



BUILD CALIFORNIA BETTER UNDERGROUND:

Current and Potential Strategies to Repair & Replace
Water Delivery Infrastructure

An ACEC California Infrastructure Discussion Paper

ACEC California
June 2015



June 2015

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ACEC California is committed to advancing dialogue on infrastructure-related issues facing California in the 21st century. This white paper on *California's Aging Water Infrastructure* is the second in a series of discussion documents we plan to issue over the next few years.

California has started to address the lack of water infrastructure to help store and maintain water supply through the passage of the water bond in 2014 but ACEC California wants to encourage state decision makers to seek an opportunity to implement a broader plan that bolsters California's entire water infrastructure. Millions of gallons of water are wasted every year through water line breaks in local cities and counties throughout California. The water agencies who own and maintain these various water delivery systems cannot keep up with the deferred maintenance of these aging systems, some of which are over 100 years old. Potentially the easiest solution for water agencies would be to raise their rates to consumers in order to fund much needed maintenance. But too often utilities and elected officials struggle to find the political will to raise water rates to proactively repair and replace aging pipes.

It's time to rethink the way we fund greatly needed repair and replacement of our water delivery systems in California. ACEC California seeks to foster the discovery of a long-term solution that maintains California's economic edge and judiciously harness its natural resources. To that end, the organization suggests that lawmakers, utilities, labor unions, the business community and ratepayers examine new ways to fund water main replacement across the state as part of a broader system-wide improvement plan. Whether P3s – or certain characteristics of P3s – could play a role in water main replacement funding could be part of that discussion.

This paper raises the question and looks at some of the alternatives being put forward in California today as well as the approaches taken in other states.

We hope you find the ideas presented in this white paper informative and illuminating. ACEC California will continue to contribute to the important discussion taking place today so that Californians can make informed decisions and create more sustainable jobs as we Build California Better.

A handwritten signature in blue ink that reads "Mary R. Erchul".

Mary Erchul
President
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A handwritten signature in blue ink that reads "Brad Diede".

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BUILDING CALIFORNIA BETTER UNDERGROUND:

CURRENT AND POTENTIAL STRATEGIES TO REPAIR & REPLACE WATER DELIVERY INFRASTRUCTURE

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For a century California's fortunes have depended upon a complex engineering marvel that transfers water from the state's northern half, which is where about 75 percent of precipitation falls, to its southern half, which accounts for about 75 percent of the state's water demand.¹ Some 40 million residents typically receive water from several sources, including rivers, streams and wells, while major state and federal water projects move roughly 14.4 million acre feet of water around California.² From the Shasta and Orville dams in the north to the All American Canal near the Mexico border – and critical pumping stations, reservoirs, aqueducts and deltas in between – as impressive as the vast system is, it still cannot overcome years of declining precipitation.

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Nor can it conceal aging infrastructure within hundreds of California’s water agencies, which possibly play the most vital role as they pull water from the various sources, clean it and deliver it to customers. For years many California municipalities have struggled with water main ruptures as age and corrosive soil have taken their toll, and tens of thousands of miles of decaying underground pipes are beyond repair. But because this last crucial piece of the system is out of sight – and drought, conservation and usage restrictions dominate headlines – it too often is ignored. That is, at least, until a rupture wastes millions of gallons of the precious resource and disrupts communities.

The problems are perhaps most acute in Los Angeles where water mains are approaching 100 years of age.³ Some 6,730 miles of Los Angeles Department of Water and Power (LADWP) mainline pipes, which are 20-inches or less in diameter, deliver water to customers and fire hydrants. The agency has assigned a grade of “F” to 13 miles (a high risk of failure) and a grade of “D” to 416 miles (a “high moderate” risk of failure).⁴ Some 2,565 miles are rated “C” (a moderate risk) and 3,146 miles are rated “B” (a low-moderate risk). Only 589 miles have an “A” grade (a low risk of failure). What’s more, of the 550 miles of trunk lines – pipes that are greater than 20 inches in diameter – 7 percent are considered to have an “F” grade.⁵

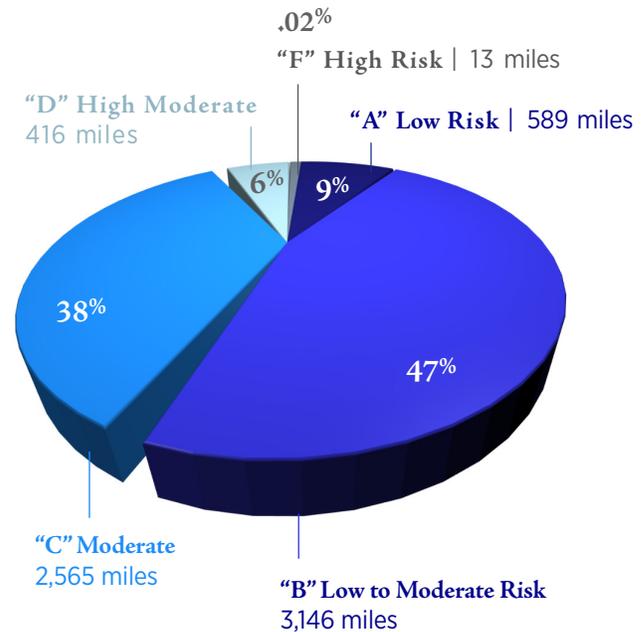
Media outlets around the country have provided highlight reels of ruptures that have created sinkholes and caused millions of dollars of property damage. As of September 2014, LADWP has paid \$9.4 million in settlements related to water main breaks over five years.⁶

One of the largest ruptures occurred near Sunset Boulevard in July 2014, where the junction of two major trunk lines discharged some 20 million gallons of water over two days and closed a portion of the thoroughfare for nearly a week.⁷ The gusher flooded the University of California, Los Angeles and caused millions of dollars in damages, including ruining the

wood floor in Pauley Pavilion.⁸ The rushing water also poured into parking garages, and LADWP received 190 claims for damaged cars.⁹ The pipe repair alone cost the agency almost \$900,000.¹⁰

Mainline Condition

Risk of Failure (in miles)



Los Angeles isn’t the only community dealing with decaying pipes. A handful of water main breaks have plagued San Francisco, San Diego, and other towns and cities over the last several months. Among others, a water main break in San Diego’s Little Italy that filled India Street with several inches of water in January 2015 affected nearly 25 restaurants and businesses and six apartments.¹¹ A manager who was forced to close his restaurant for the day told local news reporters that there wasn’t “much you can do when you have water flowing everywhere,” and that mitigation crews had been

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checking for water and mold damage.¹² San Diego has paid at least \$10 million to repair private property damages caused by water main breaks over the last eight years.¹³

In February 2015, a water main break near the Civic Center in San Francisco threatened nearby entertainment and cultural venues.¹⁴ In May 2015, a rotting water main burst in rural Valley Center northeast of Escondido, spilling about 50,000 gallons of waters in a few hours, interrupting service to 40 customers and creating a 10-foot sinkhole.¹⁵

Agencies are aware of the problem, but the replacement of decaying water pipes remains decades away due to deferred maintenance stemming from budget and labor constraints. Conservation and usage restrictions mean that agencies are selling less water to customers, which translates into fewer revenues to pay for replacement. The fact that agencies are paying more for wholesale water has exacerbated the situation.

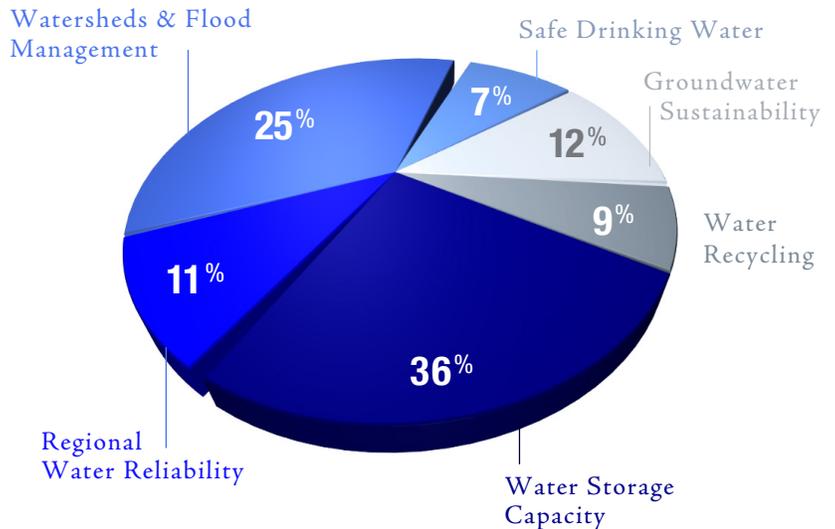
Under accepted industry standards, water agencies should be able to replace all existing water mains and other underground infrastructure over a 90-year period.¹⁶ The City of Fresno Water Division is trying to halve its pipeline and well replacement timeline to 200 years.¹⁷ Similarly, LADWP is moving at a pace that would take 300 years to replace roughly 7,200 miles of underground water pipes.¹⁸ It is aiming to improve that to 150 years by 2018.

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The challenge goes well beyond just a few communities. In 2013, the U.S. Environmental Protection Agency estimated that California’s water infrastructure

Where Will the \$7.5 Billion Go?



required \$44.5 billion in repairs, the highest amount in the nation.¹⁹ In fact, the EPA estimated that water transmission and distribution needs, including replacing underground mainline pipes, would eat up almost 60 percent – or nearly \$27 billion – of that amount.

Since that report was released, however, the drought has commanded the attention of California officials and lawmakers, who have sought ways to increase water supplies and storage capacity. Californians in November 2014 approved a \$7.5 billion water bond that allocates \$2.7 billion toward more water storage, \$725 million toward water recycling, \$900 million toward groundwater stability, \$1.89 billion for watersheds and flood management, \$810 million toward regional water reliability, and \$520 million for safe drinking water.²⁰

Subsequently, despite the critical need for more urgent and robust water main repair and replacement programs, water officials and lawmakers are managing the current crisis and hopefully seizing the larger opportunity to create a long-term plan to bolster California’s entire water delivery system, from the point of collection to the faucet. Beefed up supply and storage capacity remains years away,

but for all the envisioned improvements to that part of the system, businesses and residents will be hard pressed to appreciate the upgrades if they turn on the tap and nothing happens because water is pouring out of a broken pipe down the street.

That’s particularly true as residents are asked to conserve water or face usage restrictions. As one resident told the *Los Angeles Times* in reaction to a Woodland Hills pipe that leaked more than 500,000 gallons of water over several months before the utility located it: “This thing was wasting water and we’re in this severe drought. It’s kind of a slap in the face.”²¹

This report highlights what California cities are doing to address aging water infrastructure and the potential to pursue improvements more aggressively. Unfortunately, conventional funding solutions to replace water mains are extremely limited. But ACEC California considers it an opportune time for utilities, regulators and lawmakers to explore new financing ideas to bolster the state’s entire water infrastructure system.

While California continues to rank high in job creation – and has the largest economy of any state in the U.S. – states such as Texas remain committed to poaching California companies. ACEC California believes that sound infrastructure plays an important role alongside the state’s tax and regulatory environment, dependable workforce, quality of life, and other factors to create, attract and retain employers.

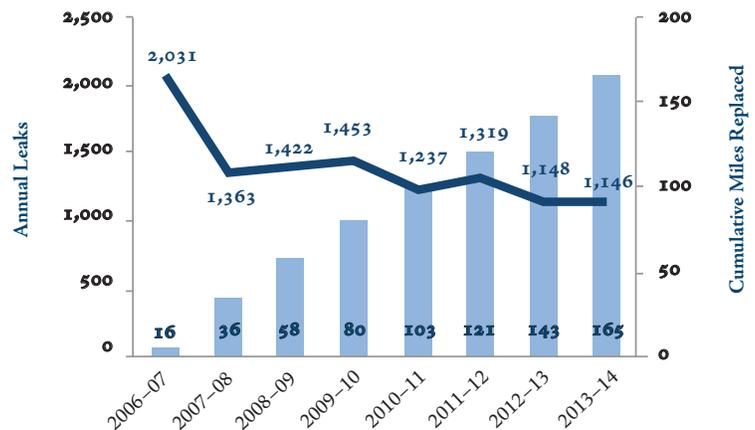
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Current Plans

Continuous reports of water main ruptures fuel a perception that utilities lack plans to tackle the problem. That’s not the case. LADWP, for example, plans to spend about \$2.2 billion on its infrastructure through fiscal year ending June 30, 2020.²² Of that amount, the utility foresees spending \$576.5 million to replace 120,000 to 250,000

Mainline Replacement Program (Fiscal Year)



feet (23 to 47 miles) of water mains annually through fiscal year ending June 30, 2018, with “F” grade pipes receiving the highest priority followed by those with a “D” grade.²³ It also plans to spend \$471.1 million to replace or repair nearly 13 miles of trunk lines and install 2.8 miles of new trunk lines.²⁴ On a longer timeline, the utility aims to replace 435 miles of water mains over the next 10 years.²⁵

The department expected to replace about 23 miles for the fiscal year ended June 30, 2015 and 28 miles the following year.²⁶ It also aims to ramp up replacement to 50 miles annually by 2020.²⁷ Still, LADWP’s current repair and replacement program doesn’t take into account the need for seismic upgrades to the utility’s entire water system over the next 20 years, which are expected to cost as much as \$15 billion.²⁸

LADWP is in early planning stages about how to tackle the seismic improvement project – it’s identifying the system’s greatest vulnerabilities and determining how to best buttress pipes that feed into hospitals, shelters and other “critical need” facilities that are part of the first-responder network.²⁹

“Our task is to merge the seismic upgrades with our pipe replacement program, and we’re putting a lot of thought into it,” said Craig Davis, Trunk Line Design Manager and an earthquake-engineering expert at LADWP.

“The reason for that is that we’re on a several-hundred year pipe replacement program, which is driven by resources and funding and longer than what we want it to be. If we take on a parallel program, we’ll have to divert resources and won’t be able to keep up with daily breaks.”

What’s more, although LADWP has laid out a water main replacement plan over several years, a revenue shortfall or urgent needs elsewhere could ultimately pull money from the plan.³⁰

“We are gearing up and increasing our production for pipe replacement,” said Charles Ngo, Asset Management & Capital Improvement Program Group Manager with Water Engineering and Technical Services at LADWP. “But these are projections to get the resources we need – staffing, crews to do the replacement and the engineering for it.”

Other initiatives focused on pipe replacement include a plan by Fresno’s water utility, which has experienced a handful of ruptures over the past several months, to spend \$82.5 million over five years as part of a \$429 million upgrade to its overall system.³¹ Additionally, the East Bay Municipal Utility District (EBMUD) is spending \$69 million over the next two years to replace up to 15 miles of water distribution pipes annually, up from about 10 miles a year.³²

Few Funding Options

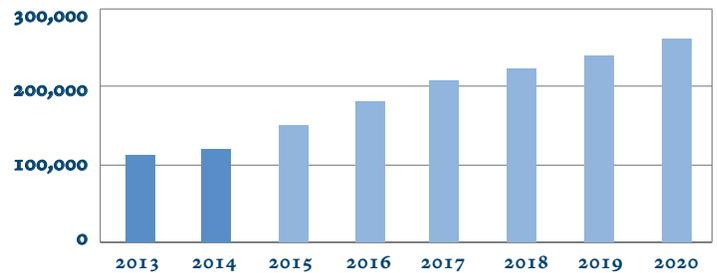
Few if any federal or state programs exist that provide significant funding to water agencies for water main replacement. In fact, the possibility that the federal government will provide substantial aid anytime soon is slim: The new Water Infrastructure Finance and Innovation Act (WIFIA), administered by the EPA and modeled after the Transportation Infrastructure

Finance and Innovation Act, is expected to receive an appropriation of only \$25 million in fiscal year 2016.³³

Water utilities are largely dependent on water rate revenues to pay for mainline and trunk upgrades: Typically they issue bonds to fund capital improvements and use rate increases to help pay them off. But for political reasons, elected officials often only grudgingly embrace rate increases, and delaying or reducing rate hikes may lead to deferred maintenance and larger problems down the road.³⁴

Mainline Replacement Goal

Feet of Mainline



260,000 ft. (50 miles) annual replacement rate by 2020

Conversely, the \$7.5 billion water bond approved in 2014 by California taxpayers is expected to spark some \$30 billion in infrastructure projects, said Timothy Quinn, executive director of the Association of California Water Agencies. But replacing and repairing aging pipes are not a priority, he confirmed.

“For the most part, the agencies holding these old pipes are going to have to pay for them themselves,” Quinn said. “While I realize there are political constraints, by and large the urban agencies in particular have had the courage to raise rates to take care of the systems. And they’re going to have to keep doing that in the future.”

That’s especially true given the success of conservation campaigns to recycle water and reduce its use. On June 1, for example, the State Water Resources Control Board enacted rules aimed at cutting water usage by 25% across all cities and towns in California, although reductions at the local level range from 8 percent to 36 percent, depending on the community.³⁵ Even before those restrictions were enacted, however, earlier conservation efforts promoted by utilities have shorn revenue growth,

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making it harder to finance infrastructure improvements. In fact, the Santa Clara Valley Water District expects to see a \$65 million drop in funds from lost revenues and drought measures, which could ultimately require a 54 percent hike in water rates over four years.³⁶

“...ACEC California believes that, given the *enormous scope of the need and capital requirements*, stakeholders across the state may want to investigate whether options such as public-private partnerships (P3s) could help solve some of the *water main challenges in the future.*”

Elsewhere, citing a need for an average of \$90 million in additional revenue to meet its obligations in each of the next five years, LADWP in the spring of 2015 began setting the stage for its first water rate increase since a 3.1 percent hike in 2009.³⁷ Staff was expected to issue a proposed rate increase in late June.³⁸

Meanwhile, San Diego raised its rates 6.5 percent annually beginning in 2007 for three years to help pay for more than \$585 million in water system improvements, including the replacement of water mains.³⁹ Similarly, the San Francisco Public Utilities

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Commission (SFPUC) on July 1, 2014 levied annual rate hikes of about 8 percent for four years to continue \$4.8 billion in infrastructure improvements that include the replacement of water mains. Those hikes followed rate increases totaling 121 percent spread over nine years beginning in 2005.⁴⁰

In some cases the increasing amount of debt to fund capital improvement projects requires utilities to spend a larger portion of revenue to pay off the loans. Ultimately, higher debt service also could require additional rate increases to maintain a city’s high credit rating, leaving little for pipe repairs and replacement. In fact, San Diego had to boost rates 7.25 percent on Jan. 1, 2014 and 7.5 percent on Jan. 1, 2015 for just that reason.⁴¹

P3 Consideration

While publicly owned utilities in California have implemented programs to address water delivery infrastructure improvements, ACEC California believes that, given the enormous scope of the need and capital requirements, stakeholders across the state may want to investigate whether options such as public-private partnerships (P3s) could help solve some of the water main challenges in the future.

In a typical P3, a public sector authority and private party enter into a contract in which the private party becomes the operator of a public asset. Agreements vary in scope, complexity and duration, but they spell out what private operators are required to invest in the asset over the life of the contract and what customers can expect.⁴²

P3s have traditionally targeted transportation, health-care, leisure and other industries, but the EPA has thrown support behind water utility P3s, particularly through WIFIA and the recently launched Water Infrastructure and Resiliency Finance Center federal program, which is focused on improving water systems through innovative financing approaches.⁴³ Under California’s Infrastructure Finance Act adopted in 1996, local government agencies may enter into P3s to fund “fee-producing infrastructure facilities,” including water supply, treatment and distribution, among other projects.⁴⁴

P3s are largely considered as an alternative financing method to tackle critical endeavors, such as the soon-to-be-completed Carlsbad Desalination Project, or when all options have failed to keep a traditionally

publicly financed operation on sound footing. Whether P3 deals are the right solution to tackle water main replacement remains a question. Nevertheless, pipe repair and replacement programs have been integral in a handful of recent water utility P3s agreements, which have been pursued by communities with decaying infrastructure and heavy debt burdens.

The early water utility P3s typically have determined rate increase schedules prior to the transfer of the utility, and the private operators now have the burden to stay within that framework while living up to its obligations. The structure could help avoid future political gridlock over rate hikes, which in extreme cases may lead to a water infrastructure “death spiral” by depressing investment in the system only to create a bigger rate shock later.⁴⁵

In 2012, Rialto in San Bernardino County entered into what is largely considered a groundbreaking P3 deal.⁴⁶ The city, which has a population of 100,000, had been in deficit spending since 2008.⁴⁷ Subsequently, the water and wastewater infrastructure suffered from longstanding deferred maintenance and foregone capital improvements, which added to repair, replacement and construction costs over time.⁴⁸

The city entered into an agreement with a joint venture between private equity firm Table Rock Capital and Union Labor Life Insurance Co. Key features of the 30-year contract included a \$42 million capital improvement program, a \$30 million upfront concession payment and an annual \$2 million contingent concession payment.⁴⁹ It also included a cumulative 115 percent rate increase over five years.⁵⁰ Rialto used some of the fees to retire some \$27.4 million in debt.⁵¹

Bayonne, N.J., a community with a population of 60,000 near New York City, also became one of the

early adopters of a water utility P3 in 2012 when it entered into a 40-year contract with United Water and private equity firm Kohlberg Kravitz & Roberts (KKR). Bayonne received \$150 million, which eliminated \$125 million in city debt, and a commitment from the private operator to provide up to \$500,000 a year in maintenance and \$107 million in capital improvements over 40 years.⁵²

Similarly, another United Water/KKR joint venture reached a P3 agreement with Middletown, Pa., in late 2014 to operate its water and wastewater system for 50 years. The joint venture provided Middletown with \$43 million upfront to help eliminate the city’s \$26 million

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debt and \$10.8 million in unfunded pension liabilities.⁵³ United Water/KKR is also financing \$83 million in infrastructure improvements to the system, which serves 9,400 people.⁵⁴

“California water utilities are trying to figure out how to squeeze efficiency out of their systems, repair or replace mains, and address maintenance on infrastructure that is close to failure,” said Leonard Gilroy, Director of Government Reform for the Reason Foundation. “P3s are certainly a viable approach to solving those problems.”

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“Although drought is devastating communities, the same resolve and ingenuity that envisioned and built engineering feats to quench that state’s thirst beginning in the early 1900s will lead California to a stronger, more secure water future.”

Conclusion

California faces its most daunting water challenge since Los Angeles established a water department in 1902 and a group of irrigation districts in 1910 founded what eventually became the Association of California Water Agencies, the largest statewide coalition of public water agencies in the country. Although drought is devastating communities, the same resolve and ingenuity that envisioned and built engineering feats to quench that state’s thirst beginning in the early 1900s will lead California to a stronger, more secure water future.

In addition to focusing on the drought, state decision makers are encouraged to seek an opportunity to implement a broader plan that bolsters California’s entire water infrastructure. Water utilities statewide recognize the challenges and are pursuing programs to replace water mains, the massive unseen and crucial network that delivers water to the tap. But the efforts too often are falling short because of the problem’s enormous scope, a lack of funding, and competing demands such as escalating debt service payments and increasing wholesale water costs. Plus, too often utilities and elected officials struggle to find the political will to raise water rates to proactively repair and replace aging pipes.

A few winters of heavy snowfall and rain in Northern California along with improving supply and storage facilities could come to naught for millions of water customers who discover their taps are dry because of local water main leaks and ruptures. Or worse – that water is cascading into their homes or businesses.

Resilient Californians in the clutches of the drought have acquiesced to water conservation, recycling and use restrictions for the better of the state. Last year they displayed overwhelming support for new ways to bolster water supplies when they approved the water

bond with nearly 67 percent of the vote. In return, the state’s citizens and businesses deserve a strategy that provides long-term stability and security through the last leg of the system.

ACEC California seeks to foster the discovery of a long-term solution that maintains California’s economic edge and judiciously harnesses its natural resources. To that end, the organization suggests that lawmakers, utilities, labor unions, the business community and ratepayers examine new ways to fund water main replacement across the state as part of a broader system-wide improvement plan. Whether P3s – or certain characteristics of P3s – could play a role in water main replacement funding could be part of that discussion.

ACEC California is a 50 plus year old, nonprofit association of private consulting engineering and land surveying firms. As a statewide organization, we are dedicated to enhancing the consulting engineering and land surveying professions, protecting the general public and promoting use of the private sector in the growth and development of our state.

Our members provide services for all phases of planning, designing and constructing projects. Member services include civil, structural, geotechnical, electrical and mechanical engineering and land surveying for all types of public works, residential, commercial and industrial projects.

The ACEC California family includes 22 local chapters covering the state, a 61-member Board of Directors (elected by the chapters), 24 Committees, 1

Academy, 5 Affiliated Organizations and a state office staff of 10.

ACEC California is the nation’s largest Member Organization in the American Council of Engineering Companies (ACEC). Membership in ACEC California means automatic membership in ACEC, and representation at the national level.
