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# ISSUE BRIEF: MOVING TOWARD TOTAL LEAD LINE REPLACEMENT IN PROVIDENCE, RI

## LESSONS FROM THREE SUCCESSFUL CITIES

## EXECUTIVE SUMMARY

Since 2007, the lead levels of water in Providence have regularly surpassed the Environmental Protection Agency (EPA) action level of 15 parts per billion (ppb). While the utility, Providence Water, has taken steps to reduce the contamination, lead levels still struggle to remain under the threshold, and close to 40,000 lead lines remain in the city as of 2020. This project sought strategies to move beyond 3 presumed areas of difficulty: (1) bifurcated lead line ownership, (2) safety of implementation, and (3) general logistics issues.

From examining the methods of three other cities via literature review and interviews, the research finds that areas of commonality include placing firm legal requirements on the party responsible for lead line replacement, allocating sufficient funding via government grants or increased water rates, providing robust assistance to low-income residents, and coordinating with private contractors to synchronously replace public and private parts of the water pipe. Numerous policy recommendations to achieve these elements are displayed in a table on pg. 11 - 12.

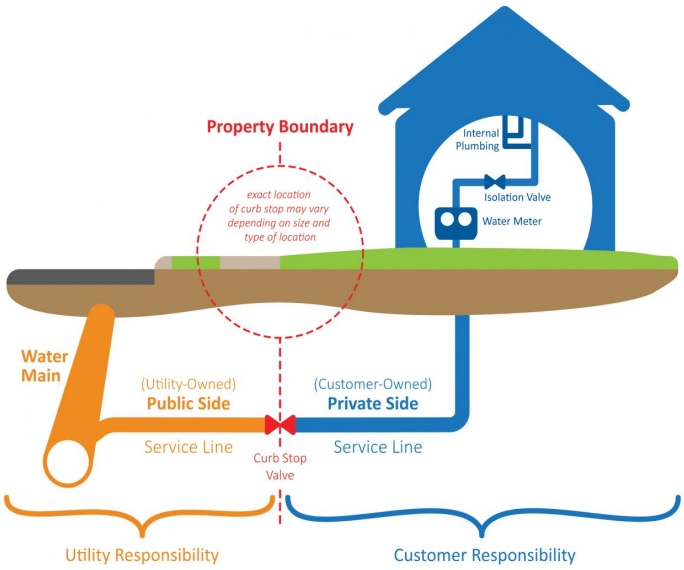
## THE ISSUE

### *The Current Situation*

Since 2007, water tests conducted biannually in Providence have found levels of lead which routinely exceed the Environmental Protection Agency (EPA) action level of 15 parts per billion.[1] As of 2018, Providence Water tests still indicate high levels of lead in drinking water in buildings and homes throughout the city. The utility has responded to these concerns by replacing the lead pipes for which it is responsible through its Water Main Rehabilitation Program (WMRP). The WMRP fixes the neediest segments of the public water lines, whether those needs are related to the existence of a lead service line, an issue with flow, or other water quality-related issues.[2] When the EPA found in 2010 that partial line replacements, meaning only the publicly owned lines are rebuilt, released more lead particles in household water supply after the repair, the RI Department of Health asked that Providence Water place a moratorium on its public lead line replacement program.[3] Partial line replacements have since resumed.

[1] "Latest Biannual Test Finds Lead in Providence Water."
[2] LePage, "20-YEAR INFRASTRUCTURE REPLACEMENT PLAN 2016-2035."
[3] Renner, "Reaction to the Solution."

A bifurcated ownership structure is the largest barrier Providence currently faces to eliminating lead piping in the city. Though the utility has a plan to tackle the public side of the line, it has limited rights and responsibilities over the private side. Water for a given street travels down a large central water main under the road surface; each house is served by a service line whose ownership is split as shown in the diagram below. Utilities are responsible for the public service line, and must maintain it, but households are responsible for the portion of the line beyond the street. Given the financial burden and the fact that there is no mandate requiring homeowners to replace their portion of the line, the majority of line replacements in Providence are partial. This perpetuates the lead problem, as replacing only the public side of line can increase lead levels in water for up to 18 months following the repair.[4]




Used with Permission/Photo Credit Greater Cincinnati Water Works

To respond to the prevalence of lead on the private side of the line, Providence Water introduced a zero-interest loan program in May of 2018. The loan program allows homeowners to pay no interest for up to 3 years on a loan of about $3,000, which covers the cost of replacing their side of the line.[5]

As of September 2018, Providence Water estimated that there are still 28,000 private-side lead service lines installed, though they do not have specific records of this.[6] According to BIP's

[4] Deshommes "Short- and Long-Term Lead Release after Partial Lead Service Line Replacements in a Metropolitan Water Distribution System."
[5] "Providence Officials Introduce Lead-Free Water Program."
[6] Brookins, "After A Year, Providence Water Customers Still Tapping Into Loan Program To Replace Lead Pipes."

discussions with Providence Water in March 2019, about 68 private lines had been replaced in Providence through the loan program, with 200 additional households throughout Providence, Cranston, Johnston, and Smithfield on the waiting list. The waiting list exists because the fund only received a $1 million grant from the RI Infrastructure bank alongside Providence Water's contribution of $250,000. As more people pay back their loans more homes can be taken off the waiting list. The utility water supply board also authorized entering into an agreement to borrow another $3 million from the Rhode Island Infrastructure Bank in January 2020. The loan program could reach more people if Providence Water continues to expand the program and increase community awareness of it.

*The Impact of Lead*

Lead is a neurotoxin that is especially harmful to children. The presence of lead in the body may hinder the first twenty years of neurodevelopment, possibly leading to seizures, comas, and death.[7] Exposure to lead while pregnant is also known to have adverse effects for infant and maternal health. [8] Researchers have quantified the social costs of childhood lead poisoning resulting from the increased need for medical care, special education, and juvenile crime prevention to be incredibly high, about $192-270 billion.[9]

The Center for Disease Control's current lead exposure guidelines acknowledge that any amount of lead exposure is unsafe, but recommend public health intervention when a child's BLL exceeds 5 micrograms of lead per deciliter of blood ($5\,\mu g/dL$), meaning they are "significantly lead poisoned."[10] According to the Rhode Island Kids Count, 10.2% of 2600 kindergarten-aged children in Providence currently have blood lead levels (BLLs) that exceed $5\ \mu g/dL$.[11] Studies of Providence kindergarteners have associated lower reading readiness with significant lead poisoning .[12]

While much of lead poisoning is linked to paint, there is evidence that lead in water plays a role. Admittedly, studies quantifying contribution of lead in water to BLLs in children are difficult to design for a variety of reasons, including difficulty in collecting reliable water lead samples and estimating water intake. Despite this, the Environmental Defense Fund used EPA data to calculate the average relative source contribution of food, water, and soil/dust from paint for infants from birth to 6 months old, toddlers 1 to 2 years old, and children from 1 to 6 years old. The results shown below in the figure from their paper reveal that water is responsible for 36% of lead exposure for infants, 12% for toddlers, and 13% for young children. Although food contributes the most to lead exposure in toddlers and young children, it is important to note the role of water in food preparation, which suggests that water's contribution may be underestimated.[13]

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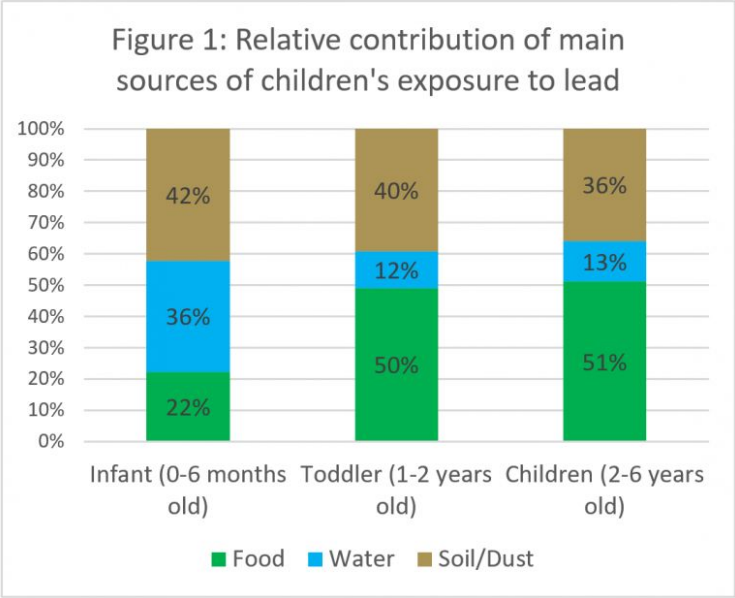
[7] "Lead Poisoning and Health."
[8] "Lead in Drinking Water and Human Blood Lead Levels in the United States."
[9] Gould, "Childhood Lead Poisoning."
[10] "Childhood Lead Poisoning."
[11] "2019 Rhode Island KIDS COUNT Factbook"
[12] Mclaine, "Elevated Blood Lead Levels and Reading Readiness at the Start of Kindergarten."
[13] Neltner, "Children's Lead Exposure: Relative Contributions of Various Sources."




Other research has also corroborated the role of drinking water in lead poisoning. In 2004, the CDC analyzed childhood blood lead screening tests from 1998-2003. While the percentage of BLLs ≥10 $\mu$g/dL and ≥5 $\mu$g/dL in Washington D.C. decreased overall, the percentage of BLLs ≥5 $\mu$g/dL in persons living in homes with lead service pipes did not decrease statistically significantly ($p = 0.34$).[14] Despite evidence that drinking water does contribute to lead poisoning, there are no Providence-specific cases known to be linked directly to lead pipes. This is not surprising, however: lead poisoning in children with BLLs 5 -9 $\mu$g/dL tends to be caused by multiple sources of lead, where no one source predominates.[15]

OUR PURPOSE

The marginal cost of fixing the private lead lines is currently low because Providence Water is making repairs on the public side. However, there is no viable solution in place to remove the private lead lines in Providence. The utility's loan program also fails to provide a solution for households in lower income brackets, for whom the financial barrier still remains insurmountably high, despite the loan. Moreover, the program provides no solution for renters, who make up 66 percent of households in Providence.[16] Since Providence Water advertises the program and its lead warning through mailers and its water bill, these materials often end up in the hands of the landlord. Renters thus do not have control over their landlord's decision to enroll in the program and suffer from lack of information. As Providence Water moves forward with the WMRP, this is the

[14] CDC, "Blood Lead Levels in Residents of Homes with Elevated Lead in Tap Water --- District of Columbia, 2004."
[15] Bernard, "Prevalence of Blood Lead Levels ≥5 Mg/DL Among US Children 1 to 5 Years of Age and Socioeconomic and Demographic Factors Associated With Blood of Lead Levels 5 to 10 Mg/DL, Third National Health and Nutrition Examination Survey, 1988–1994."
[16] "2018 Housing Factbook."

perfect opportunity for it to remove the whole line. As such, now may be a window of opportunity to address the problem.

This policy brief proceeds by explaining how three cities – Madison, Wisconsin; Pittsburgh, Pennsylvania; and North Providence, Rhode Island – similar in character to Providence, have successfully tackled barriers to complete lead line replacement. Our findings are based on interviews with city officials and secondary research, and our analysis draws parallels to Providence, where possible.

## IMPLEMENTATION MODELS & LOGISTICS

### *North Providence, RI*

In 2017, the mayor of North Providence, Charles Lombardi, began an initiative to rid his town of all of its lead service lines. The manager of the initiative, Dean Martilli, indicated one motivating factor was the cost reduction associated with coordinating with Providence Water to extend the WMRP's replacements of public lines to also cover private lines. The project required approval from a series of entities in the town's government. After funding was secured, the planning commission deconflicted the project proposal with the town's code or zoning requirements. After being approved by the planning commission, it was sent to the town council, where it was approved unanimously.

The town picks a new neighborhood block to complete each year, based on certain criteria, including income levels and prevalence of lead pipes, and then submits a specification for bidding. North Providence, however, struggles to get contractors to bid. Indeed, last year, only three contractors in the state of Rhode Island bid for the contract to replace the private lines. Martilli reported that this was because the work associated with replacing the private lines is considered "drudge-work" and is therefore not that attractive to contractors. The contractor must price every house, as the price per house ranges from $3300 to $3900 depending on the grade of the driveway.

For the contractors to complete the private-side work, the town requires eligible households to complete a right of entry contract, along with the application to enroll in the program. Around 93% of eligible households agree to move forward with the process. Martilli reports that the primary reason why households refuse to participate is because of the requirement for income disclosure; residents report concern with sharing income information with government officials. As of now, the town has successfully been able to replace 225 lines and has about 475 remaining. Because the program has an income requirement, the town does not have a completion date or plan to eradicate all the private lead pipes through its program, as will be discussed more thoroughly in the financing section.

### *Madison, WI*

In 2001, Madison began a campaign to replace its lead lines after a local chemical engineertested the water. She found that the chemical recommended to keep lead from leaching into the water, phosphate, actually increased the lead content of the water fourfold. Once a plan to remove the lead lines was created, utility crews replaced the utility's side of the lines, while private plumbers were hired by homeowners to replace private lines. When possible, the two sides worked together to ensure that both the private and public side of one line were replaced at the same time. However, Madison replaced their private lines before the EPA found, in 2010, that partial replacement could lead to increased lead particles in household water supply during the time of the repair.[17] Therefore, the city did not require the utility to coordinate with the private plumbers. According to conversations with the water utility, this meant, more often than not, the private side was replaced at owners' discretion in an uncoordinated manner.

Prior to implementation of the program, Madison's city council passed an ordinance mandating that property owners replace their side of the lead line within six months. They would face a penalty of up to $1000 per day that they were not in compliance.[18] The utility compensated households for half the cost of replacement, up to $1000. Their average reimbursement was $670. Thanks to this approach, the city estimates that it has almost 100% of known lead lines replaced.

*Pittsburgh, PA*

Similar to Flint, Michigan, lead in water became a pressing issue in 2014 when Pittsburgh Water and Sewer Authority (PWSA) changed its anti-corrosion chemical. This caused increased lead corrosion in pipes, resulting in lead levels twice the amount of the legal limit of 15ppb. In 2017, PWSA began replacing its side of the lead lines. Because the law barred PWSA from replacing private lines, the agency replaced only public lines and worked with Pittsburgh's urban development authority to provide a $500,000 low-interest (3%) loan program (up to $10,000) for low-income residents (below 120% of area median income) to help replace private lines.[19] Since partial line replacement increases lead exposure, PWSA ceased partial replacements June 2017.[20] During this moratorium, the utility made the decision to seek public funding to ensure all private lines in Pittsburgh could be replaced.

Ultimately, the water utility took a number of steps to ensure when line replacement began again, they could replace both sides of the service line, both public and private. They developed an advisory group of engineering, public health, and policy experts, called the Community Lead Response Advisory Committee, to advise the project. The utility is set to replace 2800 private service lines in 2019. Their methodology for replacement is guided by a few factors, which allow them to prioritize more at-risk neighborhoods for earlier private-side replacement. The public health factors are (not in order of importance): presence of children or pregnant women in the

[17] Renner, "Reaction to the Solution."
[18] "Information for Utilities on Lead Service Replacement | Water Utility, City of Madison, Wisconsin."
[19] Caruso, "Can Families, Low-Income Households Afford to Get Lead out of Their Water?"
[20] Shoemaker, "Pittsburgh Is Close to Having a Solution for the Lead Crisis. But Questions Remain."

household, actual lead pipe presence, household income levels, and blood lead levels of family members, where data is available.

Beyond this system for replacement of private lines that Pittsburgh will be implementing in the coming years, the utility also has a program for low-income households, called the Dollar Energy Fund, which allows a maximum of 200 low income households to have their private side and the connected public line replaced at no additional cost. PWSA also has a retroactive reimbursement program: homeowners who replaced their private lines between February 1, 2016, and December 31, 2018, can be reimbursed up to $5500, which covers the average cost of the repair.[21]

FINANCING

*North Providence, RI*

In early 2017, Mayor Charles Lombardi and his team worked to apply for federal funding from Housing and Urban Development (HUD) through the Community Development Block Grant (CDBG) to replace the private lead lines in the town. All CDBG-eligible projects must comply with one of three national objectives: benefit low and moderate-income persons; address community development needs having a particular urgency because existing conditions pose a serious and immediate threat to the health or welfare of the community; or prevention or elimination of slums or blight.[22] Since the town filed for the CDBG under the HUD objective of providing a suitable living environment for low and moderate-income households, potential applicants are required to provide income information and payslips for everyone living in the household, and the program can only occur in qualified low-income neighborhoods. The town is currently hoping to re-apply for the block grant under the HUD objective of urgent need, in this case, immediate health threats. If they are able to successfully do this, they will be able to replace all of the town's private lines with the federal dollars. Each year, the town now receives federal grant funds for this purpose, ranging from $270,000 to $350,000, and Providence Water matches the funds at a similar rate.[23] Each private line replacement costs the city about $3,500, though it varies depending on the property.

*Madison, WI*

The Public Service Commission (PSC) of Wisconsin initially blocked the use of increased customer rates to fund the replacement of private lead service lines. The PSC approves rates for municipal and private utilities, unlike state commissions that regulate utilities operated by private companies.[24] The Utility was therefore forced to find an alternate source of revenue. There were two primary sources of funding: first, the city council approved placing half the cost of customer lead service lines on sewer rates, which were not regulated by the PSC. The City justified this cost by demonstrating substantial savings that resulted from replacing lead pipes and avoiding the cost

[21] "PWSA Approves Reimbursement Program for Private Lead Line Replacements."
[22] "CDBG Entitlement Program Eligibility Requirements - HUD Exchange."
[23] Shorey, "Town Again Picking up Tab on Lead Pipe Replacements."
[24] Neltner, "Wisconsin on the Verge of Taking an Important Step to Replacing Its Lead Pipes."

of removing phosphate additives at wastewater treatment plants.[25] The second source was revenue generated by renting space on top of water towers to cell phone companies for their antennas.[26]

*Pittsburgh, PA*

The utility's board agreed to a rate increase to finance repairs associated with the private side of the line. Additionally, in 2018, PWSA received $50 million from PENNVEST, a <bank/fund/slush pool> which funds water reform projects throughout Pennsylvania. The money constituted "a $35.4 million loan at 1 percent interest over 30 years and a grant totaling $13.7 million," which the utility stated would help offset rate increases.[27] In the end, the rates increased by 13.7%. In order to use public money for private repairs, the state legislature passed a law to clarify what types of public dollars could be used for private projects like water line replacement.[28]

Moreover, the utility is currently funding a separate program specifically focused on low-income households via a unique financing source. When the utility placed a moratorium on lead line replacement in 2017, it violated a state law that mandated that a certain percentage of lead lines be replaced each year. The utility made a deal with the state to reallocate the financial penalty they faced for this to the low-income private line replacement program.

COMMUNITY ENGAGEMENT

*North Providence, RI*

After choosing the neighborhood to focus on that year, the town sends mailers to each household, explaining what the program does and how it works. They also host a town hall each year in the spring to discuss the program with households. Usually around 70-90 people from the community attend, and a representative from Providence Water is there to speak with them, along with representatives from the town who run the program.

After sending mailers and hosting town halls, the city also formally sends the application to each qualifying household. Both tenants and landlords are required to complete the official application, the conflict of interest form, and the current occupant (tenant or homeowner) is required to complete a right of entry form.

After the applications are sent out, Martilli works with households who refuse to complete the form, fill it out incorrectly, or have questions about the form itself. He also reaches out to households directly when they refuse to sign up for the program. Martilli reported that about 80% of applications turned in are incomplete because residents did not complete one or both of the income requirements of the form: reporting income and attaching relevant payslips.

*Madison, WI*

[25] Cantor, "Lead and Copper Rule Compliance Sampling."
[26] City of Madison, "EPA Seeks details of Madison's lead service replacement program."
[27] "State Awards PWSA Nearly $50 Million for Replacement of Lead Water Lines."
[28] Shoemaker, "Pittsburgh Is Close to Having a Solution for the Lead Crisis. But Questions Remain."

The community council's new mandate requiring homeowners to replace their lead pipes within six months was met with criticism, according to the city. People also protested the use of public dollars for private line replacement, and did not believe the public health risk of lead was significant enough to warrant this initiative. According to Madison Water Utility, residents who did not comply were taken to court and fined. The city sent mailers instructing residents on how to perform scratch tests to check for lead, and they also provided residents with information about the reimbursement program. The vast majority of households complied, and the city deemed the houses of those who did not as uninhabitable.

*Pittsburgh, PA*

PWSA contacts households in neighborhoods chosen for pipe replacement via phone and flyers. The utility has a division called The Lead Help Desk, which "manages customer communication and outreach related to lead," and "has collected over 5,000 signed agreements from property owners in the 2019 replacement program work zones."[29] According to program manager Dan Duffy, after door hangers are placed and voicemails are left, the utility attempts to follow-up with unresponsive households. Duffy indicated that the utility was surprised by the number of people who were unwilling to complete the online waiver that would allow them to have their line replaced for free. He indicated that this generally seemed to occur more often in low income neighborhoods.

DISCUSSION

While Providence has some initiatives in place to tackle lead in water, it has much further to go to achieve total lead line replacement. Providence can learn from the experiences of these cities, which utilized distinctly different approaches to tackle the same problem. The city continues to replace lead pipes on the public side of the service line each year, and it would be more cost effective, logistically easier, and healthier for community members if the city took the opportunity to do full, rather than partial line replacements. While there are a variety of financing sources the utility could capitalize on to ensure the full cost of private-side replacement is not placed on the household, any reimbursement plan must be sensitive to issues of equity and efficacy.

Madison's approach was as effective as it was because the city instituted an enforcement mechanism. By only funding a portion of the replacement and giving citizens only six months to replace their lines, however, it was likely not the most equitable approach. Lower income families likely faced greater hardship in complying with the mandate. In contrast, the PWSA's program covers the costs of private-side replacement for all households, indiscriminate of income level. However, the utility noted that a surprising number of people were unwilling to allow the utility to replace their line, despite it being free of cost and arranged by the utility. Though the reason is unclear, perhaps it is because they did not want to go through the hassle of having contractors on their property doing the repair or understand the gravity of lead in water. Given this, Providence should consider how to implement a program that would maximize the number of people who replace their lines. Moreover, Providence Water needs to carefully consider how it will engage the

[29] "2019 Lead Service Line Replacement Program Reaches Early Milestones."

community and make them aware of the program and its complexities as it moves forward. Perhaps the utility could look to PWSA, which has been highly transparent with the community about its methodology for public-side replacement and about how its private-side program works.

Moreover, there are logistical and financial costs and benefits to various reimbursement models. Providence can learn from the experiences of other cities, as well as do further research to ascertain which model would work best for Providence. Once the city assesses where the private lead lines are located, it will be better able to determine what kind of financial assistance would maximize benefit. For example, if private lead lines are primarily located in low income neighborhoods, a 50% reimbursement approach like Madison's may not be the most effective, and North Providence's block grant approach may be more so.

Locating where the private lead lines are will be a key first step in developing an effective plan. Madison, WI faced a similar issue prior to the implementation of their program, but the utility sent out a mandatory survey, asking residents what material was used for their service lines. The city held community meetings where people could learn how to locate their lines, and how to check for lead using a scratch test.[30] These surveys, along with detailed documentation of lead line inspection, have resulted in a more comprehensive record of service line composition. The city of Pittsburgh and PWSA are also continuing to identify the location of lead pipes using the "curb box inspection technique," which allows utility crews to inspect and document the material in the pipes using cameras.[31]

Finally, Providence could benefit from North Providence's experiences, even if the city chooses a different method of implementation, given that North Providence and Providence share the same water utility. Moving forward, the city could benefit greatly from discussions with other water utilities and an effort to collect more data on where private lead lines remain. Taking these initial steps will break down some barriers to a path forward.

## POSSIBLE POLICY SOLUTIONS

The following list of possible solutions has been compiled based on the experiences and actions taken by the water utilities and cities that we researched for this report. As was the case in other cities, the most effective solution will likely require a multi-pronged approach involving multiple actors. This will ensure that the city has a plan that is both cost-feasible and effective for whole line replacements.

Some of these solutions put greater onus on the homeowner (financially, logistically, or both), while others put the onus on the water utility. As has been the case in the other cities detailed in this report, the best path forward will likely be one that allows the state and/or city to work in partnership with the water utility toward a solution.

### *Legal Measures*

[30] "Information for Utilities on Lead Service Replacement | Water Utility, City of Madison, Wisconsin."
[31] "PWSA Kicks Off 2018 Curb Box Inspection Program to Find Lead Water Service Lines."

| *Action* | *Actor* | *Pros* | *Cons* |
|---|---|---|---|
| Amend seller disclosure requirements to require that homeowners disclose lead pipes[32] | Rhode Island Real Estate Commission[33] or the State | Promotes community health through increased awareness of lead risk.<br>Is already implemented for paint. | Will require increased regulation of real estate transactions. |
| Pass an ordinance mandating that lead pipes are replaced by the homeowner within a window of time | City Council | Prevents the risks of partial lead line replacement.<br>Distributes the costs among those who receive benefits. | Places financial and logistical strain on homeowners |
| Create a piece of legislation clarifying that public dollars can be used for private repair (if necessary) | State | Acts as a prerequisite to securing financial support for lead pipe replacement | Can put pressure on budget |
| Pass a law which would 1) require a certain percentage of lead to be removed by the utility each year; and 2) ban partial replacements | State | Ensures gradual reduction in lead pipes | Discourages deliberation among stakeholders and greatly restricts flexibility of implementation |

*Financing*

| *Action* | *Actor* | *Pros* | *Cons* |
|---|---|---|---|
| Apply for CDBG funding under either the objective to meet "an urgent need" or to "benefit low and moderate-income | The City of Providence | Offset expenditures of pipe replacement, can help to balance budget, prioritizes lower income families without the resources | Does not facilitate 100% lead line replacement |

[32] "Grading the Nation: State disclosure policies for lead pipes."
[33] According to the State of Rhode Island General Laws, "The Rhode Island real estate commission has the right to amend the seller disclosure requirements by adding or deleting requirements when there is a determination that health, safety, or legal needs require a change." R.I.G.L. § 5-20.8-2.

| | | | |
|---|---|---|---|
| persons" | | to take on a loan | |
| Raise rates and/or apply for funding from the RI Infrastructure Bank | Providence Water | Offset expenditures of pipe replacement, can help to balance budget | |
| Sell or rent out an asset | Providence Water | Offset expenditures of pipe replacement, can help to balance budget | Requires Providence Water to take on financial risk due to investment in pipe replacement |
| Create a statute that imposes a non-consensual lien on a person's house for the cost of the replacement | City Council | | |

## CONCLUSION

With over 11,000 public service lines remaining, Providence Water has been working more aggressively in recent years to eliminate its side of the city's lead lines. Nevertheless, without a massive change in public awareness, public policy, and funding, the city will not be able to make significant strides in chipping away at the 28,000 private lead lines remaining. The most substantial effort—from the utility, city, or state—to put a dent in this figure comes from the utility's zero percent loan, which only 1% of all homeowners with lead had signed up for by August 2019.[34]

Clearly a substantial disruption to this status quo is needed. By evaluating the lead line removal processes of other model cities, this brief intends to begin a conversation to help Providence sharply pivot away from the path it is on.

[34] Gavigan, Parker. "Providence targeting high lead levels in public water."

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