Pre-19th Century

Native American Water Management: Before European settlers arrived, the indigenous people of the Los Angeles area, such as the Tongva tribe, made use of natural water sources, including the Los Angeles River, springs, and groundwater wells. They were skilled at managing these resources sustainably. [1]

1781 Los Angeles' first water system, the Zanja Madre ("Mother Ditch"), was built by Spanish settlers to divert water from the Los Angeles River to the original pueblo. It remained in use for nearly 100 years. Water was carried by hand, and irrigation for farming was essential. [1]

1848 The Zanja Madre was a 12-mile-long ditch that brought water from the Los Angeles River to the settlement and nearby farmland. It was primitive but served as a critical early water source. [1]

1854 The city created a formal water department and appointed a zanjero (ditch overseer) to manage the Zanja Madre. This was the beginning of a public water utility in L.A. [1]

1868 Los Angeles Water Company: This was the city's first private water company. It was formed to address the city's growing need for clean drinking water but faced challenges, especially as the population expanded rapidly. [1]

1880 Under engineer William Mulholland, the city expanded its water infrastructure with wooden pipes, reservoirs, and increased distribution to meet urban demand. This set the stage for more ambitious water projects. [1]

1905 To solve future water shortages, L.A. secretly bought land and water rights in the Owens Valley through agents. This controversial move later led to water conflicts in the region. [1]

1908 The city approved a $23 million bond to construct a 233-mile aqueduct from the Owens River to Los Angeles. Mulholland oversaw the project, a monumental feat of engineering at the time. [1]

1913 On November 5, 1913, William Mulholland, the head of the Los Angeles Department of Water and Power, oversaw the completion of the Los Angeles Aqueduct. This aqueduct, which was over 200 miles long, brought water from the Owens River in Owens Valley to Los Angeles, changing the city's water landscape forever. [1]

1970 A second aqueduct was constructed to supplement the original and handle higher water demand. This infrastructure doubled the Owens Valley supply capacity. [1]

1986 L.A. completed its first major filtration plant, using ozone and modern technology to purify up to 600 million gallons per day. This marked a major step in water quality management. [1]

2000 L.A. upgraded aging water mains and embraced smart water systems, stormwater capture, and recycling to fight drought and climate change. Conservation efforts were strengthened citywide. [1]

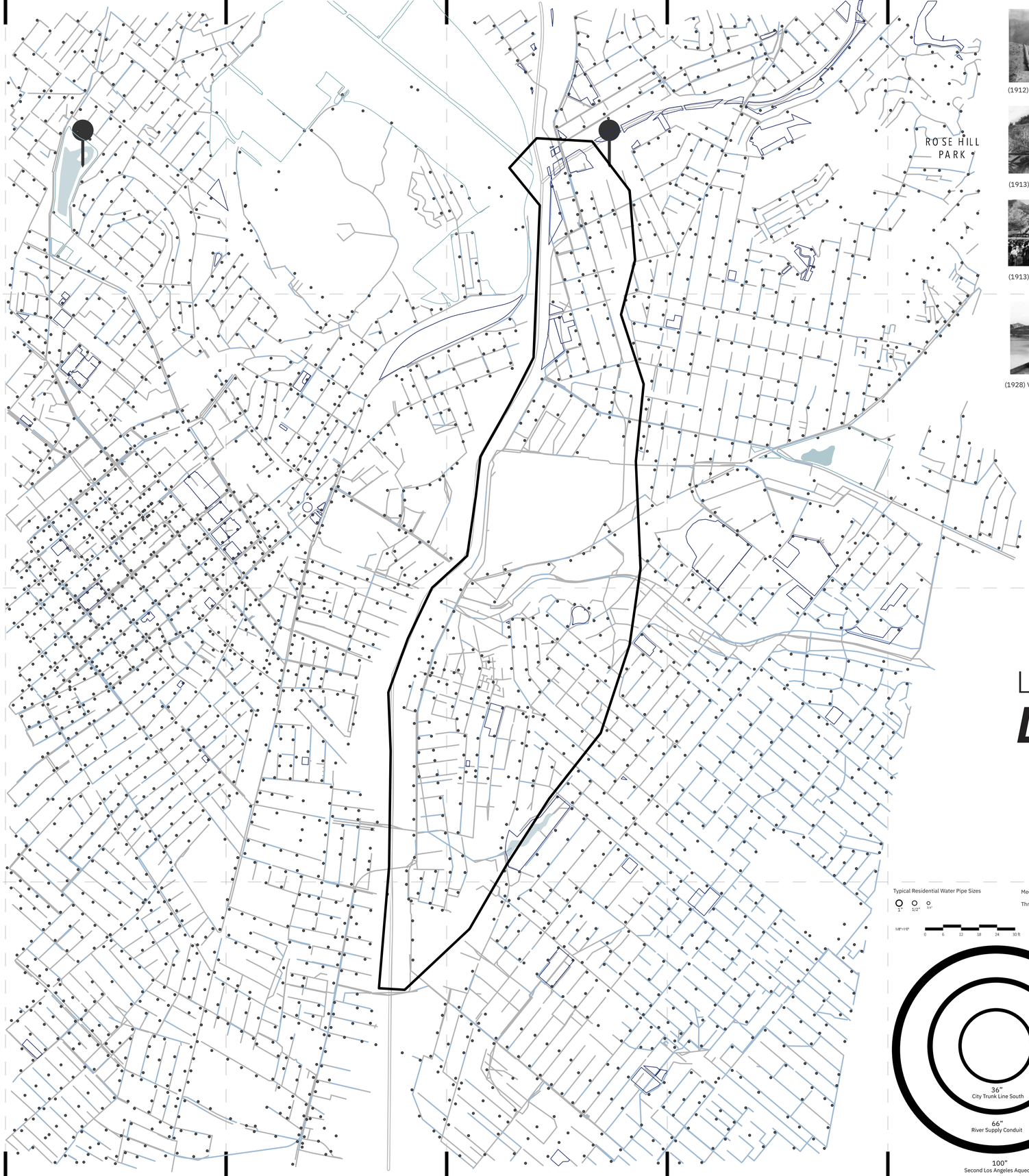
2014 Amid California's historic drought, L.A. imposed restrictions and invested in wastewater recycling and groundwater recharge. This shifted focus from imported water to local sources. [1]

2014 The Santa Ynez Reservoir, crucial for emergency water storage, was taken offline for repairs, highlighting infrastructure vulnerabilities. The city responded with alternative supply planning. [1]

1. "Water System Past and Present." Los Angeles Department of Water and Power. Accessed April 15, 2025. https://www.ladwp.com/who-we-are/our-history/water-system-past-and-present.

2. "Facts & History | Los Angeles Department of Water and Power." n.d. Www.ladwp.com. https://www.ladwp.com/who-we-are/water-system/los-angeles-aqueduct/facts-history.

3. "Water and Power Associates." 2022. Waterandpower.org. 2022. https://waterandpower.org/museum/Colorado%20River%20Aqueduct.html.



(1912) Los Angeles Aqueduct

(1913) Opeaning Water Gates

(1913) 1st Flow of the Water

(1928) View of Mulholland Dam

Los Angeles Aqueduct

Length: 233 miles.
Width: 10–30 feet at the narrowest, expanding to up to 50 feet in some sections.
Depth: 4–6 feet for the trench, with a pipe diameter typically between 4–6 feet.

The aqueduct is made primarily of concrete and steel (for pipes and reinforcement).

Concrete: The aqueduct is mostly built with reinforced concrete, both in the form of lined canals and concrete pipes. Given the length and scale, it is estimated that around 500,000 cubic yards of concrete were used in the construction of the Los Angeles Aqueduct.

Steel: Steel was used in the reinforcement of concrete, especially in pipe sections and structural supports. In the original construction, an estimated 50,000 tons of steel were likely used for reinforcement and pipeline structures.

Colorado River Aqueduct

Dimensions:
Length: 242miles.
Diameter: The pipeline varies between 8 ft and 12 ft.
Steel pipe for the aqueduct.

Materials:
The aqueduct consists mostly of steel for the large-diameter pipes and concrete for certain sections.

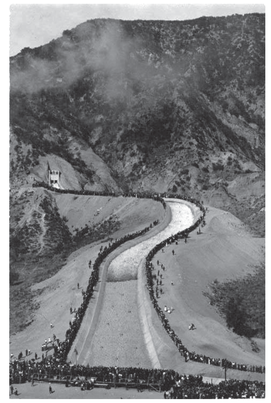
Concrete: Like the LA Aqueduct, the Colorado River Aqueduct uses concrete in canals and junctions. The Colorado River Aqueduct's concrete infrastructure likely uses several hundred thousand cubic yards of concrete.

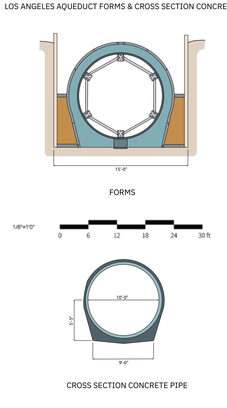
Steel: Steel is used predominantly in the large-diameter pipelines and reinforcement.

Steel Quantity Estimate: The aqueduct's construction involved an estimated 70,000 tons of steel. [2][3]

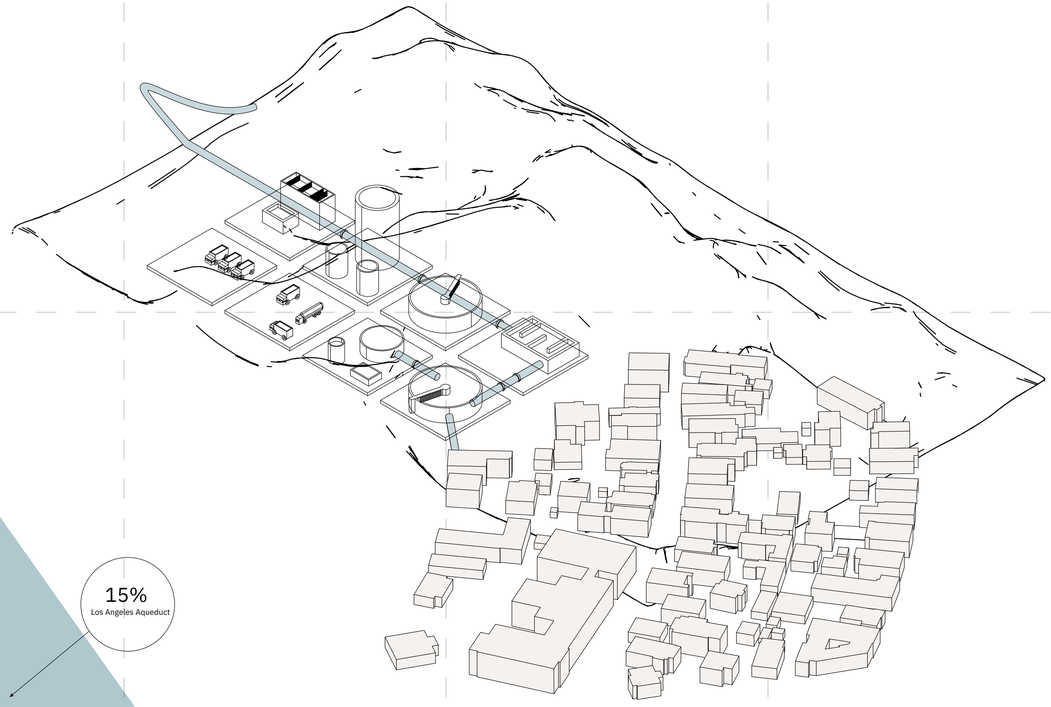
LOS ANGELES **INFRASTRUCTURE**
DRINKING WATER

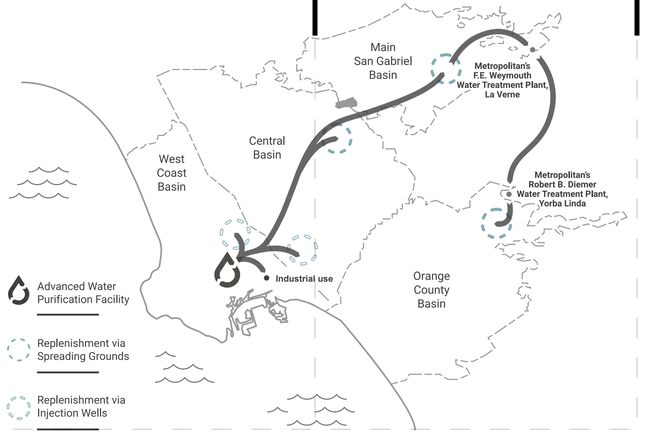
Los Angeles: COUNTY OF LOS ANGELES
Infrastructure: DRINKING WATER
Project: ANIA AVANESIAN KONARAKI





ABRIDGED OF WATER INFRASTRUCTURE





Existing Infrastructure
The Los Angeles Department of Water and Power (LADWP) oversees a vast water system comprising approximately 7,340 miles of mainlines and trunk lines. Given that the average weight of a steel water pipe is approximately 0.6 pounds per foot, the total weight of these pipes is estimated to be around 5,404,800 pounds (2,702.4 tons). It's important to note that this is a rough estimate, as the actual weight would vary based on pipe material, diameter, and wall thickness. [5]

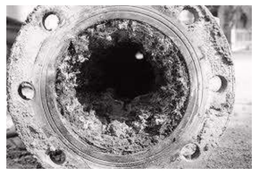
Reservoirs
LADWP operates several reservoirs, including the Santa Ynez Reservoir in the Pacific Palisades, which has a capacity of 117 million gallons. While the exact structural weight isn't specified, reservoirs are substantial concrete structures, each weighing thousands of tons. [5]

Maintenance and Replacement Efforts
Maintaining and replacing aging infrastructure is a significant undertaking for LADWP. The department has identified that approximately 6% of its water mains are graded D and F, indicating a high risk of failure. To address this, LADWP has developed a ten-year Capital Improvement Program, allocating over $6 billion for capital improvements in the coming years. This program focuses on replacing or upgrading major system components, including trunk lines, major system connections, distribution mains, and service replacements. [4]

Aging Infrastructure and Leak Incidence

The city's water distribution system spans approximately 7,340 miles, with many pipes installed over 90 years ago. Approximately 6% of these pipes are graded D or F, indicating a high risk of failure. On average, the Los Angeles Department of Water and Power (LADWP) experiences about 3 to 4 water main breaks daily. [6]

LADWP has initiated programs to mitigate leaks, including the use of hydrophones to detect leaks and a goal to replace 210,000 feet of pipe in the current fiscal year. However, with a replacement rate of about 195,000 feet annually, it would take approximately 37 years to replace all pipes graded D and F. [6]



Water Mains and Trunk Lines

Length: LADWP maintains ~7,340 miles of main and trunk water lines.

Convert to feet:
7,340 miles × 5,280 ft/mile = 38,755,200 feet

Estimated weight per foot (average): 0.6 lbs/foot (steel or ductile iron average)

Total weight (in pounds):
38,755,200 ft × 0.6 lbs/ft = 23,253,120 lbs

In tons:
23,253,120 lbs ÷ 2,000 = ~11,627 tons

4."Urban Water Management Plan 2020 Appendix A-H." n.d. Accessed April 16, 2025. https://www.ladwp.com/sites/default/files/documents/LADWP_2020_UWMP_Appendix_A_H_Web.pdf.

Storage Reservoirs

LADWP manages 10+ major reservoirs. Santa Ynez alone stores 117 million gallons and is a massive structure.

Estimate for reinforced concrete structure:

A mid-size reservoir = ~10,000 tons

If there are 10+ similar ones: ~100,000 tons (very conservative)

5."Urban Water Management Plan." 2020. Los Angeles Department of Water and Power. 2020. https://www.ladwp.com/who-we-are/water-system/sources-supply/urban-water-management-plan.

Ongoing Maintenance and Replacement "Weight"

While "weight" for this is conceptual, we can represent it as the average annual tonnage of replaced materials:

LADWP aims to replace 280,000 feet (~53 miles) of pipe per year by 2025.

280,000 ft × 0.6 lbs/ft = 168,000 lbs/year = ~84 tons/year in replaced piping

With fittings, valves, trench materials, etc., round to ~150 tons/year for all components.

6. "L.A.'S Aging Water Pipes; a $1-Billion Dilemma." 2015. Graphics. latimes.com. January 7, 2015. https://graphics.latimes.com/la-aging-water-infrastructure/?utm_source.

Treatment Facilities & Pumping Stations

Dozens across the county; includes filtration plants, pump stations, and regulators.

Approximate embodied infrastructure weight per site (equipment + concrete base + buildings): ~500–1,000 tons each.

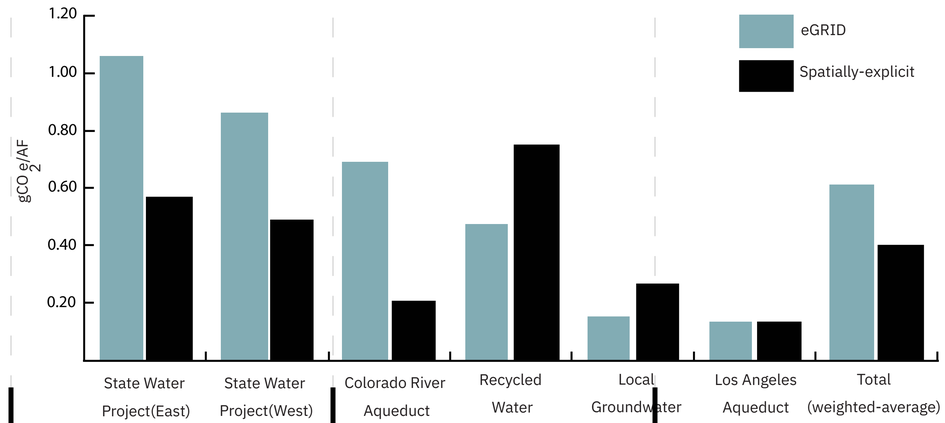
Estimate for 50 major sites:
50 × 750 tons avg = ~37,500 tons

MAP DATAS

7. Ground water basins feature layer. (n.d.). https://egis-lacounty.hub.arcgis.com/datasets/lacounty::ground-water-basins-feature-layer/about

8. Esri, "Item ID ccf56ac23ebf421ab3ea43dc6fba8049," ArcGIS Online, accessed April 25, 2025, https://www.arcgis.com/home/item.html?id=ccf56ac23ebf421ab3ea43dc6fba8049.

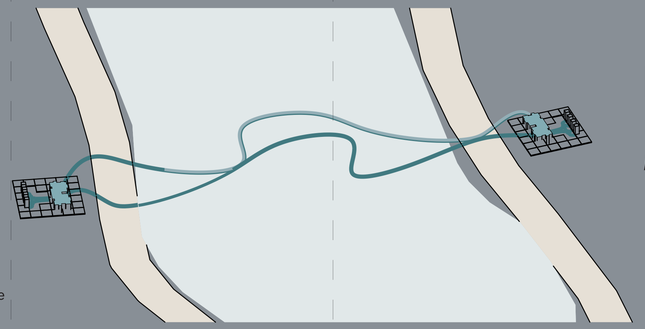
9. Esri, Healthy Places Index (HPI) 2023 by Census Tract, ArcGIS Online, accessed April 25, 2025, https://www.arcgis.com/home/item.html?id=ccf56ac23ebf421ab3ea43dc6fba8049.



LOS ANGELES **INFRASTRUCTURE**
RAINFALL SYMPHONY

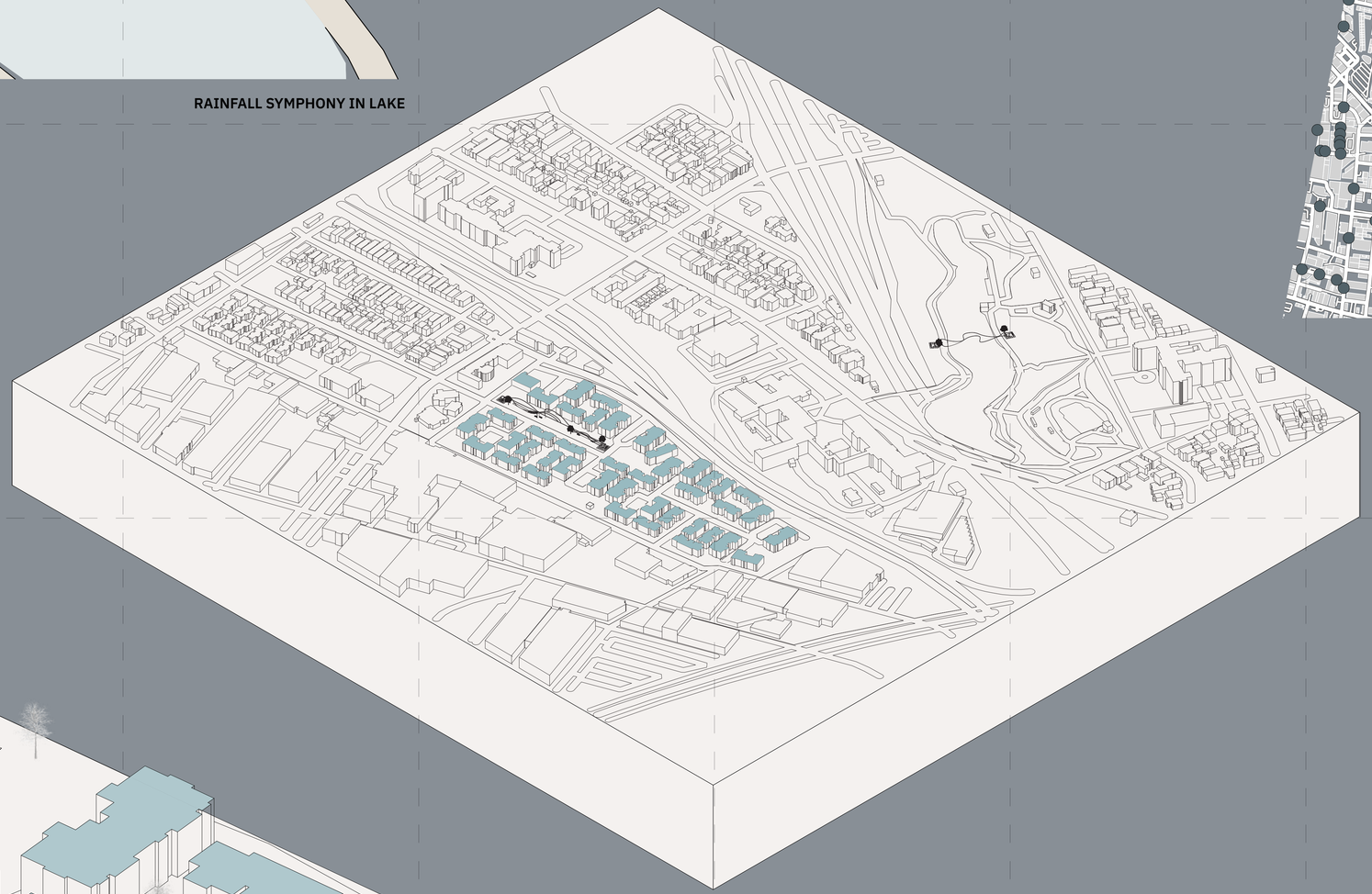
Description

This project proposes a sustainable water infrastructure system designed to significantly reduce Los Angeles' dependence on imported water. The plan includes replacing aging and inefficient pipelines with modern, efficient systems while also implementing advanced water recycling technologies. Treated wastewater from local communities will be filtered and reused, providing a reliable source of clean drinking water. Beyond utility, the infrastructure will serve as a multifunctional community space a gathering place where residents can connect, socialize, and engage with their environment. Architecturally, the structure will be a bold symbol of the city's commitment to sustainable growth, energy efficiency, and water independence.

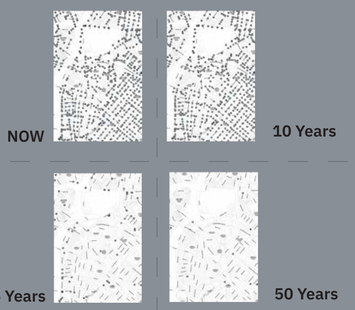


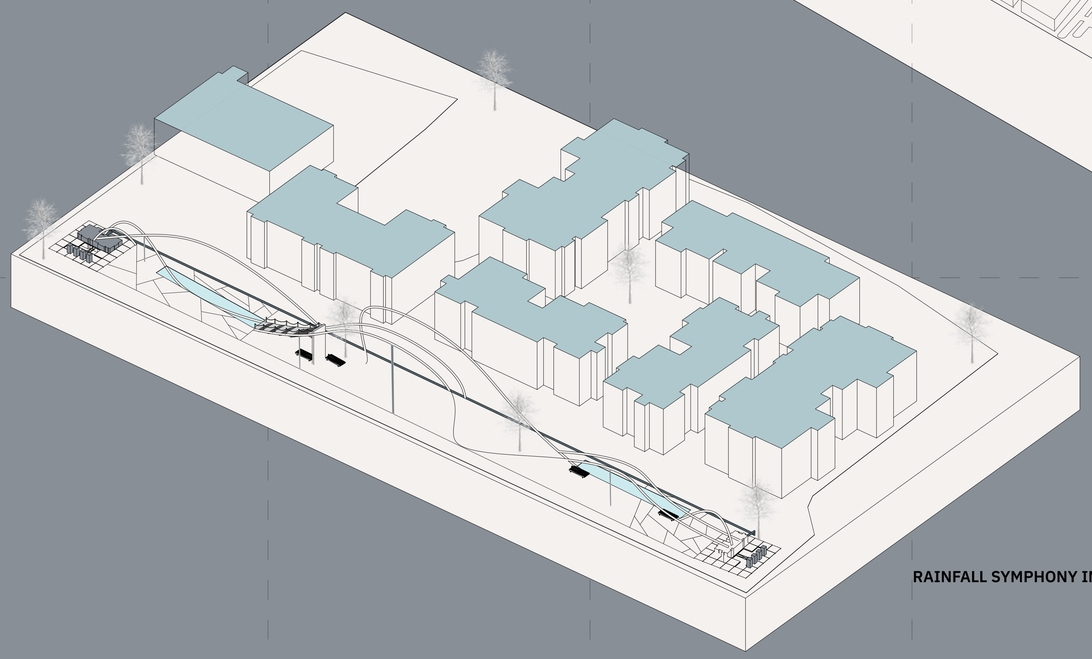
RAINFALL SYMPHONY IN LAKE

Additionally, the system will feature timed leaks that serve a dual purpose: maintaining the infrastructure and watering the surrounding park landscape in an eco-conscious manner. This holistic approach not only addresses critical environmental issues but also promotes community involvement and urban resilience.

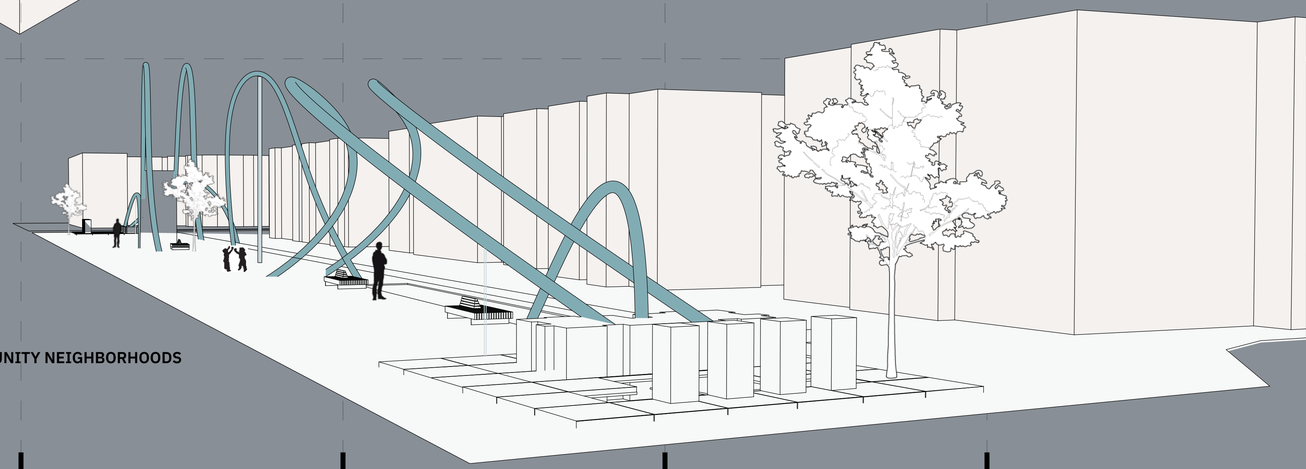


Sewer Structures Maintenance Hole





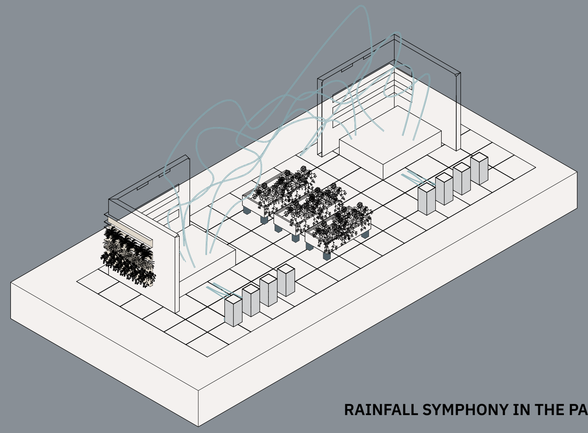
RAINFALL SYMPHONY IN GATED COMMUNITY NEIGHBORHOODS



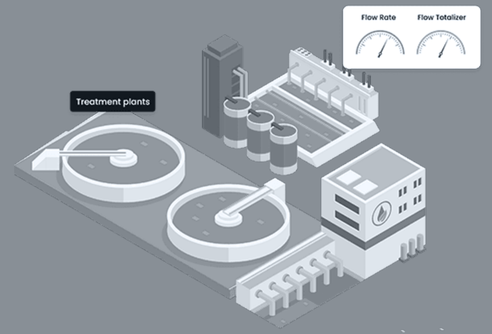
Description

This project proposes a large-scale, vertically integrated water infrastructure system designed to drastically reduce Los Angeles' reliance on imported water. At twice the size of the previous model, this new infrastructure will consolidate all key water management functions—collection, storage, filtration, and distribution—within a single, architecturally bold tower structure. Outdated and inefficient pipelines across the city will be replaced with modern, energy-efficient systems, while advanced water recycling technologies will treat community wastewater to provide a s afe, sustainable supply of drinking water. By incorporating water towers within the design, the system will maintain consistent water pressure even during peak usage times. Beyond its practical role, the tower will act as a multifunctional community hub—offering

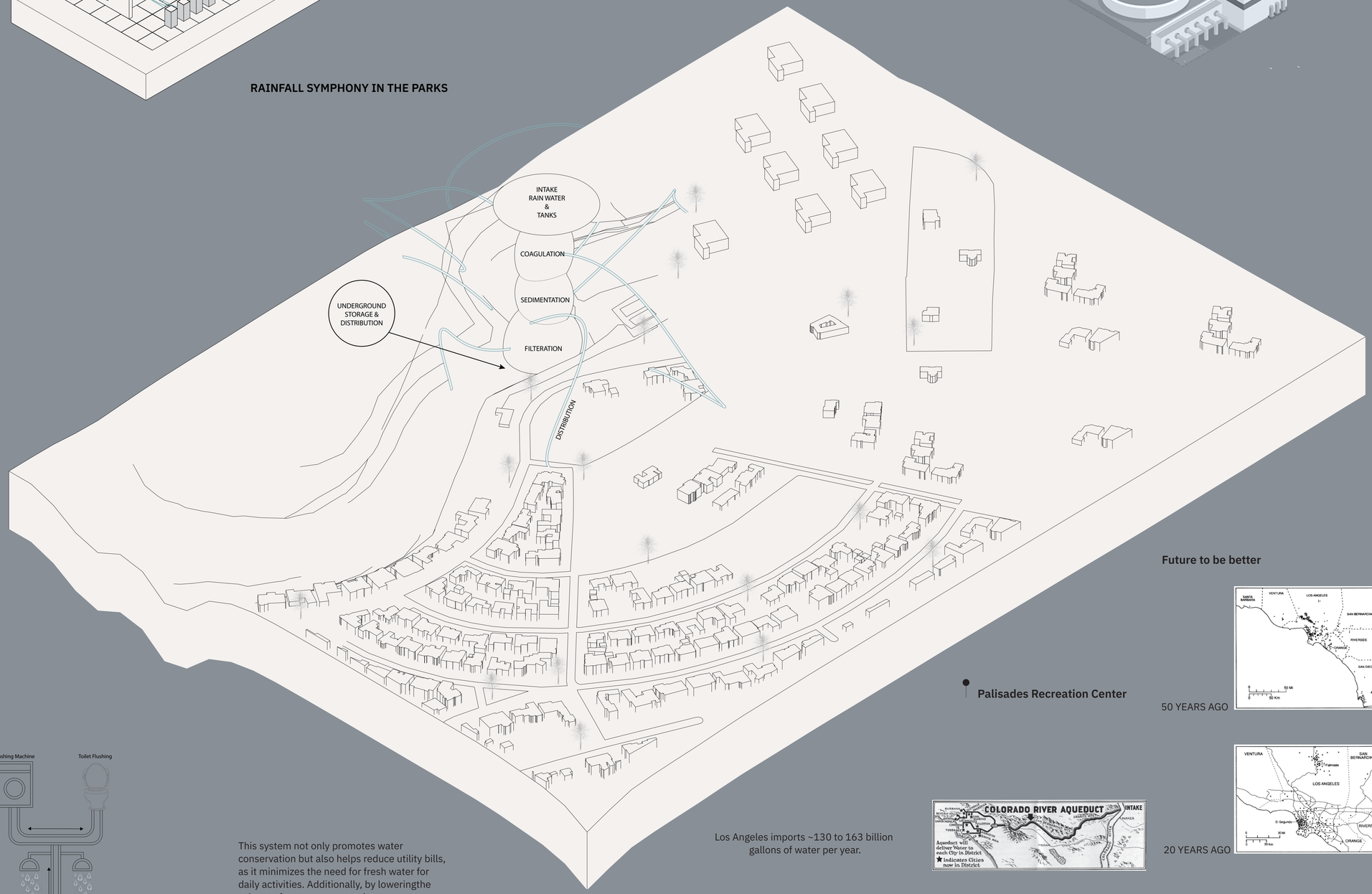
public gathering spaces that encourage social interaction and environmental awareness. It will also feature controlled, timed water releases that irrigate surrounding green spaces, turning essential maintenance into an ecological benefit. This comprehensive, future-focused solution addresses both environmental and urban challenges, positioning Los Angeles as a leader in sustainable city planning and water resilience.



LOS ANGELES **INFRASTRUCTURE**
AQUANUKE CREATION

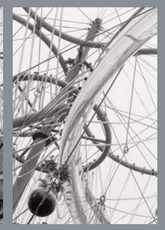


RAINFALL SYMPHONY IN THE PARKS



Precedence research

MoMA PS1 YAP 2015 - COSMO / Andrés Jaque / Office for Political Innovation [10]



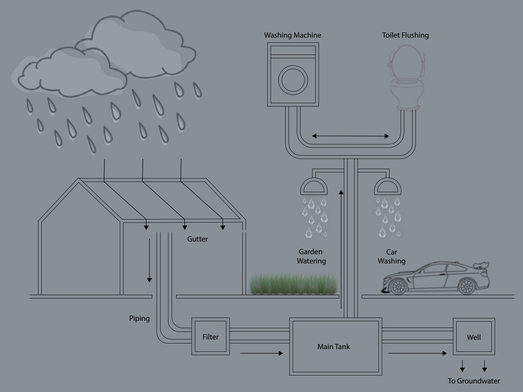
Potential Community Partners

Pure Water Los Angeles is a water recycling program that aims to provide a new, local, and sustainable water supply by purifying wastewater to produce high-quality drinking water. LADWP has been collaborating with community groups, elected officials, and environmental leaders since 2019 to develop the program's Master Plan, with a focus on transparency and stakeholder engagement. [11]

This is dedicated to treating wastewater to high-quality standards for reuse, helping to conserve Los Angeles' limited water resources. Its primary goal is to support sustainable water management by producing recycled water for irrigation, industrial use, and groundwater replenishment reducing reliance on imported water and enhancing the city's long-term water resilience. [12]

Single House Proposal

Recycling gray water the wastewater from sinks, showers, and washing machines into a system for plate treatment offers an innovative, sustainable solution for reducing water waste. By filtering and reusing this water, households can significantly lower their freshwater consumption, easing the strain on local water supplies. Gray water treatment systems are designed to filter out contaminants such as soap, oils, and food particles, making the water suitable for non-potable uses like cleaning, irrigation, or toilet flushing.



This system not only promotes water conservation but also helps reduce utility bills, as it minimizes the need for fresh water for daily activities. Additionally, by loweringthe volume of wastewater entering sewer systems, it helps reduce pressure on municipal treatment facilities. However, to ensure safety and effectiveness, these systems require regular maintenance and proper filtration to prevent health risks and system malfunctions. When implemented thoughtfully, gray water recycling offers an eco-friendly way to enhance sustainability while reducing household water usage.

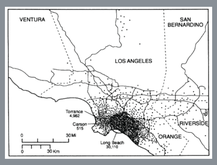
Future to be better

Palisades Recreation Center

50 YEARS AGO

20 YEARS AGO

NOW



Los Angeles imports ~130 to 163 billion gallons of water per year.

Source	Approx. % of Imported Water	Annual Gallons (est.)
Colorado River Aqueduct	~40–50%	~65–80 billion gallons
State Water Project	~30–35%	~40–57 billion gallons
L.A. Aqueduct (Owens Valley)	~20–25%	~26–40 billion gallons

10. "Gallery of MoMA PS1 YAP 2015 - COSMO / Andrés Jaque / Office for Political Innovation - 7." 2015. ArchDaily. 2015. https://www.archdaily.com/645883/cosmo-andres-jaque-office-for-political-innovation/558975a5e58ecef4b5000130-cosmo-andres-jaque-office-for-political-innovation-photo?next_project=no.

11. "Pure Water Los Angeles." 2024. Los Angeles Department of Water and Power. 2024. https://www.ladwp.com/who-we-are/water-system/sources-supply/pure-water-los-angeles.

12. "Slauson Connect Clean Water Project - CIS." 2024. CIS. September 10, 2024. https://www.cisolutions.com/project/slauson-connect-clean-water-project/.