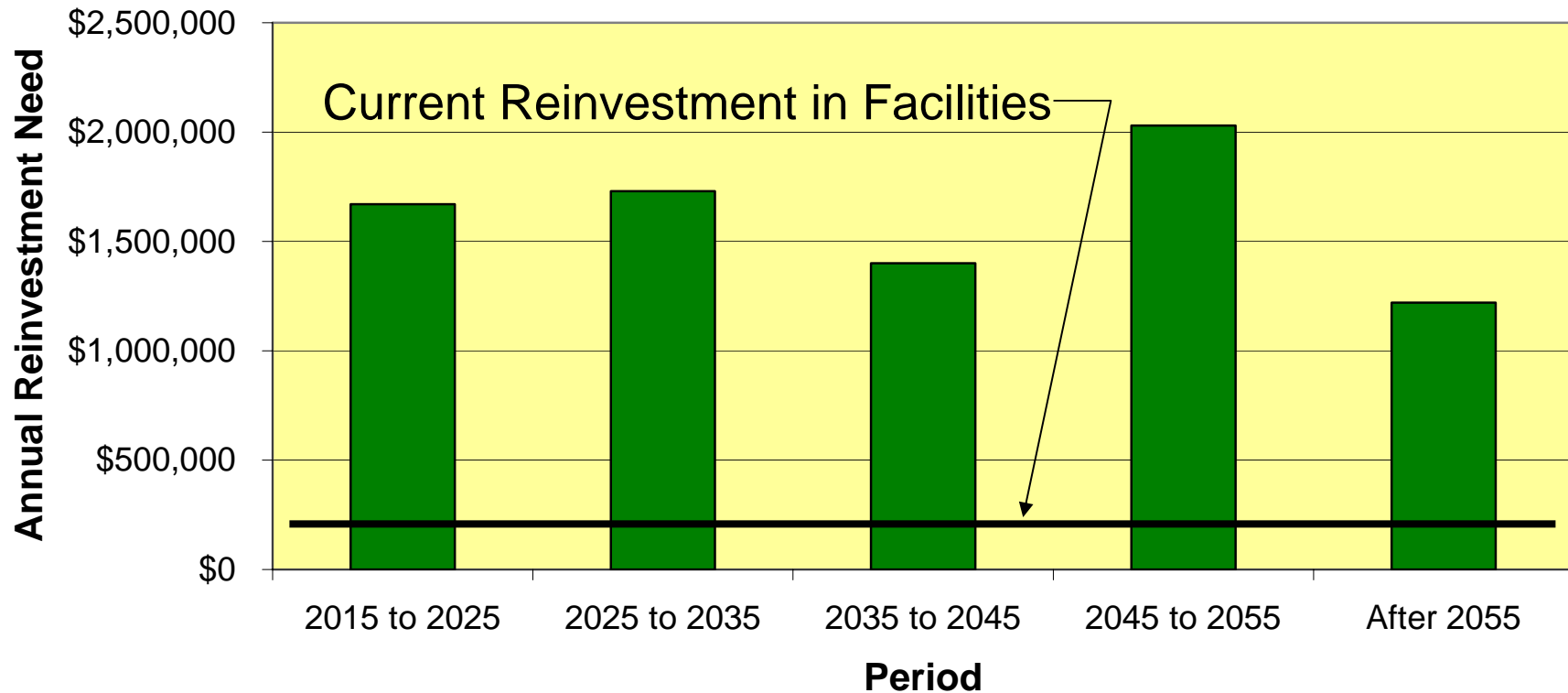
Component weights are based on evaluation of typical component cost for standard pumping station.

# Condition Rating

<b>Condition Rating – Pumping and Storage Facilities</b>	
<b>Condition Rating</b>	<b>Definition</b>
1	New condition. Meets or exceeds standard.
2	Well maintained and appears to be in better condition than actual age would indicate. No improvements needed in near future to maintain working order.
3	In working order and shows signs of aging consistent with actual age of component. Improvements needed in near future to maintain working order.
4	Operable, but shows signs of aging greater than expected. Has high occurrence of maintenance requirements.
5	Needs Immediate Replacement. Failure is imminent.



# Facility Reinvestment Needs



Capital costs in 2005 dollars and not adjusted for inflation.



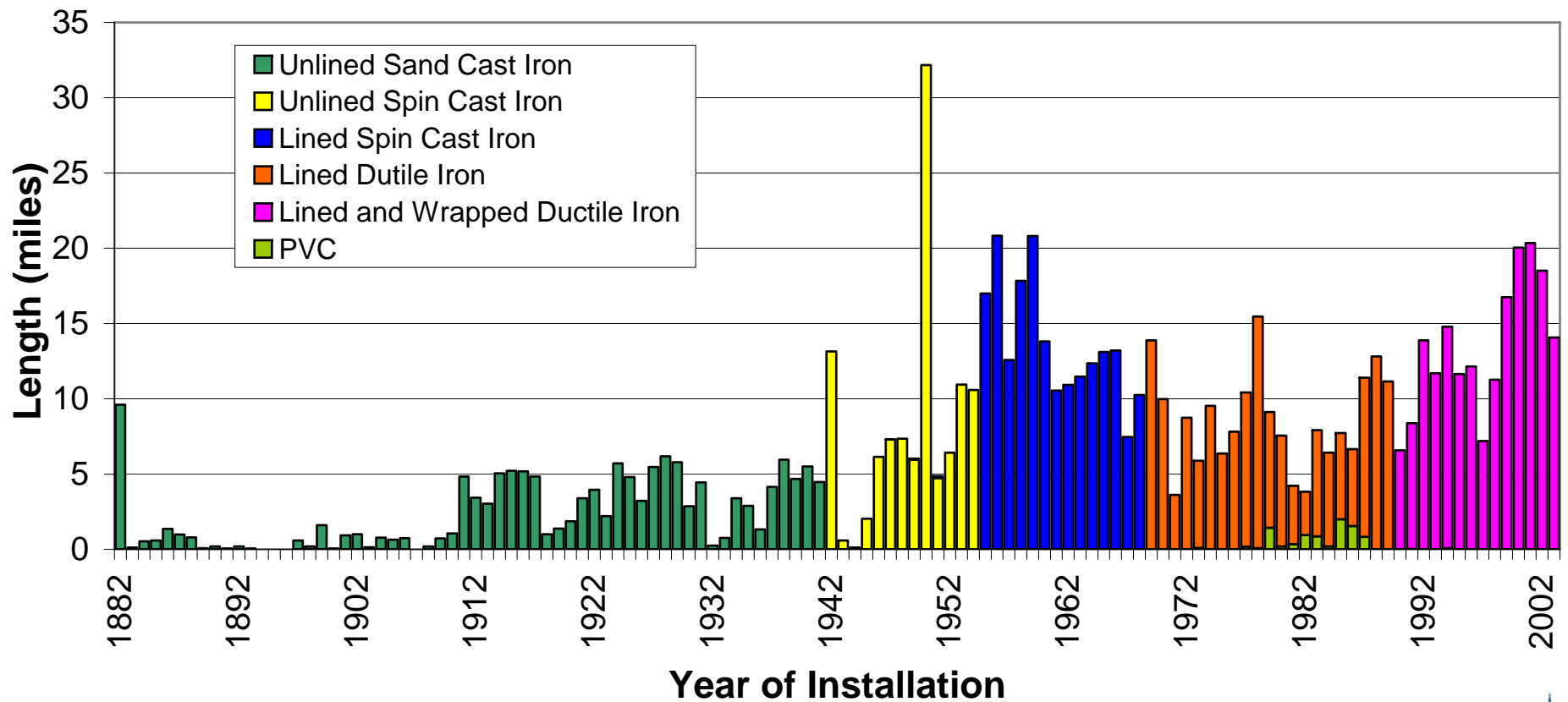
# Common Identified Facility Needs

- Facilities in General are in Good Condition, Well Maintained.
- Chemical Feed Housing Locations Not Consistent with Today's Code.
- Some Vent / Overflow Concerns Reservoir Interiors Condition Varied

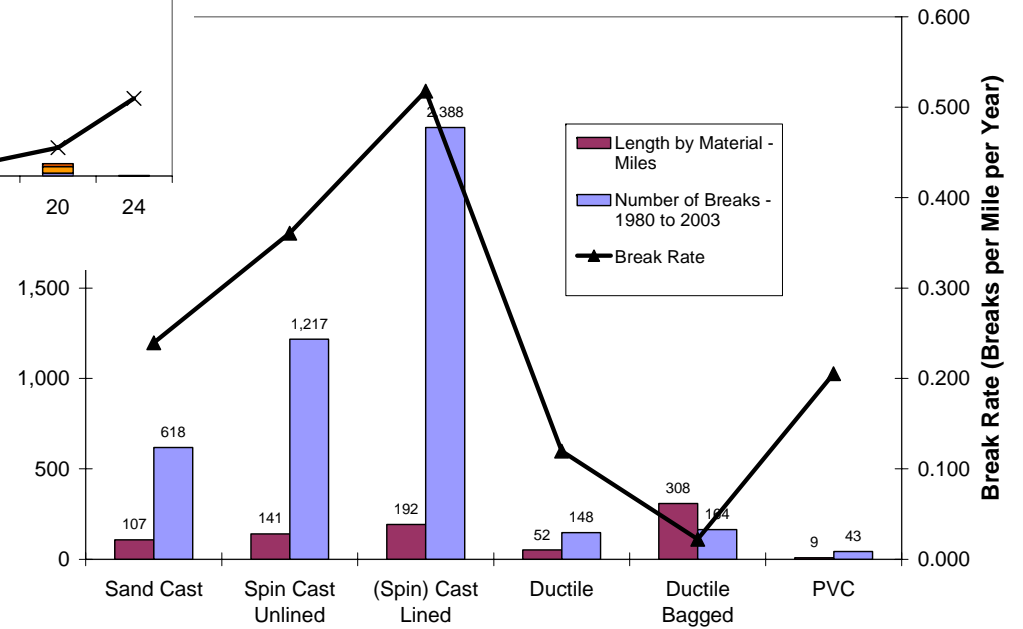
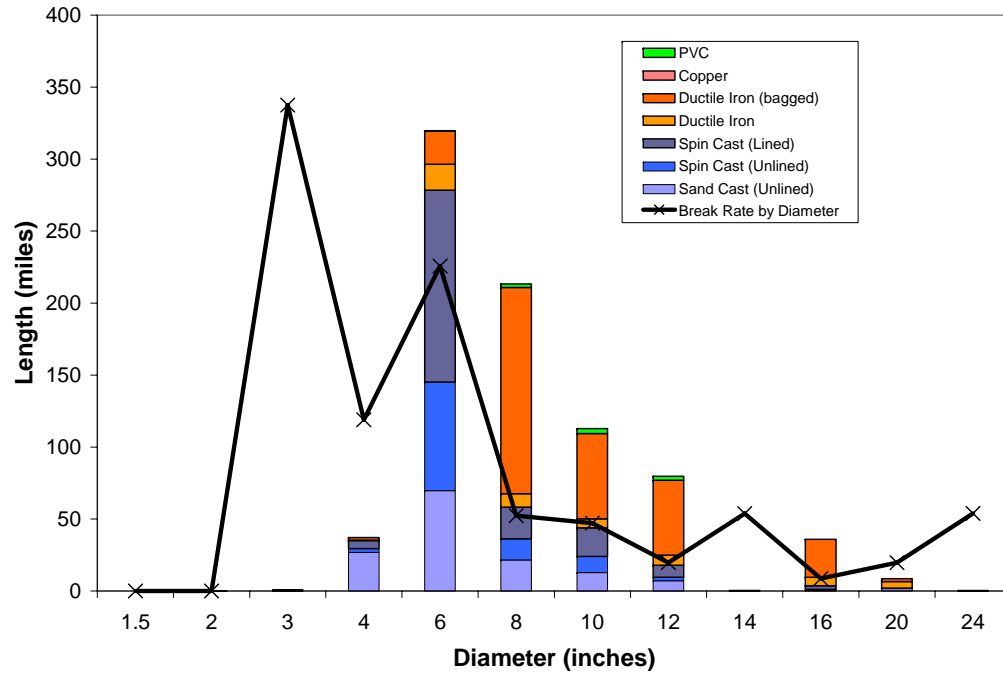
## Prioritized Facility Improvements

- Perform High Priority Facility Improvements
- Replace Booster Station 106
- Repair Reservoir 106
- Perform Well borehole rehabilitation at 13, 17, and 24.
- Repair Pumping Station 12
- Repair Reservoir 7
- Repaint Elevated Tanks 120, 126, and 315.

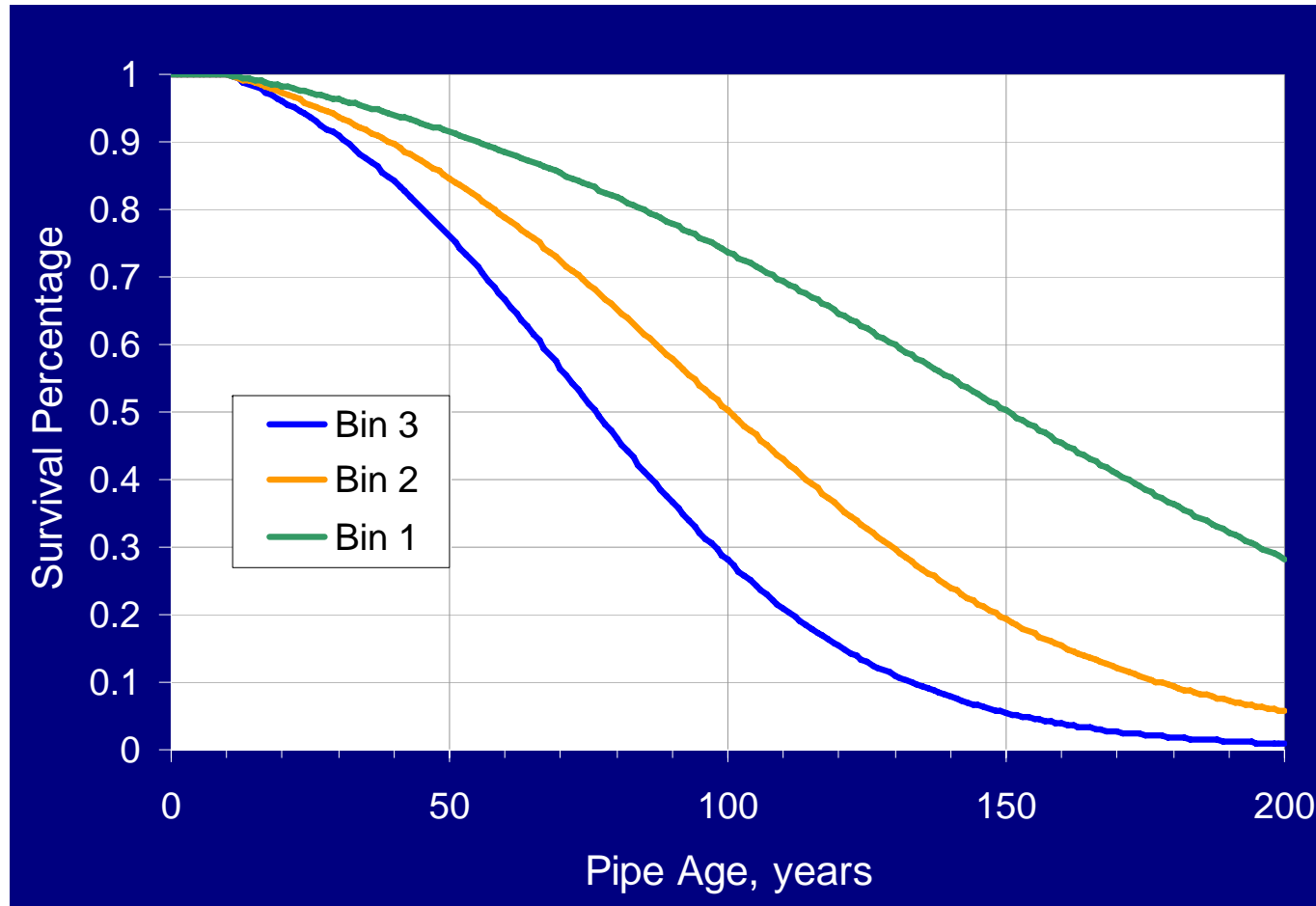
# Length of Pipe by Material and Year



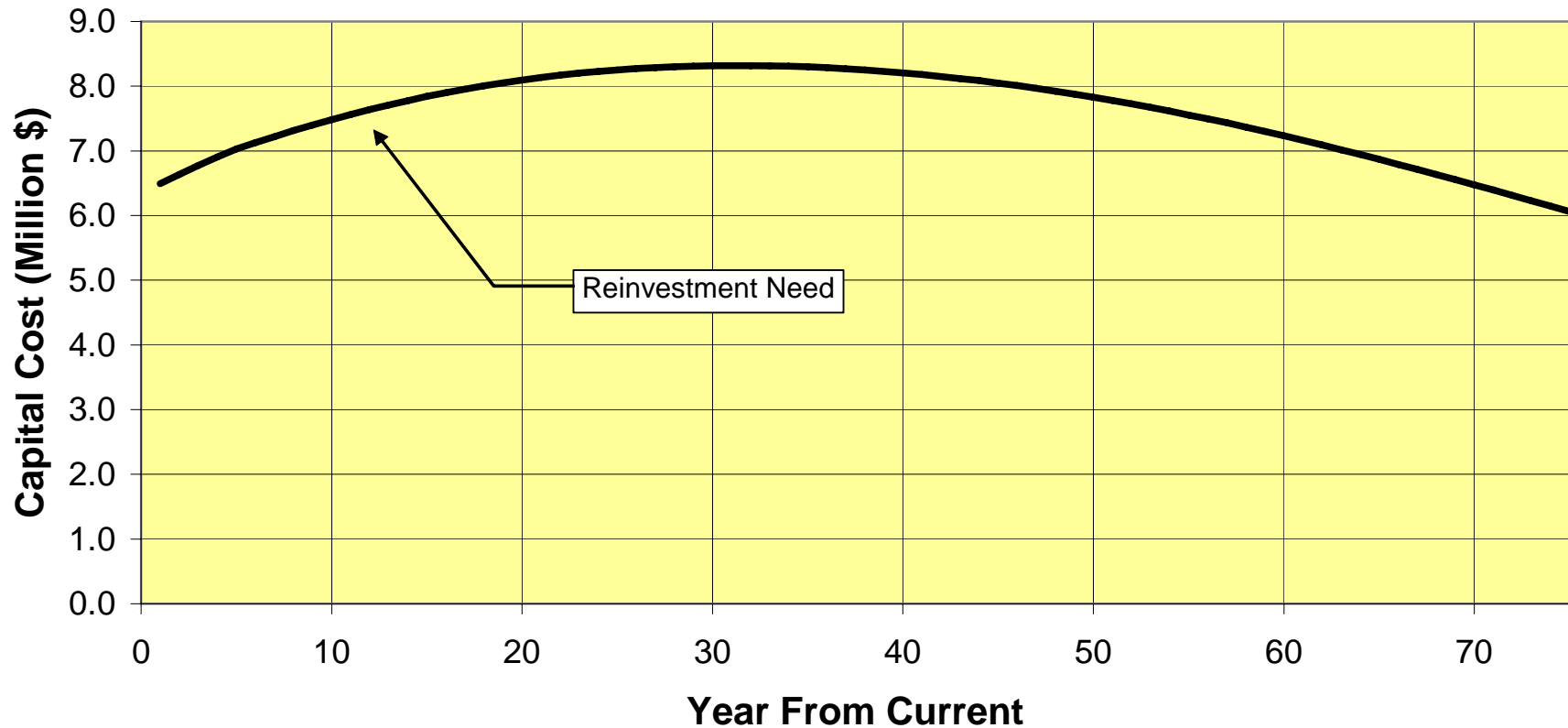
# Break Trends Analysis



# Survival Curves



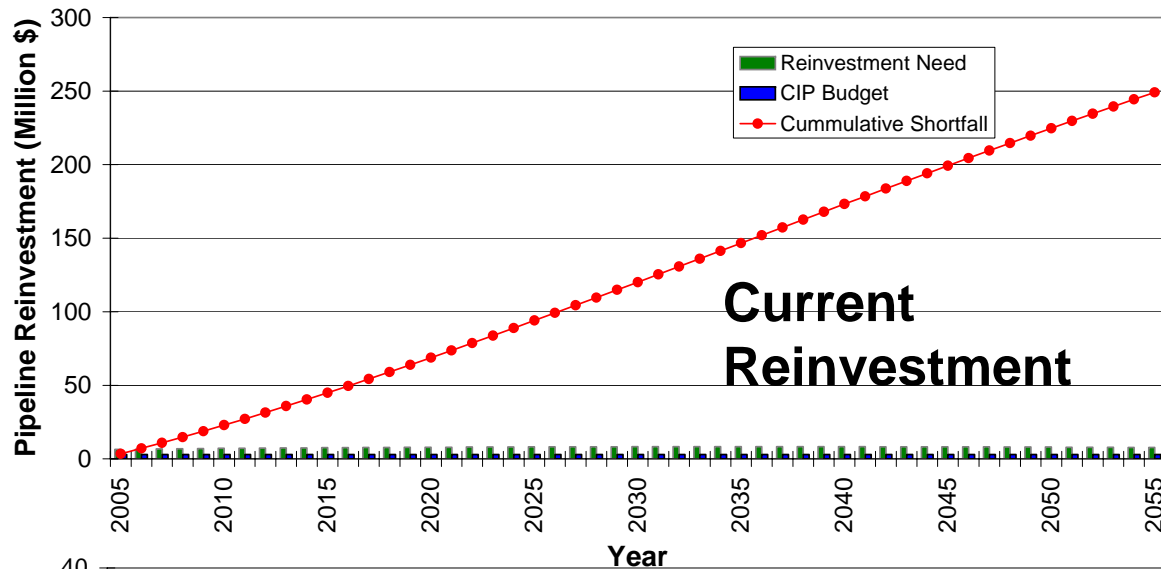
# Pipeline Reinvestment Needs



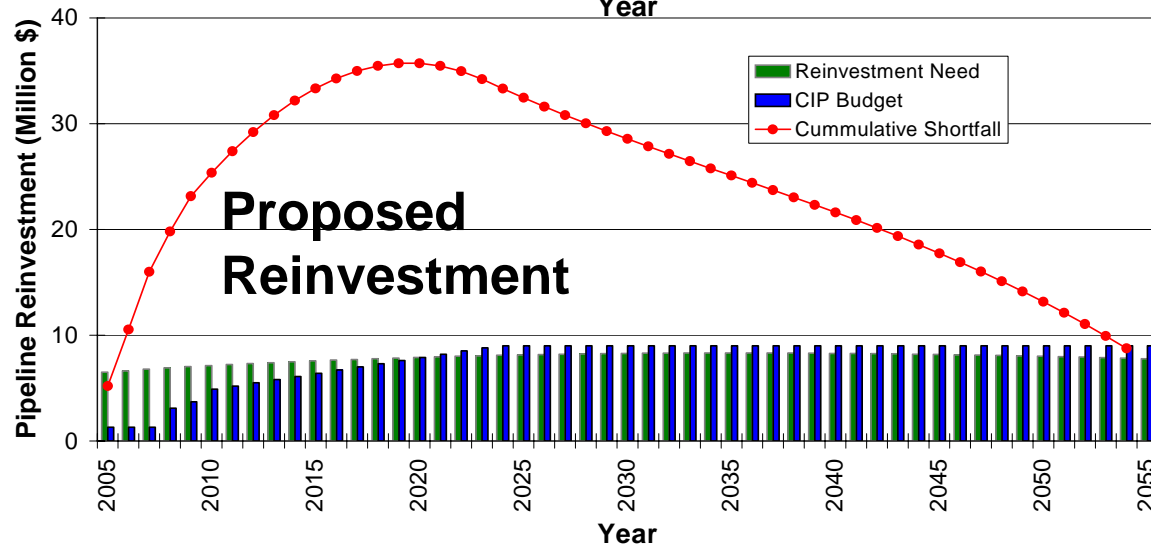
Capital costs in 2005 dollars and not adjusted for inflation.



# Pipeline Reinvestment Shortfall



*It is the goal of the Utility to regularly increase the annual reinvestment spending to catch up with needs. It will take many years to achieve this goal due to limitations in rate increases and the Utility's bonding capacity.*



# Prioritized Pipeline Improvements

<b>Pipeline Criteria Scoring</b>				
<b>Criteria</b>	<b>Impact Score</b>			<b>Weight</b>
	<b>1</b>	<b>2</b>	<b>3</b>	
Number of Breaks	2 to 3	3 to 6	7 or more	3
Break Rates	Lowest 1/3	Middle 1/3	Highest 1/3	3
Coordination With Public Works	Default	Roadway Resurfacing, Storm Water or Sanitary Sewer Project	Roadway Reconstruction Project	3
Diameter	8” and smaller	4” and smaller	10” and larger	2
Critical Pipelines	Default	Not-limited Access Federal and State Highways	Limited Access Federal Highways, single supply lines, and others as directed by City	2
Noteworthy Locations	Default	Colleges and Schools	Hospitals, Stadiums, Airport, State Capital Building, University of Wisconsin Co-generation Plant	1
Soil Type	Default	Marshy	Not used	



## Recommendations

- Increase annual budget to build up to \$2 million per year facility reinvestment by year 2025
- Implement corrective measures for overflow pipes and chemical rooms (\$2.6 million in addition to annual reinvestment for facilities)
- Increase annual budget to build up to \$9 million per year for pipeline replacement by year 2024
- These costs are year 2005 basis and should be increased annually to account for inflation

# Miscellaneous Recommendations

- Maintenance Recommendations
- Additional Data Collection Protocols
- Evaluate Pressure vs. Main Breaks
- Conduct Water Audit
- Computerized Maintenance Management System