



2018-19

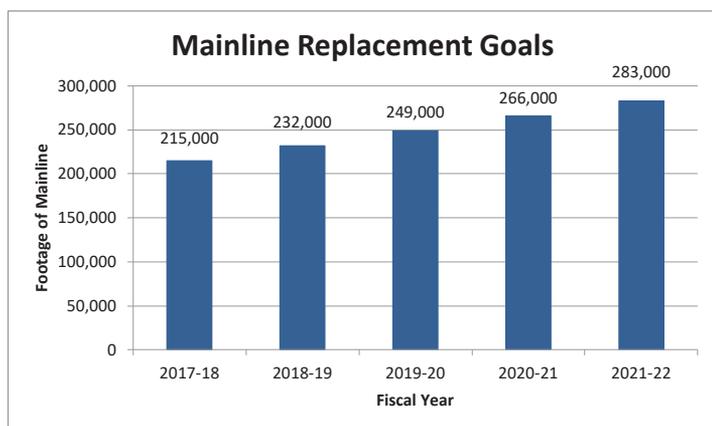
**LADWP
Water
Infrastructure
Plan**

Introduction

All major components of the Water System infrastructure are evaluated as part of the ongoing Asset Management (AM) Program. The goal of AM is to systematically manage assets in a way that will result in the lowest cost of ownership, including capital and operations and maintenance costs. The Water Infrastructure Plan (WIP) includes infrastructure upgrades that are a part of the \$6.3 billion five-year Water System capital plan. The main elements of the WIP are discussed below. The AM Program data and analysis is continuously being improved and refined.

Distribution Mainline

Distribution mainlines (pipes 20 inches or less in diameter) constitute the backbone of LADWP's water distribution system. There are approximately 6,780 miles of mainline throughout the City of Los Angeles. Over 28% (about 1,871 miles) of LADWP's mainlines are over 80 years old, while the average lifespan of an iron water main is about 100 years. LADWP has set goals to ramp up the replacement of water distribution mainline to bring the pipe replacement cycle closer to the expected pipe life cycle by 2023.



2017-18 Achievements:

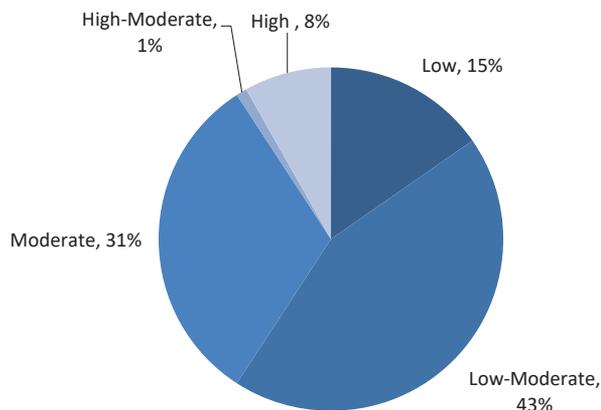
- Installed over 216,000 feet of mainline pipe, exceeding target of 215,000 feet.

Priorities are based on the following factors:

- Leak history (number and type of leaks, most recent leak count, and duration between leaks)
- Age of pipe (including design and construction method used at time of installation)
- Soil conditions (corrosiveness, hillside, landslide, fault line, and liquefaction potential)
- Risk of service interruption and community disruptions
- Coordination with planned projects by Bureau of Street Services and other Water System improvement projects

Using the prioritization factors listed above, LADWP assigns a score to pipe segments. Based on the analysis, about 8% of LADWP's water distribution mainlines are classified as a high priority for replacement.

Mainline Condition (Needing Improvement)



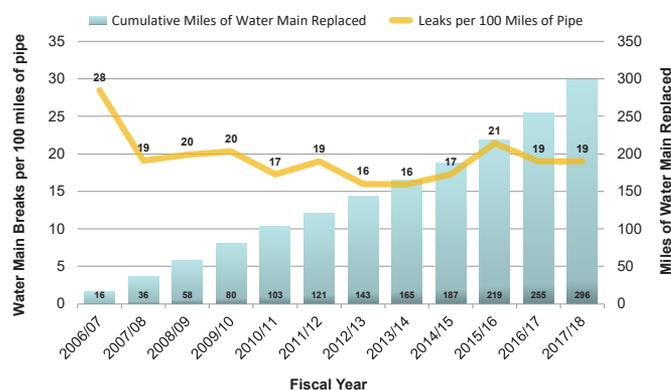
Key Points:

- LADWP's FY 2017-18 leak rate of 19.6 per 100 miles is better than the national industry average of 25 leaks per 100 miles.

2018-19 Goal: Replace 232,000 feet of mainlines

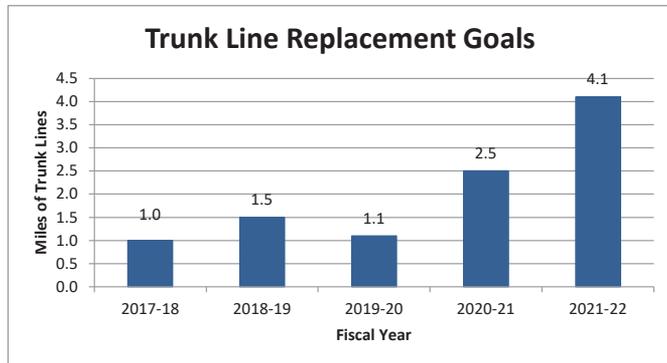
- Continue to increase hiring mainline crews to achieve an installation rate of 300,000 feet per year, to correspond with the life cycle of pipes.
- Replace 500 miles of high-risk mainlines throughout the city in the next 10 years.
- Enhance the resiliency of the water distribution pipeline network through the use of earthquake resistant pipe.
- Reduce water distribution system life cycle costs, including capital and operations and maintenance costs.

Mainline Installation and Number of Leaks



Trunk Lines

Trunk lines (pipes greater than 20 inches in diameter) provide the transmission capacity to move large amounts of water around the city – from reservoirs and tanks to the smaller distribution mainlines. There are approximately 560 miles of transmission pipelines throughout the City of Los Angeles. Prioritization for trunk line replacement is similar to the process for mainlines, taking into account leak history, soil conditions, and pipe age, along with other factors.



2017-18 Achievements:

- Replaced approximately 1.2 miles of trunk line pipe.

Key Points:

- Trunk line replacements are typically multi-year projects. As such, it is important to identify and implement mitigation measures as needed during construction.
- Trunk line ruptures are infrequent with two major breaks occurring in the past decade.

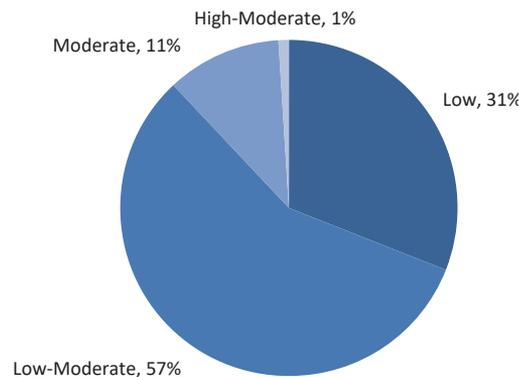
2018-19 Goals:

- Replace approximately 1.5 miles of trunk line, including a portion of Foothill Trunk Line with new earthquake resistant pipe.

Long-Term Goals:

- Accelerate design and construction of trunk line projects to replace moderately high risk trunk lines.
- Replace approximately 40 miles of trunk lines with a high-moderate score for needing improvement.
- Continue the corrosion protection program.
- Continue pipe replacements required to meet drinking water regulatory compliance.
- Enhance trunk line piping network through the use of earthquake resistant pipe.
- Continue to work with stakeholders to communicate projects and implement mitigation measures to minimize impacts due to construction.
- Minimize trunk line system life cycle costs, including capital and operations and maintenance expenses.

Trunk Line Condition (Needing Improvement)



Large Valves



Crews install 20-inch and 24-inch valve replacements at El Segundo Boulevard and Halldale Avenue.

LADWP has 2,806 large valves (16 to 144 inches or greater in diameter) in the water system network. Large valves are flow control devices that are critical for water system operations.

Large valve replacement is based on operational needs. LADWP's goal has been to replace five large valves per year, based on results of the Large Valve Assessment Program. There are currently 23 valves identified for replacement. LADWP's plan is to continue with a targeted large valve replacement program that strategically prioritizes replacements on

large valves in the water distribution system based on water shutdown and valve availability. As changes to the Water System are made, replacement priorities are adjusted.

2017-18 Achievement:

- Replaced 5 large valves.

2018-19 Goal:

- Replace 5 large valves

Long-Term Goals:

- Maintain and update a complete list of broken and/or difficult to operate valves.
- Continue the periodic valve exercise program to minimize valve damage and extend the valves' useful life.
- Continue the installation and renewal of large valves in conjunction with trunk line construction projects.

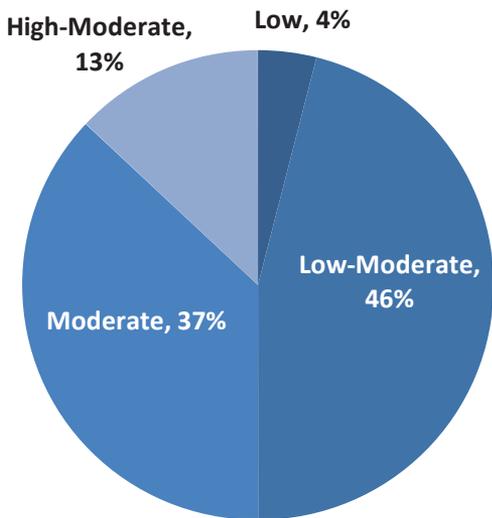
Pump Stations

There are 84 pump stations that pump water to customers or storage tanks at higher elevations in the city.

Objectives:

- Prevent service disruptions.
- Maintain operations during construction/replacement.
- Minimize operational costs.
- Reduce repair costs through appropriate preventative maintenance.

Pump Station Condition (Needing Improvement)



2017-18 Achievement:

- Replaced or rehabilitated 17 pumps/motors, exceeding the 12 planned for the fiscal year.

2018-19 Goal:

- Replace or rehabilitate 12 pumps/motors.



Pressure Regulator and Relief Stations

There are 331 regulator and relief stations. Regulator and relief stations control water pressure by adjusting for changes in flow and accommodating customer peak usage.

Objectives:

- Prevent service disruptions.
- Maintain system operations during construction.
- Minimize life-cycle costs.

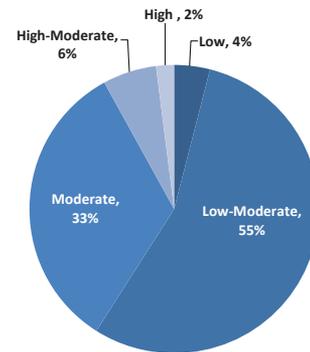
2017-18 Achievement:

- Retrofitted 4 stations that were highly corroded, leaking, and inoperable. The fiscal year goal was achieved.
- Replaced 2 regulator station headers.

2018-19 Goals:

- Retrofit 4 regulator stations per year through 2022.
- Some full station replacements are required due to structural requirements and expanded operational needs.
- Replace 2 regulator station headers.

Pressure Regulator Station and Relief Station Condition (Needing Improvement)

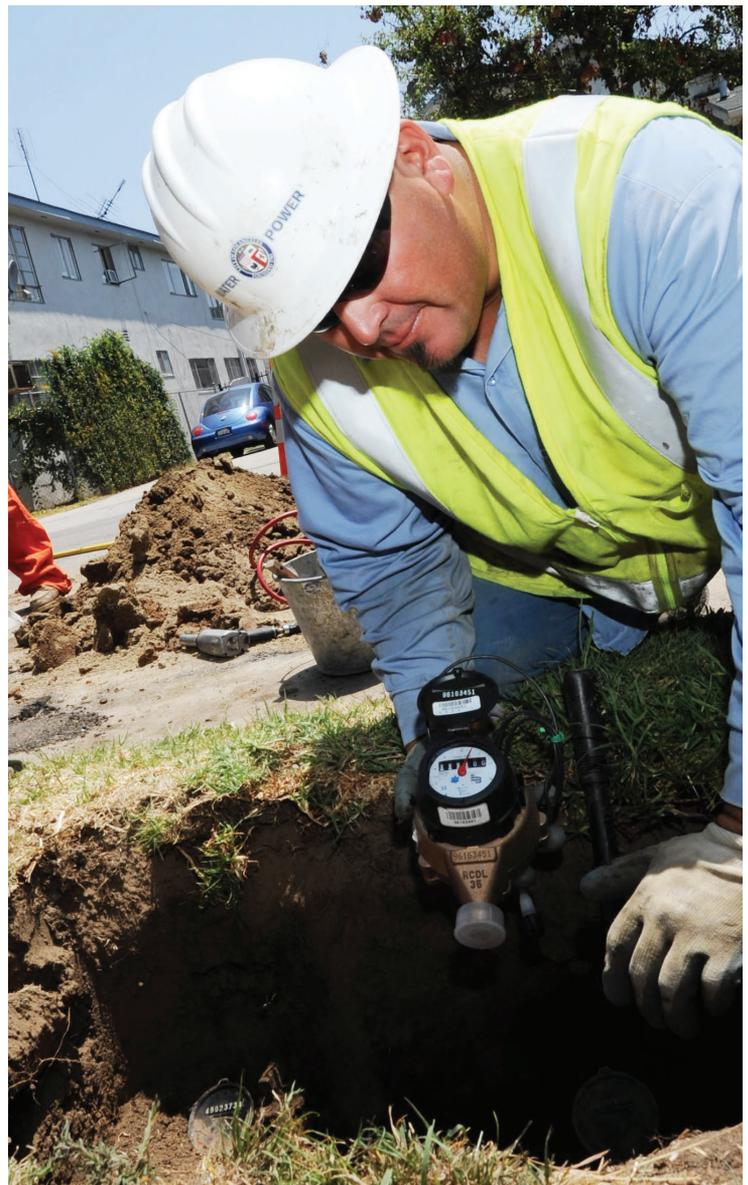
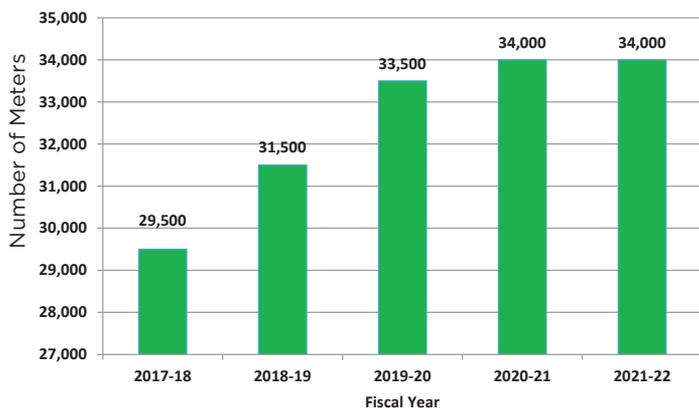


Water Meter Replacement Program

There are over 6,500 large meters (3 inches and larger) and approximately 700,000 small meters (2 inches and smaller) in the water distribution system. Accurate metering is necessary to fully account for water use by all customers as well as quantify water loss within the distribution system. LADWP has completed its cycle for large meter replacement, and is focused on replacing small meters, which constitute the vast majority of the Water System's meter inventory.

The industry average life cycle of a small meter is 20 years, before wear and tear on its moving parts cause loss of measuring accuracy. Over the next five years, LADWP plans to ramp up to a replacement cycle of 20 years.

Small Meter Replacement Goal



2017-18 Achievement:

- Replaced 28,200 meters out of 29,500 planned.

2018-19 Goal:

- Replace 31,500 meters

Long-Term Goals:

- Increase the small meter replacement rate to achieve a 20-year replacement cycle.
- Continue to evaluate automated meter programs that may provide the highest value to LADWP and our customers through real-time water use monitoring.
- Achieve at least 80% completion rate for repair and/or replacement of stuck or defective meters within 30 days after the service order is released by the Field Investigations Group.



Elysian Reservoir



Upper Stone Canyon Reservoir

In-City Reservoirs and Tanks

Within the Los Angeles basin, LADWP operates eight major active reservoirs and 110 smaller storage facilities, all of which create operational flexibility to balance water supplies and customer demands. The following is an update on the eight major active reservoirs: Eagle Rock, Elysian, Lower Franklin No. 2, Santa Ynez, and Lower Van Norman Bypass reservoirs are protected with a roof or floating membrane; Headworks East is a buried structure; Los Angeles Reservoir utilizes shade balls and ultraviolet disinfection; and a floating cover was installed at Upper Stone Canyon. A new buried reservoir, Headworks West, is currently in construction.

Additionally, the following six large reservoirs are no longer in service but contain water: Encino, Lower Hollywood, Upper Hollywood, Silver Lake, Lower Stone Canyon, and Ivanhoe Reservoir. Various levels of maintenance are necessary at these locations to allow for potential emergency use of the water as well as limited public access.

Similar to the in-city reservoirs, storage tanks provide the needed daily and emergency supplies for the community. Having capacity ranges from 9,000 gallons to 30 million gallons, the typical useful life for steel and concrete tanks is 60 years and 100 years, respectively.

Objectives:

- Preserve water quality and structural integrity.
- Replace reservoir floating covers based on a 20-year useful life, or earlier if needed due to deterioration and damage, or as required by the Division of Drinking Water.
- Retrofit and/or replace tanks based on condition assessment of tank structural and mechanical elements, materials, and seismic stability.
- Maintain dam surveillance on reservoirs as required by the Division of Safety of Dams.
- Continue inspection and maintenance program for reservoirs and tanks.

2017-18 Achievements:

- Completed Elysian Reservoir floating cover installation.
- Completed Ivanhoe and valve installation at the ultraviolet (UV) treatment plant at Los Angeles Reservoir.

2018-19 Goals:

- Complete/update inundation maps and emergency plans for dams at Stone Canyon, Encino, Eagle Rock, Santa Ynez, Elysian, and Hollywood.
- Complete Upper Stone Canyon floating cover installation.

Long-Term Goals:

- Complete Upper Stone Canyon Reservoir cover.
- Replace Green Verdugo Reservoir cover.
- Complete the UV treatment plant for the Los Angeles Reservoir outflow.

Los Angeles Aqueduct (LAA) Reservoirs & Dams

There are eight LAA reservoirs and dams beyond the city limits.

Objective:

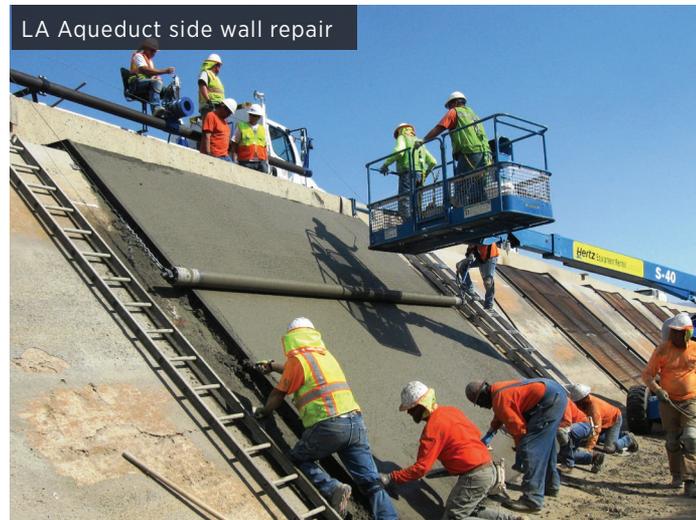
- Evaluate and maintain dam structural integrity by conducting site-specific stability studies and maintain a reservoir surveillance program, as required and overseen by the Division of Safety of Dams.

2017-18 Achievements

- Completed instrumentation upgrades at Bouquet Canyon dam.

2018-19 Goals:

- Complete the design for seismic improvements to North Haiwee Dam No. 2 and identify a risk reduction project for Tinemaha Dam.
- Complete Long Valley Dam Spillway Assessment.



Los Angeles Aqueduct System

There are approximately 300 miles of LAA tunnels, open channels, covered channels, and sag pipes that convey water from the Eastern Sierra and Owens Valley to Los Angeles.

Objective:

- Maintain operations through in-place refurbishment of the entire LAA system.

2017-18 Achievements:

- Due to high run-off, crews spread 250,000 acre-feet of water in Owens Valley augmenting groundwater supplies.
- Crews minimized runoff water to Owens Lake to 20,000 acre-feet.
- Completed rehabilitation of Maclay Highline and placed it into service. Work involved:
 - Rehabilitating 45 feet of collapsed tunnel section. Installing 1,900 feet of 72-inch corrugated pipe. Replaced 70 feet of structurally unsound tunnel section with box conduit. Installed and placed in service flow meter.
- One mile of Aqueduct original top removed. Goal of three miles not achieved due to excessive snowpack run-off.
- Constructed 2 cathodic protection stations at Crow's Nest and Siphon #2.
- Completed re-coating exterior of Pine Tree Sag Pipe (1,700 feet).

Long-Term Goals:

- Re-coat exterior of sag pipes. 10 miles completed to date with 5 miles remaining.
- Construct 2 cathodic protection stations a year. 16 are completed to date with 14 remaining.
- Replace an average of 3 miles of concrete lid on the covered channels annually. 30 miles are completed to date with 70 miles remaining.
- Re-drill and replace groundwater wells in the Owens Valley averaging 2 per year. There are 100 operational wells out of a total of 130.
- Design and build a sedimentation facility at Fairmont Reservoir to meet long-term water quality requirements for water supplied through the LAA and east branch of the State Water Project.
- Design mitigation for a San Andreas Fault rupture at the Elizabeth Tunnel.



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