

ASU partnership helps ADOT optimize water use across urban freeways

By Faith Kearns, ASU News
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Every day, hundreds of thousands of drivers travel Phoenix-area freeways lined with desert trees, shrubs and cacti. Few likely consider what it takes to keep those landscapes alive, or how much water it requires.

A new partnership between Arizona State University and the Arizona Department of Transportation is taking a closer look.

Led by [Harry Cooper](#), director of water conservation innovation for the [Arizona Water Innovation Initiative](#) — a statewide project from ASU's Julie Ann Wrigley Global Futures Laboratory in collaboration with the Ira A. Fulton Schools of Engineering — the ADOT Urban Freeway Landscape Water Use Efficiency Project aims to better understand how much water is used to irrigate freeway landscapes, and how to use less while keeping plants healthy.

"In a residential home, up to 70% of water use is outdoors, and much of that is landscape irrigation," Cooper said. "Now imagine that same dynamic multiplied across thousands of acres of freeway landscaping. These are large outdoor systems, and even modest efficiency gains of 10% translate into significant regional water savings."

That scale makes freeway landscapes worth examining. ADOT manages approximately 6,960 miles of roadways statewide, including more than 250 miles of landscaped and irrigated urban freeways in metro Phoenix.

With Colorado River shortages and increasing pressure on groundwater supplies, cities may need to reassess water allocations — including water used to irrigate roadway landscaping — in the future. Helping ADOT optimize its water use now could better position the state agency and its municipal partners to adapt to a hotter, drier future.

Fieldwork at freeway scale

Cooper is working with a group of students to collect data. On field days, Cooper and about a dozen graduate students meet before sunrise and head out onto freeway landscapes, outfitted in hard hats and high-visibility vests. Working alongside ADOT staff to ensure safety, the team splits into three groups.

One group tests the irrigation system, checking valves, leaks and pressure. Another evaluates emitters and how water is being delivered to plants. A third conducts plant inventories, noting which species thrive and which struggle in harsh roadside conditions.

“We’re looking at both sides of the equation,” Cooper said. “How much water is being applied, and how are the plants responding?”

So far, Cooper says the team has found fewer major leaks than anticipated, which is a testament to ADOT’s maintenance efforts. They are also documenting plant losses and identifying species that consistently underperform.

“Often the solution isn’t just adding more water,” Cooper said. “It may be changing how or what we plant and how we maintain these landscapes.”

Direct impact for the state — and for students

For ADOT, the partnership with ASU provides analytical capacity. The team is delivering irrigation performance data and plant inventories that can inform future design standards and maintenance practices.

“What we’re providing ADOT is actionable insight,” Cooper said. “It helps them understand how much water is being used and where there may be opportunities to improve efficiency without sacrificing the benefits these landscapes provide. We are also connecting them with the Arizona Department of Water Resources and state water priorities to make sure we are all aligned.”

For ASU students, the project offers rare hands-on experience at the intersection of infrastructure, ecology and public policy.

“It’s one thing to learn about drought-tolerant plant materials and water conservation in class,” said Sara Filler, landscape architecture student and graduate research assistant on the project. “It’s another to be out along urban freeways testing irrigation systems and knowing that the data we collect will inform decision-making on plant suitability and outdoor water use.”

Students from conservation, landscape architecture, engineering, construction management and data science are working together to create a singular dataset.

“We are seeing firsthand how design, construction and maintenance can influence long-term water use and plant survival,” said Sriram Goteti, construction management student and graduate research assistant for the project. “We are learning how important proper installation and smart maintenance practices are for water conservation and plant health.”

Cooper sees the collaboration as a model for how universities can serve as problem-solving partners to state agencies.

“This is exactly the kind of work a public research university should be doing,” he said. “We’re aligning with state water priorities, supporting another public agency and preparing students to tackle real-world water challenges.”

Looking ahead

ADOT’s landscape and irrigation standards often influence transportation departments across the state, and the project’s findings could benefit other municipal departments seeking to reduce outdoor water use.

“Our partnership with ASU is helping us take a data-driven look at how we manage our landscape assets,” ADOT Central Section Environmental Program Administrator Alexis Zaring said. “As water supplies become more uncertain, we need to ensure we’re using every gallon wisely while maintaining safe and attractive transportation corridors.”

Future phases could move from evaluation to implementation — piloting revised irrigation designs and schedules, adjusting plant lists or testing landscape construction methods.

“Even relatively small water savings replicated across thousands of landscaped acres really add up,” Cooper said. “This is about stewarding our urban landscapes responsibly while preparing for the challenging water realities ahead.”

This story originally appeared on [ASU News](#).

Main image



Harry Cooper, director of water conservation innovation for the Arizona Water Innovation Initiative, reviews “as-built” record drawings on-site during landscape data collection efforts. Photo by Uday Kumar Marthineni

Text image(s)



Student researchers collecting pressure data (foreground) and emitter performance data (background). Photo by Harry Cooper/ASU



Close-ups of vegetation found along ADOT freeways in the Phoenix metro area (from left): Texas ebony, ocotillo and sweet acacia. Photos by Harry Cooper/ASU



Student researchers using a soil probe to measure infiltration at multiport emitter locations. Photo by Harry Cooper/ASU