



**BROKEN ARROW MUNICIPAL AUTHORITY  
HISTORY AND FUTURE  
WATER AND SEWER INFRASTRUCTURE**

**May 3, 2016**

# Aging Infrastructure

Environmental Impacts

Emerging Technologies

More Stringent Regulations

Increasing Utility Rates

Escalating Costs

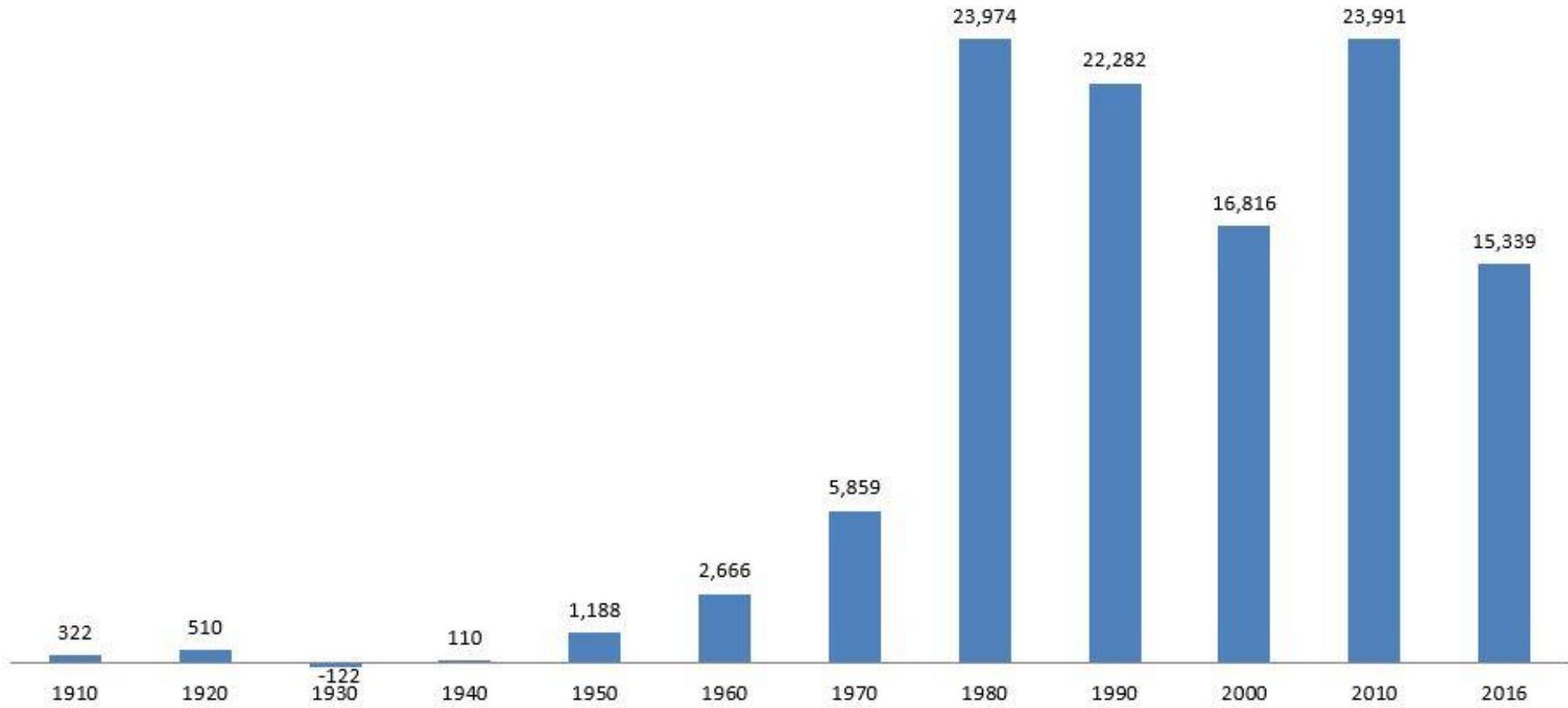
Deferred Maintenance

## CITY OF BROKEN ARROW POPULATION ANALYSIS

Year	Population	Per. Annual Growth Rate	Decade Growth Rate	Run Average Growth Rate	Period Differential	Decade Differential	Percent of Pop
1904	1,383				1,383		1.32
1910	1,576	2.20%	23.26%	2.20	193	322	0.18
1920	2,086	2.84%	32.36%	2.60	510	510	0.49
1930	1,964	-0.60%	-5.85%	1.36	-122	-122	-0.12
1940	2,074	0.55%	5.60%	1.13	110	110	0.11
1950	3,262	4.63%	<b>57.28%</b>	1.88	1,188	1,188	1.13
1960	5,928	6.16%	<b>81.73%</b>	2.63	2,666	2,666	2.55
1970	11,787	7.11%	<b>98.84%</b>	3.30	5,859	5,859	5.59
1980	35,761	11.74%	<b>203.39%</b>	4.37	23,974	<b>23,974</b>	<b>22.89</b>
1990	58,043	4.96%	<b>62.31%</b>	4.44	22,282	<b>22,282</b>	<b>21.28</b>
2000	74,859	2.58%	28.97%	4.25	16,816	<b>16,816</b>	<b>16.06</b>
2010	98,850	2.82%	32.05%	4.11	23,991	<b>23,991</b>	<b>22.91</b>
2014	104,726	1.45%	14.86%	4.01	5,876	14,690	5.61
2016	107,794	1.45%	14.65%	3.97	3,068	15,339	2.93

# POPULATION CHANGE

■ POPULATION CHANGE



# Water System Timeline

- 1963 Center Ground Storage Tank on Tiger Hill Operational – 1.0 MG
- 1967 Verdigris River Water Treatment Plant Operational – 4.0 MGD
- 1976 Verdigris River Water Treatment Plant Expansion Operational – 10.0 MGD
- 1976 West Ground Storage Tank on Tiger Hill Operational – 1.0 MG
- 1979 East Ground Storage Tank on Tiger Hill Operational – 2.0 MG
- 1981 36” Grand River Raw Water Supply Line from OOWA to the WTP – 23 miles
- 1981 36” Treated Water Transmission Line from WTP to south part of distribution –12 miles
- 1982 Purchased Water from OOWA through Transmission Line Operational – 27.0 MGD
- 1983 South Elevated Storage Tower Operational – 1.0 MG
- 1999 Battle Creek Ground Storage Tank Operational – 5.0 MG
- 2005 High Pressure Plane Elevated Storage Tower Operational – 1.0 MG
- 2011 Greenbrier Booster Pump Station – 1.44 MGD
- 2013 24” Primary Supplemental Water Connection with TMUA – 1.25 miles
- 2014 Verdigris River Micro-Filtration Water Treatment Facility Operational – 20 MGD

# Wastewater System Timeline

- **1960** Westside Sewer Disposal Plant Operational
- **1970** Lynn Lane Trunk Sewer Line from downtown/Westside to new plant – 6.73 miles
- **1970** Lynn Lane Wastewater Treatment Plant Operational – 1.0 MGD
- **1971** Regional Metropolitan Utility Authority (RMUA) Trust Declaration
- **1976** Haikey Creek Lift Station and Force Main to new plant – 3.75 miles
- **1976** Haikey Creek Wastewater Treatment Plant Operational – 2.0 MGD
- **1985** Lynn Lane Wastewater Treatment Plant Expansion – 4.5 MGD
- **1985** County Line Trunk Sewer Line from 91<sup>st</sup> Street to Lynn Lane Plant – 5.63 miles
- **1986** Haikey Creek Wastewater Treatment Plant Expansion – 8.0 MGD
- **1998** Lynn Lane Wastewater Treatment Plant Expansion – 6.5 MGD
- **1999** Haikey Creek Wastewater Treatment Plant Expansion – 16.0 MGD
- **2008** Lynn Lane Wastewater Treatment Plant Expansion – 8.0 MGD

# Utility System Inventory

## Water System:

- Water Treatment Facility 1 – 20 MGD Microfiltration plant
- Finished Water Storage 1 – 6 MG
- High Service Pumps 4 – 12.0 MGD, 900 HP, VFD Pumps
- Low Pressure Plane Storage 4 Ground Storage Tanks – 9 MG
- High Pressure Plane Storage 1 Elevated Storage Tower – 1 MG
- Booster Pump Stations 1 Elevated Storage Tower – 1 MG
- Supplemental Water Connections 3 Residential feed stations
- 1 Direct feed to High Pressure Plane Storage
- 2 with TMUA – Average 4.5 MGD

## Wastewater System:

- Wastewater Treatment Facility 1 – 8.0 MGD Plant (Lynn Lane)
- 1 – 12.0 MGD Plant (Haikey Creek)
- Lift Stations 30 – In system stations
- 2 – Direct feed stations to plants

**1979** East Ground Storage Tank on Tiger Hill Operational – 2.0 MG

**1963**  
Center Ground Storage Tank on Tiger Hill Operational – 1.0 MG

**1976** West Ground Storage Tank on Tiger Hill Operational – 1.0 MG



**1983** South  
Elevated Storage  
Tower Operational  
– 1.0 MG



**1999** Battle Creek  
Ground Storage Tank  
Operational – 5.0 MG



**2005** High Pressure  
Plane Elevated Storage  
Tower Operational –  
1.0 MG



**1976 Verdigris  
River Water  
Treatment Plant  
Expansion  
Operational – 10.0  
MGD**



**2014 Verdigris  
River Micro-  
Filtration Water  
Treatment Facility  
Operational – 20  
MGD**



- **2008** Lynn Lane Wastewater Treatment Plant Expansion – 8.0 MGD



- **1999** Haikey Creek Wastewater Treatment Plant Expansion – 16.0 MGD



## WATER SYSTEM IMPROVEMENTS

### Water Plant Projects (BAMA)

Sludge Removal Program  
Copper Sulfate Feed Addition  
Plate Settler Extension  
Micro-Filtration Membrane System Expansion  
OOVA\Grand River Line Connection Improvements

### Water Master Connection Projects

Primary Supplemental Water Connection Improvements  
Secondary Supplemental Water Connection Addition  
OOVA\Grand River Transmission Line Rehabilitation

### Water Distribution System Projects

Kenwood Hills Booster Pump Station Rehabilitation  
24" Transimission Line - South Loop Improvements  
16" Transmission Line - South Loop Improvements  
24" Waterline Connection Improvements from 5 MG GST to System  
Old Town Waterline Improvements

### Water Storage System Projects

2 MG plus Water Storage Tower  
1 MG Elevated Water Tank Restoration (New Orleans Street)  
1 MG GST Restoration - Phase I (Tiger Hill)  
1 MG GST Restoration - Phase II (Tiger Hill)  
1 MG Elevated Water Tank Restoration (High Pressure Plane)

## WASTEWATER SYSTEM IMPROVEMENTS

### Haikey Creek Plant Projects (RMUA)

SCBA\Sampler\Clarifiers\Pumps Controls

Headworks Improvements

Flow Equalization Basin Addition

Maintenance Building Addition

Activated Sludge Aeration Improvements

Grit Removal Facility Rehabilitation

Main Lift Station Force Main Improvements

### Haikey Creek Basin Projects (BAMA)

Haikey Creek Trunk Sewer Line Upgrade - Phase I

### Lynn Lane Plant Projects (BAMA)

Maintenance Building Addition

Headworks\Grit Removal Improvements

Sludge Digestion Improvements

Rehabilitation of West Clarifier\Digestors

Disinfection System Modifications

### Lynn Lane Basin Projects (BAMA)

Lynn Lane Trunk Sewer Line Replacement

County Line Trunk Sewer Line Replacement

Elm Creek Trunk Sewer Replacement Line - Phase I

Aspen Creek Trunk Sewer Line Addition

Oak Crest Addition Improvements

East Haskell Addition Improvements

Lift Station (5) Screening Improvements

Lift Station SCADA Improvements

Oneta Road (241st Street) Lift Station Improvements (CO)

209th Lift Station Force Main Improvements

Miscellaneous Lift Station Improvements (App. 3 Stations)



**DISCUSSION**

**QUESTIONS AND ANSWERS**