Department of Public Works
Environmental Engineering Section

City of Milwaukee

2010 Oakland and North Sinkhole

2001-2011 Sewer Replacement

	Replaced	Lined	Total
Year	(miles)	(miles)	(miles)
2011 (est)	13.46	16.19	29.65
2010	10.51	12.82	23.33
2009	13.78	15.74	29.52
2008	14.65	2.75	17.40
2007	11.25	5.11	16.36
2006	7.61	3.49	11.10
2005	10.63	2.76	13.39
2004	8.82	1.99	10.81
2003	13.05	2.25	15.30
2002	13.70	0.66	14.36
2001	6.55	1.15	7.70
Average	11.27	5.90	17.17

Major projects in 2010

- W Bluemound Rd Relocation Project
  - 1,700 feet of sewer tunneling - $4.6 Million
- E North Ave and N Oakland Ave sewer relay / lining
  - 3,000 feet of 12” to 66” sewer rehabilitation - $4.5 million
- N 26th St and W Vine St sewer re-routing
  - The existing sewer was re-routed to a deeper larger outlet - $700,000

Sewer Replacement Program

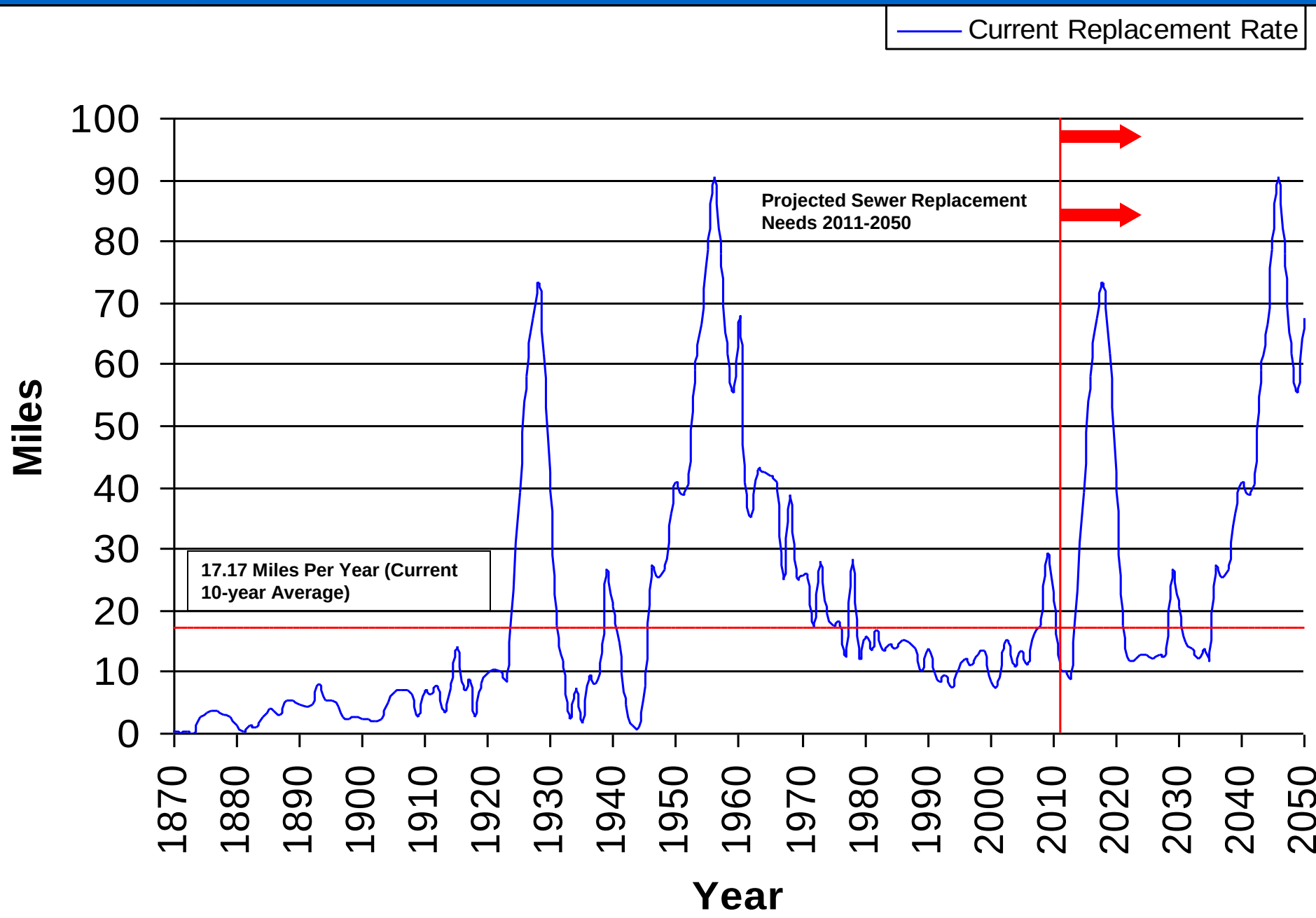
On what basis are Sewer Mains selected for replacement?

- Index Rating based on Sewer Exams
- Existing Hydraulics – Backwater studies
- Paving Projects – Not part of Index Rating

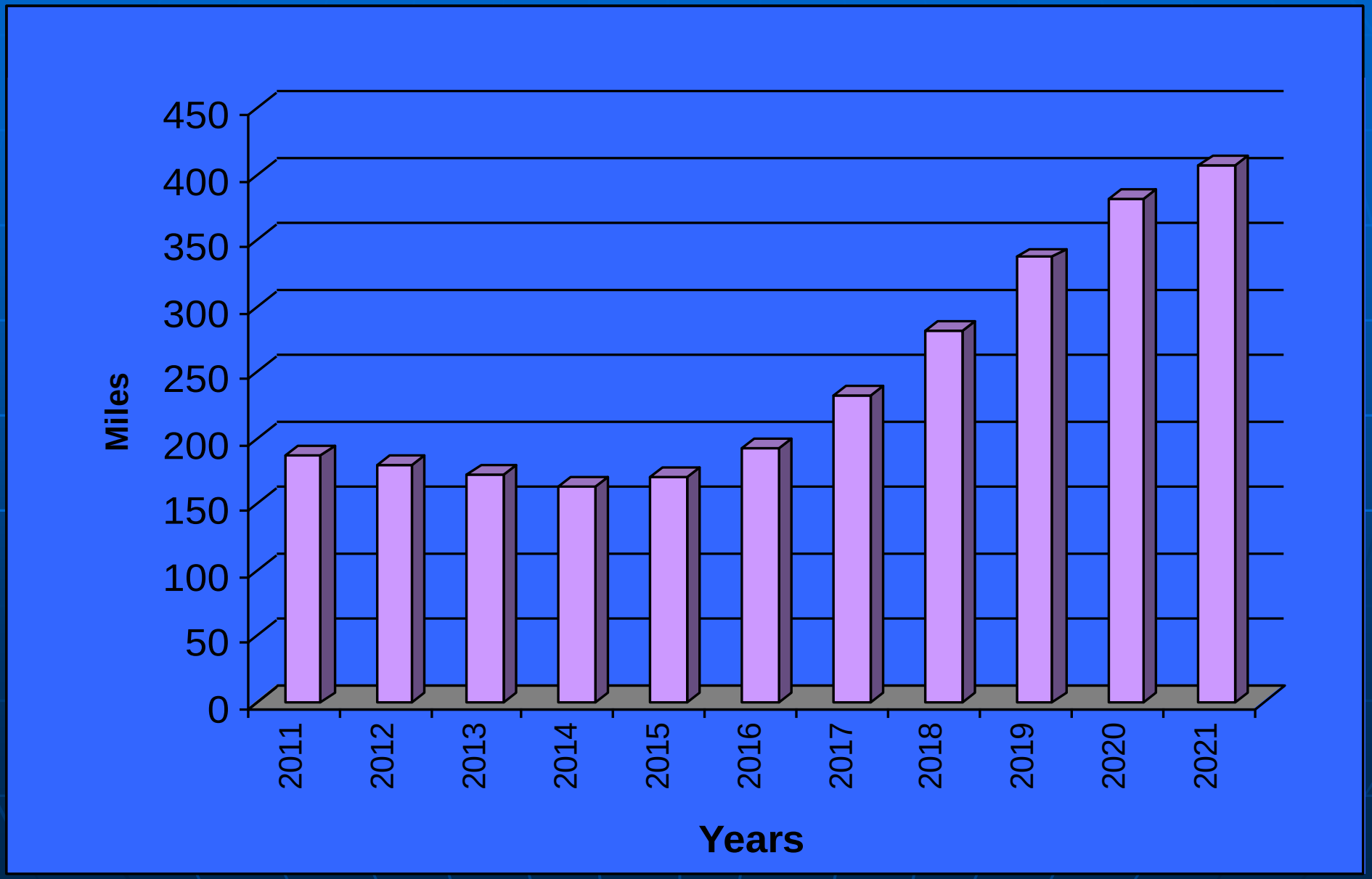
Age of Sewers

Type of Sewer	<26 Years	26 to 50 years	51 to 75 years	76 to 100 years	>100 Years	Total
	(miles)	(miles)	(miles)	(miles)	(miles)	(miles)
Combined	180.2	81.3	64.4	98.1	123.0	547.0
Sanitary	92.5	288.2	376.4	183.2	0.0	940.4
Storm	48.6	296.3	393.7	221.3	0.8	960.7
Total	321.3	665.8	834.5	502.6	123.8	2,448.1

Total Miles of Sewers Installed Per Year



Future Sewer Lengths needed to be rehabilitated that are greater than 90-Years Old 2011-2021
(assuming an average replacement rate of 17.2 miles per year)



Sewer Useful Life Information

City	Useful Life
City of Vancouver, Canada	90
Germany	75
Australia	95
Tacoma, Wash. USA	95
Seattle, Wash. USA	95

The expected useful life of a sewer is 90-years. A number of cities around the world have 80 to 100 years of useful life as a bench mark.

Sewer Replacement Information

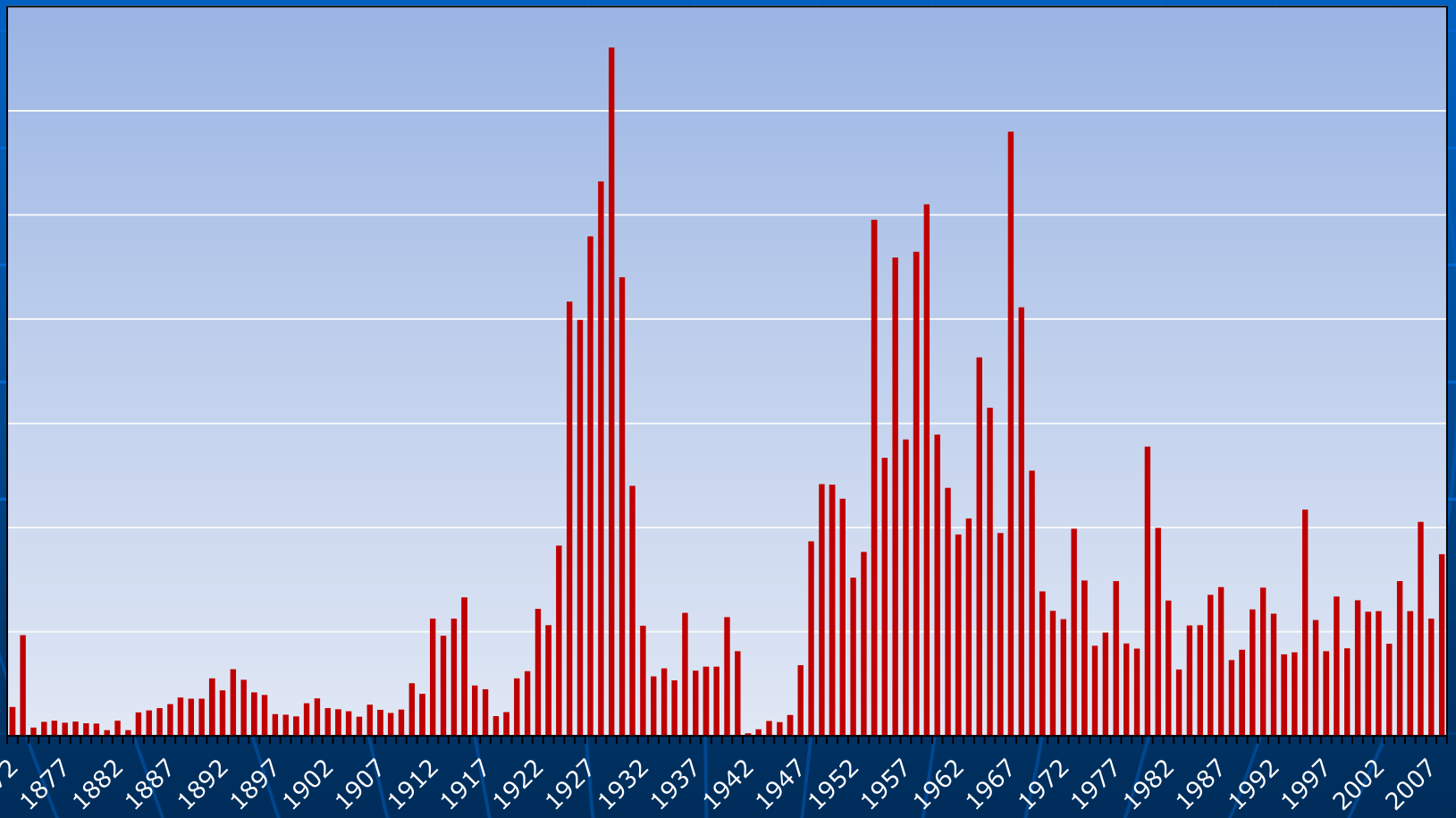
- Currently there are 209 miles of City of Milwaukee sewers that are greater than 90-years old
- With 2,448 miles of sewer in the City and an annual replacement rate of 17.2 miles our current sewer replacement rate is once every 142 years
- With 2,448 miles of sewer in the City and a useful sewer life cycle of 90 years the replacement rate needed to meet the 90 year useful life cycle is 27 miles annually

Own, Operate and Maintain in *Four** Communities

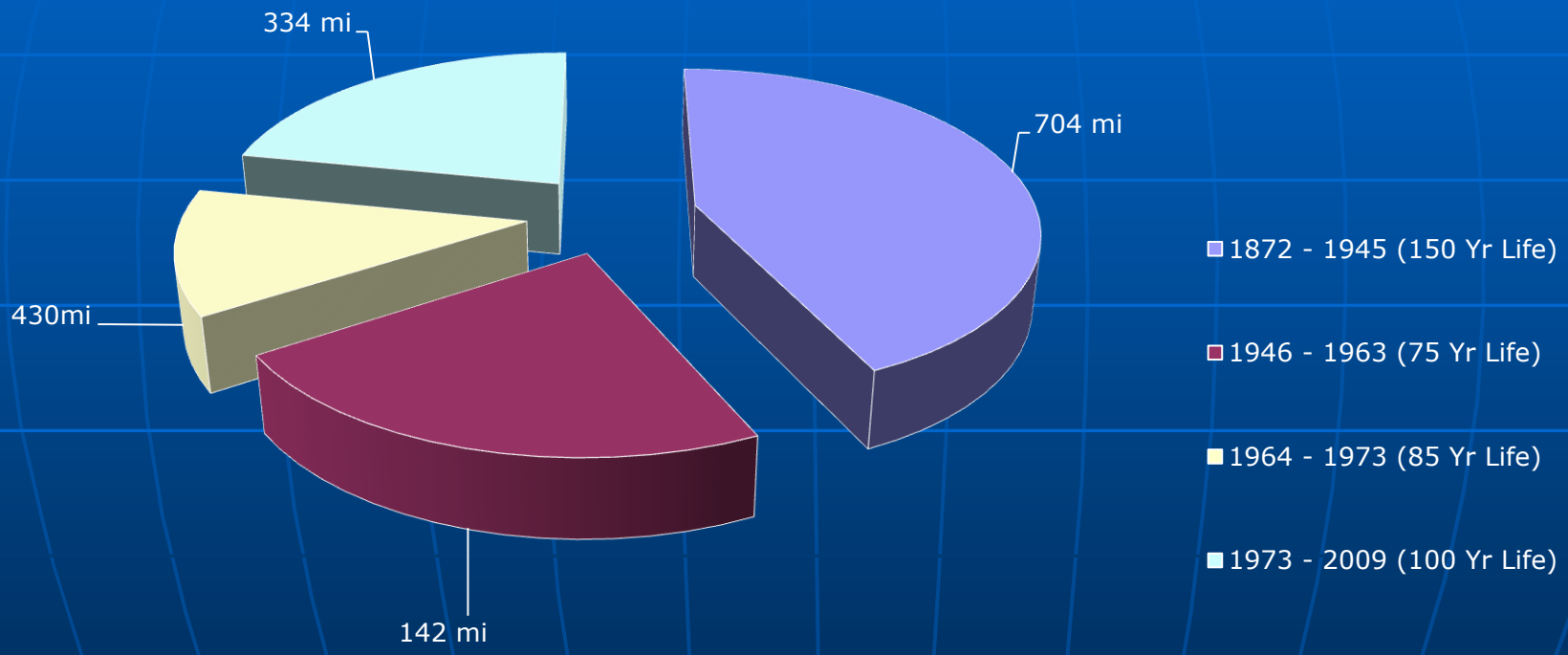
- 2,000 miles of water main
- 20,000 hydrants
- 50,000 valves
- 162,000 water meters

*Milwaukee, Greenfield, Hales Corners, St. Francis

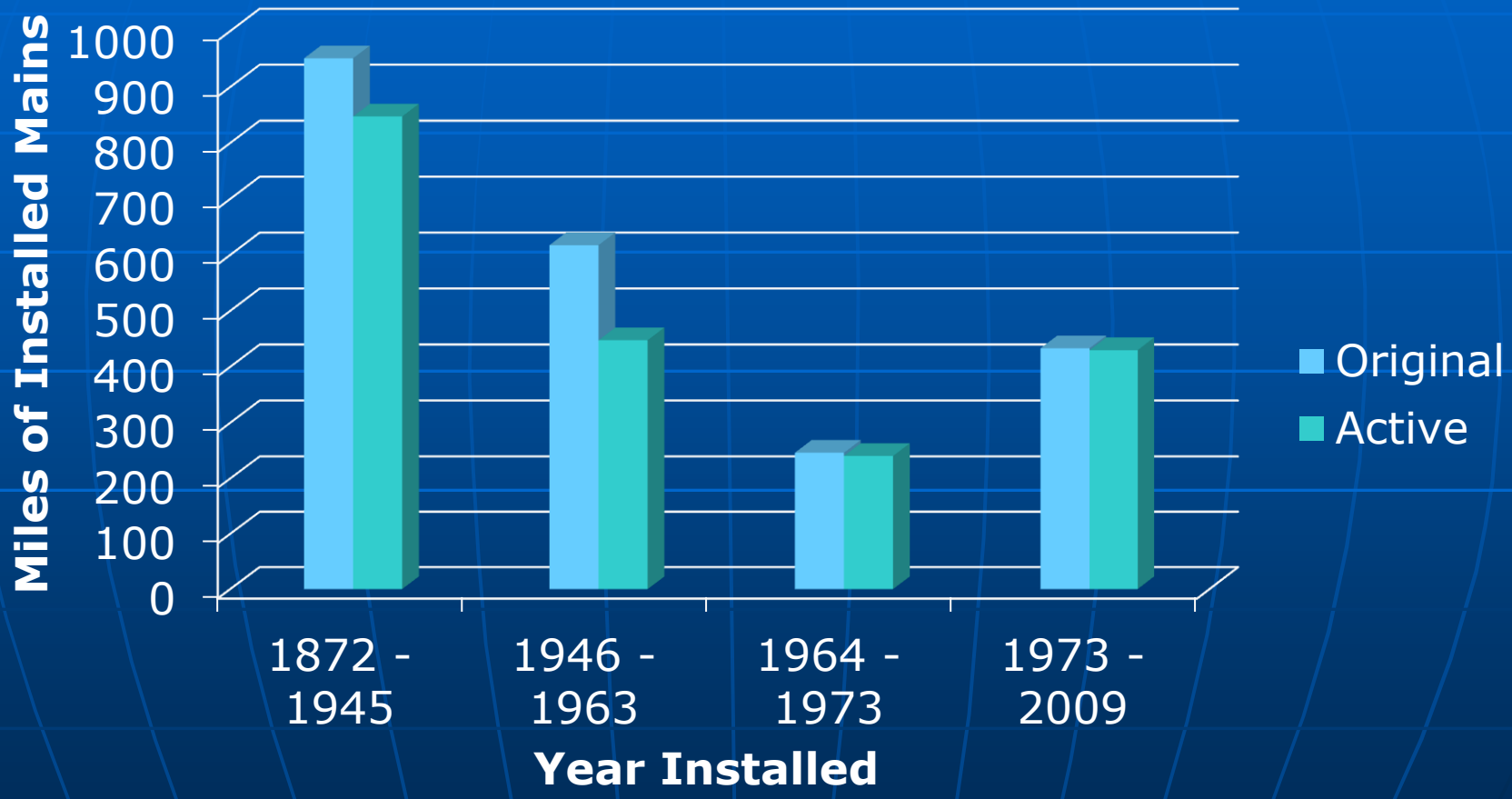
Water Mains Installed by Year



Life Expectancy Estimates



Replacements Focus on Failing Mains



Water Main Breaks