Whose Lead Water Pipes are Being Fully Replaced in Washington, DC?

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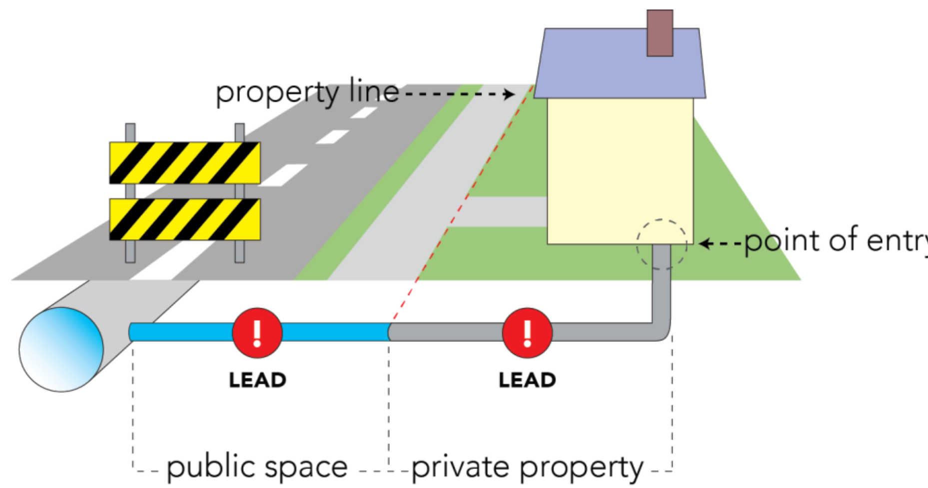
DC's Lead Replacement Programs 2009-2019

- **Water Main Replacement (CIP Projects)**

  DC Water replaced public side; offered homeowner set price for private side

  $500 + $100/ft



- **Voluntary Replacement Program**

  -both portions are lead and no work is planned,

  -DC Water replaces public portion; homeowner is responsible for costs on private property

  -Also covered emergency repairs

  -Costs averaged $600 + $125/ft

Customer Notifications for Water Main Replacement Projects

#1) 2-3 months before construction -blue booklet

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IMPORTANT CONSTRUCTION INFORMATION FOR RESIDENTS

DC Water is Improving Water Infrastructure in Your Neighborhood

DCWATER.COM DISTRICT OF COLUMBIA WATER AND SEWER AUTHORITY
George S. Hawkins, General Manager

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During upcoming infrastructure improvements on your block, DC Water will replace your water service pipe in public space. Please read this important information about what you should expect before, during and after construction.

For more information, contact:

DC Water Customer Service: 202-354-3600

24-Hour Command Center: 202-612-3400

Si usted necesita la versión en Español de este panfleto por favor llamar al 202-354-3600.

DC Water also provides translation assistance with 150 languages.

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IMPORTANT INFORMATION

Understanding your property line and water service pipe
Public space includes the street, sidewalk and very often what homeowners consider their front yard. DC Water locates property lines using information publicly available through the D.C. Department of Consumer and Regulatory Affairs' Office of the Surveyor.

Installing a thermal expansion device
Homeowners must ensure a thermal expansion device is installed on the household plumbing system, after DC Water replaces your water service pipe.
• see page 4

Lead pipe replacement
During construction, DC Water will replace water service pipes in public space, including lead service pipes. After a lead pipe replacement, a temporary increase in lead will likely occur in household tap water.
• see page 6

DCWATER.COM 1

#1b) DC Water mails packet with cost and contract agreement

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LEAD CAN BE A SIGNIFICANT RISK TO YOUR HEALTH, ESPECIALLY FOR PREGNANT WOMEN AND CHILDREN UNDER AGE SIX.

During upcoming infrastructure improvements on your block, DC Water will replace your water service pipe in public space. The water service pipe is owned by the property owner. However, during construction projects, DC Water is authorized to repair, maintain or renew the portion of the service pipe in public space. The portion of the service pipe on private property is the exclusive responsibility of the property owner.

The material of water service pipes can vary from home to home in the District and some households still have lead service pipes. When DC Water replaces water service pipes during a construction project, any existing lead service pipes in public space will be replaced. Households with lead service pipes are strongly encouraged to take advantage of this opportunity to replace the portion of the lead pipe on private property. Replacement of lead pipe on both public and private property is the most effective way to reduce lead levels in drinking water.

If we confirm you have a lead service pipe during construction:

- DC Water will replace your lead service pipe in public space at no cost to you.
- With your agreement, DC Water will replace the portion of the lead service pipe on private property with copper service pipe.
- Replacing your service pipe on private property is the homeowner's financial responsibility. However, DC Water can coordinate and complete the replacement process for you.

additional questions?

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24-Hour Command Center: **202-612-3400**

lead@dcwater.com

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#3) 2 weeks prior to construction

Concerns about partial replacement of LSLs point to …

A new indicator of environmental (in)justice and health (in)equity

Ratio of full to partial LSLRs

New hypotheses to be tested

- Under cost-sharing arrangements, lower-income households are more likely to experience partial LSLRs compared to higher-income households.
- In cities like DC with high levels of racial and income segregation, spatial patterns of partial vs. full replacements will be evident.

Study Design - Steps

1. Obtain data on 3428 LSLRs and aggregate to census tract and ward levels for DC, 2009-18.

2. Calculate % of replacements that were full replacements for each census tract and ward, by LSLR type.

3. Obtain selected demographic data for each census tract and ward from American Community Survey 5-year estimates.

4. Correlate demographics with full replacement rates by type.

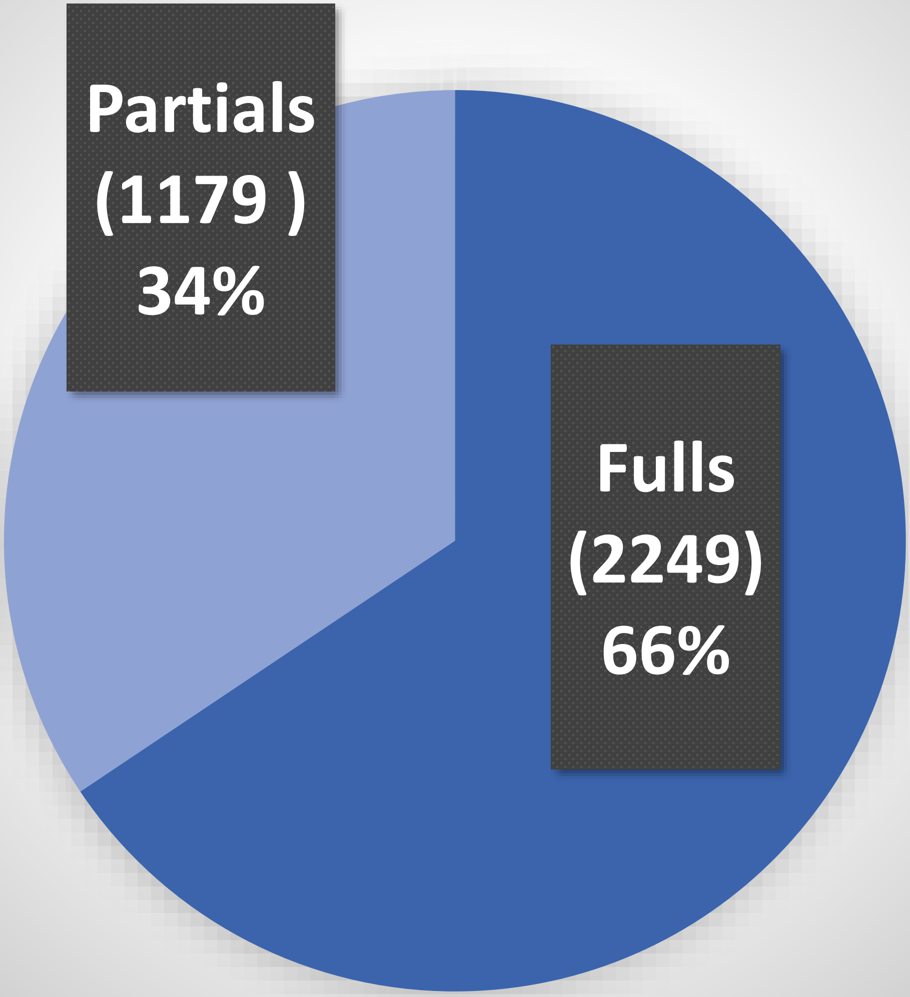
DC offered 3 types of full replacement during our study period

1. **Utility initiated**: Capital improvement projects
   - Utility pays for public side and offers to arrange full LSLR
   - Customer agrees & pays for private side

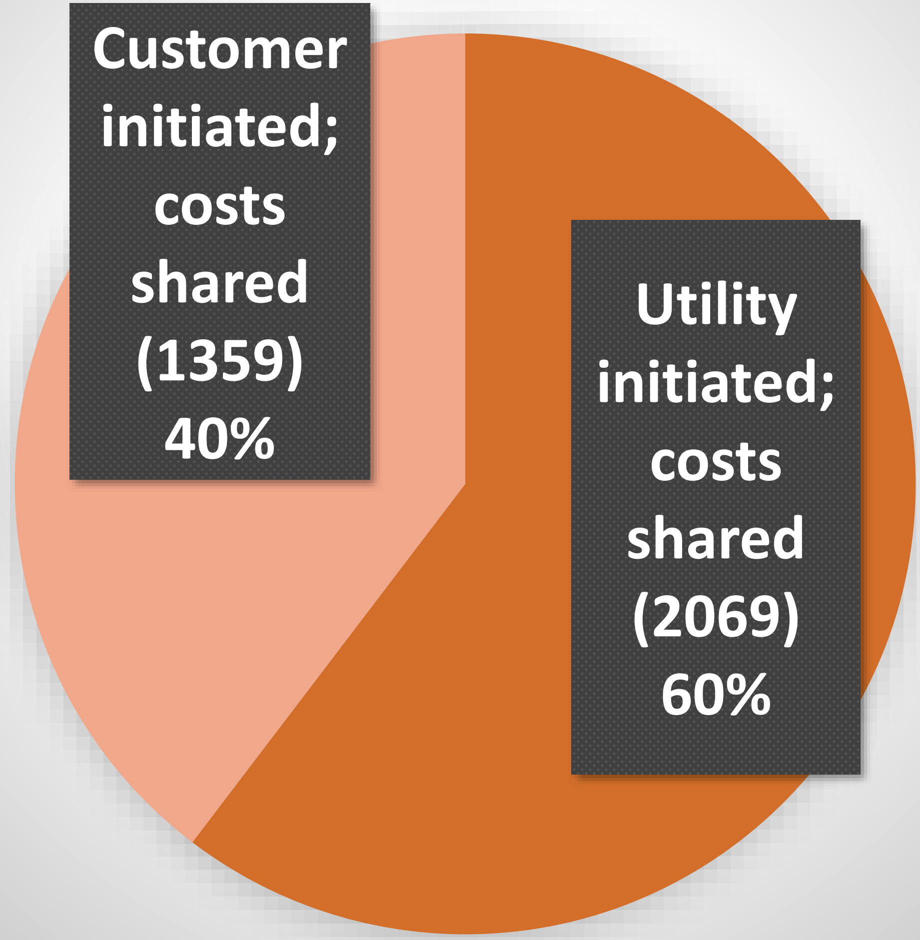
2. **Utility initiated**: Emergency repairs
   - Utility pays for public side and offers to arrange full LSLR
   - Customer agrees & pays for private side

3. **Customer initiated**: Known as “voluntary”
   - Utility pays for public side and arranges work
   - Customer pays for private side

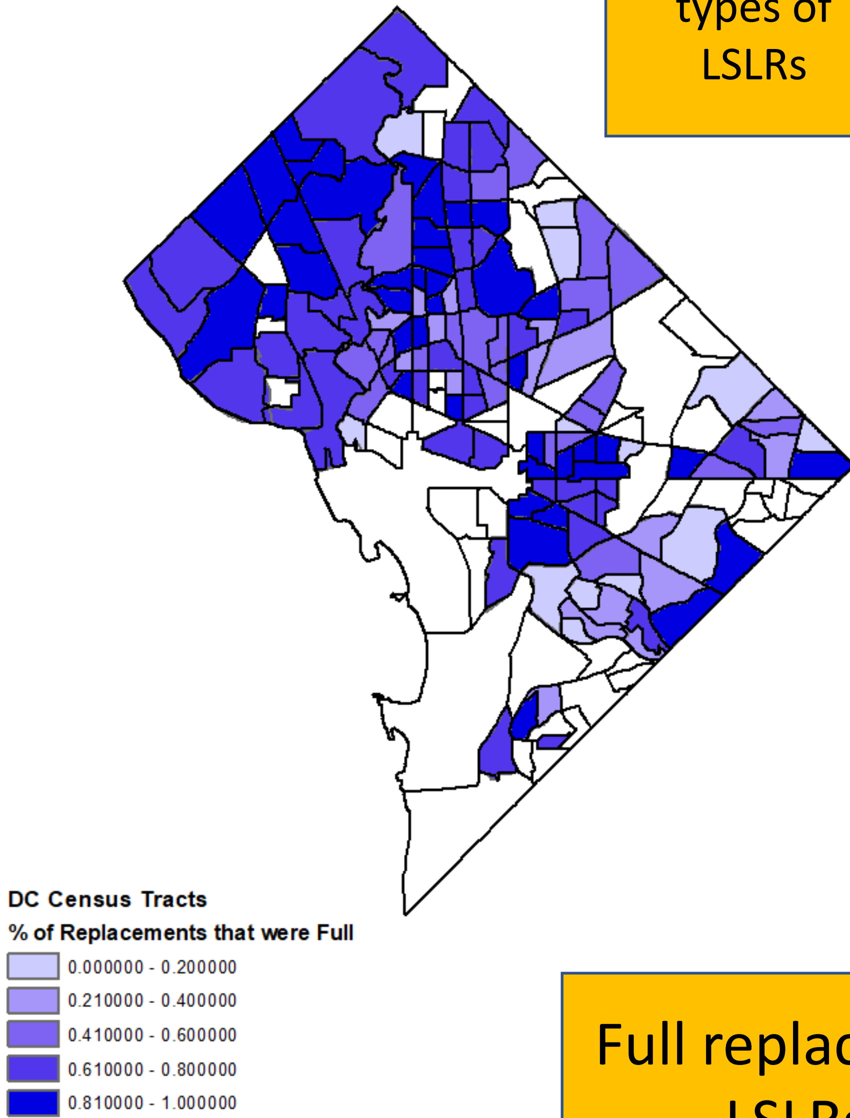
Full or partial?



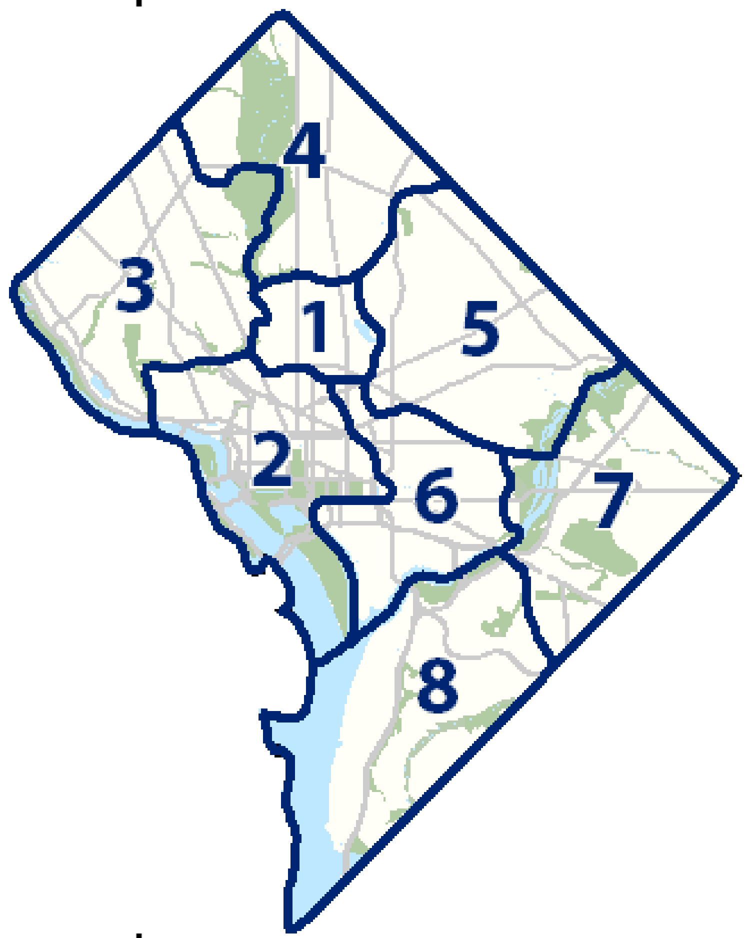
Who initiated? Who paid?



All 3428 DC LSLRs 2009-18



This map includes all 3 types of LSLRs



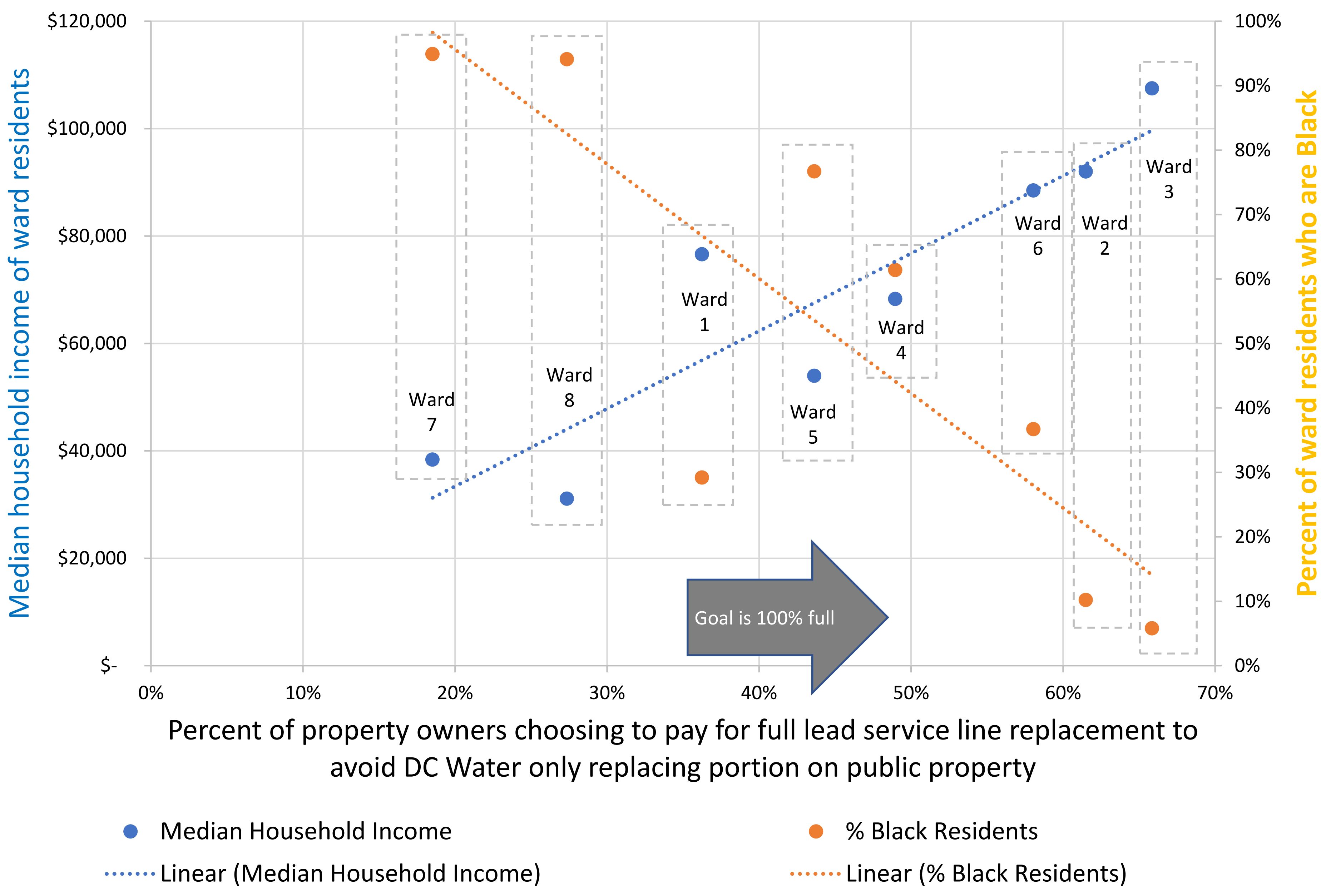
Full replacement rates (fulls as percent of total LSLRs) vary by census tract and ward

Our key findings

Under cost-sharing arrangements …

- Demographic characteristics help explain rates of full LSLR.
- Spatial disparities are evident.

Rate of full replacements is higher in DC wards with higher median household income and smaller percent Black population, 2009-18, CIPs only



Are those relationships statistically significant?

YES

Ward	A. Rate of full LSLRs (utility initiated, non- emergency)	B. % African-American	C. Median Household Income in $
7	18.5	95.5	38,681
8	27.4	92.9	31,391
1	36.2	31.4	78,885
5	43.6	71.6	55,425
4	49.0	56.9	70,198
6	58.1	37.1	90,526
2	61.5	10.1	93,689
3	65.9	7.9	109,367
Column A correlated with … (R)*	* -0.71 < R > 0.71 is statistically significant at 0.05 level (6 degrees of freedom)	-0.86	0.90

We also found significant bivariate correlations at census tract level (using simple regression, too – not shown)

Census tracts' rates of full LSLRs correlated with …	R Values	
	Utility initiated; non-emergency*	All types of LSLRs**
% African American	-0.306	-0.390
% with Bachelor's degree or higher	0.278	0.387
Household median income	0.246	0.311

*-0.205 < R > 0.205 is statistically significant at 0.05 level (90 degrees of freedom)
**-0.195 < R > 0.195 is statistically significant at 0.05 level (100+ degrees of freedom)

Race is significant when full LSLR rate is regressed on race, income, and education

Regression Statistics			For utility-initiated, non-emergency LSLRs				
Multiple R	0.5084						
R Square	0.2585			*F*	*Significance F*		
Adjusted R Square	0.2346			10.8062	0.0000		
Standard Error	0.2279						
Observations	97.0000						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	0.6969	0.1710	4.0758	0.0001	0.3574	1.0364
% Black	-0.0035	0.0014	-2.4185	0.0175	-0.0063	-0.0006
HH Median Income ($)	0.0000	0.0000	1.4681	0.1454	0.0000	0.0000
% Bachelors or higher	-0.0012	0.0015	-0.8052	0.4227	-0.0043	0.0018

To address multicollinearity, we used a measure of deprivation at the census tract level.
ADI (Area Deprivation Index) combines 17 variables:

- % of population aged >= 25 years with < 9 years of education
- % of population aged >= 25 years with < a high school diploma
- % of employed persons >=16 years of age in white-collar occupations
- Median family income
- Income disparity*
- Median home value
- Median gross rent
- Median monthly mortgage
- % owner-occupied housing units (home ownership rate)
- Unemployment rate
- % of families below the poverty level
- % of population below 150% of the poverty threshold
- % of single-parent households with children < 18 years of age
- % of households without a motor vehicle
- % of households without a telephone
- % of occupied housing units without complete plumbing
- % of households with more than one person per room (crowding)

Higher dep index = more deprived

*log of 100 x ratio of # of households with <$10,000 income to # of households with $50,000 or more in income

Correlation of deprivation index with full LSLR rate is statistically significant

Rate of full LSLRs correlated with …	R Values	
	Utility initiated; non-emergency*	All types of LSLRs**
National ADI rank (1-100)	-0.280	-0.324
"State" ADI rank (1-10)	-0.310	-0.387

*-0.205 < R > 0.205 is statistically significant at 0.05 level (90 degrees of freedom)
**-0.195 < R > 0.195 is statistically significant at 0.05 level (100+ degrees of freedom)

Dep index is significant when full LSLR rate is regressed on national or state ADI rank

Regression Statistics			Utility-initiated, non-emergency LSLRs			
Multiple R	0.5107					
R Square	0.2608					
Adjusted R Square	0.2529		These are state rank results only.			
Standard Error	0.2231					
Observations	96.0000					
ANOVA						
	df	SS	MS	F	Significance F	
Regression	1.0000	1.6502	1.6502	33.1595	0.0000	
Residual	94.0000	4.6779	0.0498			
Total	95.0000	6.3281				
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	0.8504	0.0538	15.8156	0.0000	0.7437	0.9572
ADI State Rank	-0.0541	0.0094	-5.7584	0.0000	-0.0727	-0.0354

Conclusions and discussion

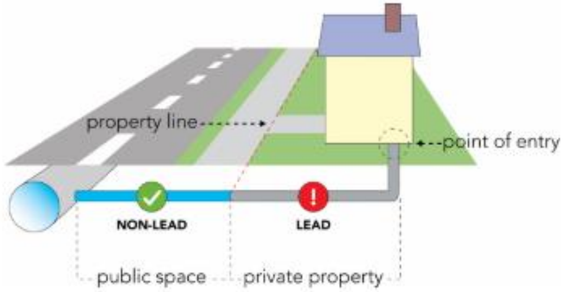
- It is important to understand the impacts of cost sharing on access to full LSLRs, especially in cities that are still conducting partial replacements.
- Our results suggest that uneven access to full LSLRs exacerbates patterns of disadvantage associated not only with income, but also race, education, and an array of deprivation indicators linked to poor health outcomes.
- Recent policy changes in Washington, DC are expected to solve the local problem of partial replacements (as Maureen will explain). Washington offers a model for other cities.

We would like to thank the Robert Wood Johnson Foundation for their generous support of this research.

DC's Current Lead Programs

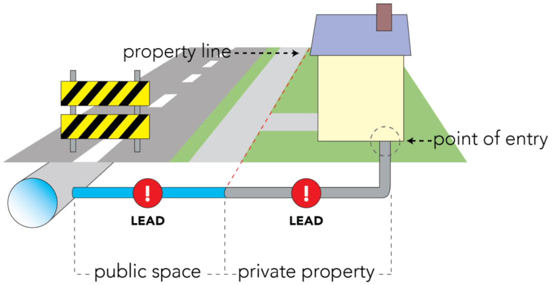
- ***NEW* Program 1 - Assistance Program to Redress Past Partials**

  If non-lead on public-side and lead on private-side, a new program will cover 50-100% of costs of replacement based on area median income



- ***NEW* Program 2 - CIP & Emergency Repairs**

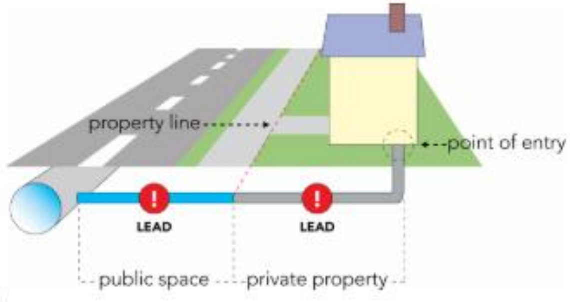
  If any portion of private-side is lead, replacement is free.



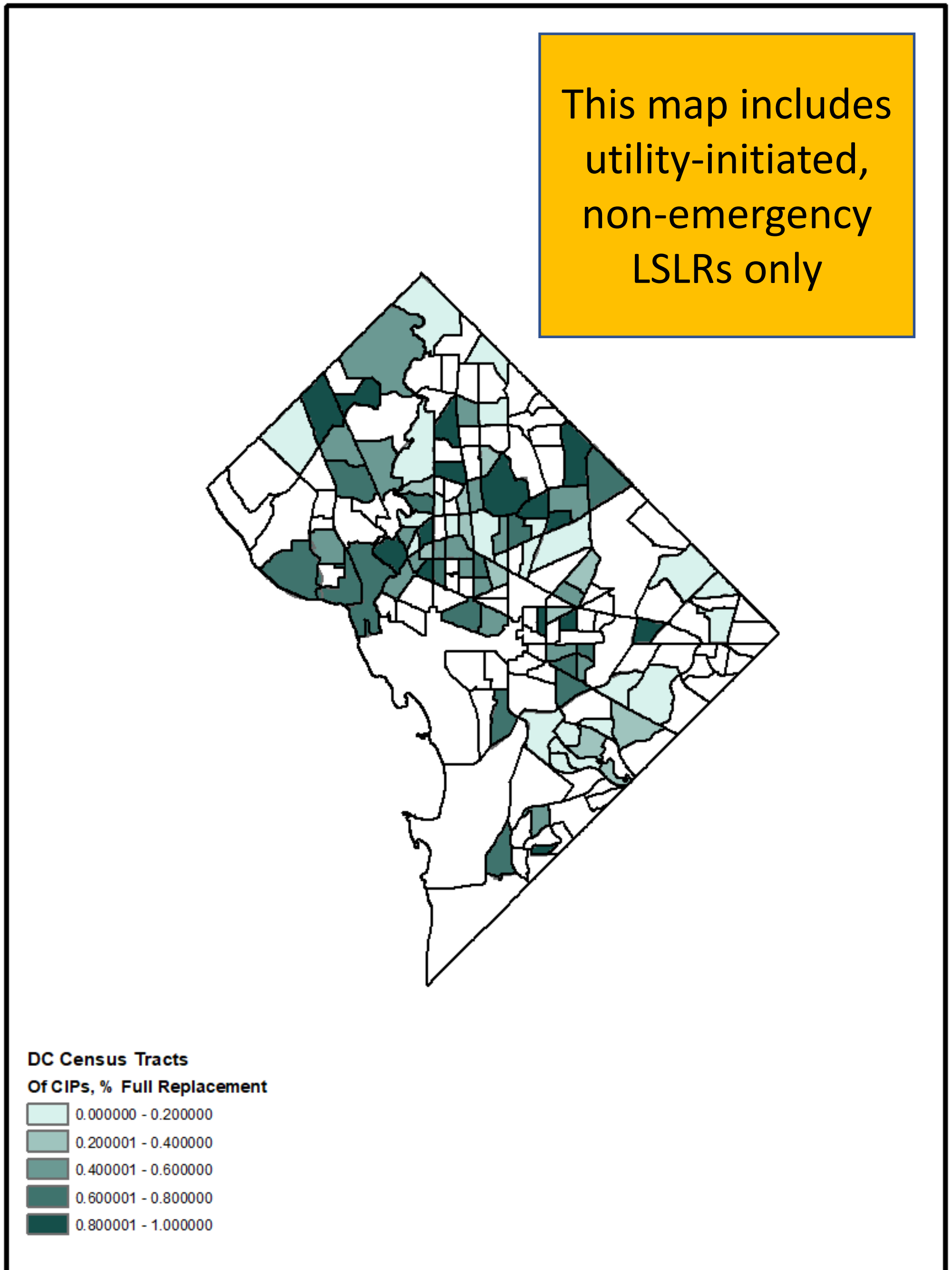
- **Program 3 - Voluntary Replacement Program**

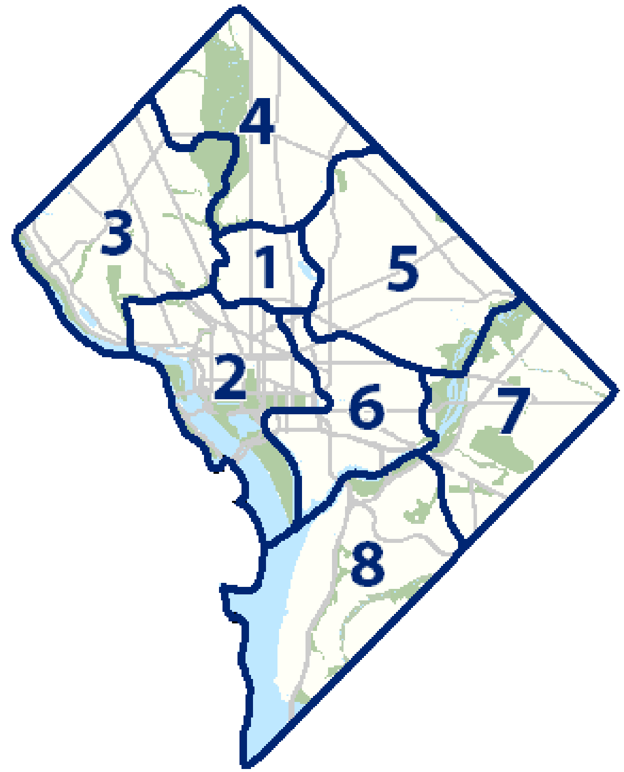
  If both portions are lead and no work is planned, the customer is responsible for costs on private property

  ***Costs now average $1,000 + $150/ft**



Extra Slides


This map includes utility-initiated, non-emergency LSLRs only
DC Census Tracts
Of CIPs, % Full Replacement
0.000000 - 0.200000
0.200001 - 0.400000
0.400001 - 0.600000
0.600001 - 0.800000
0.800001 - 1.000000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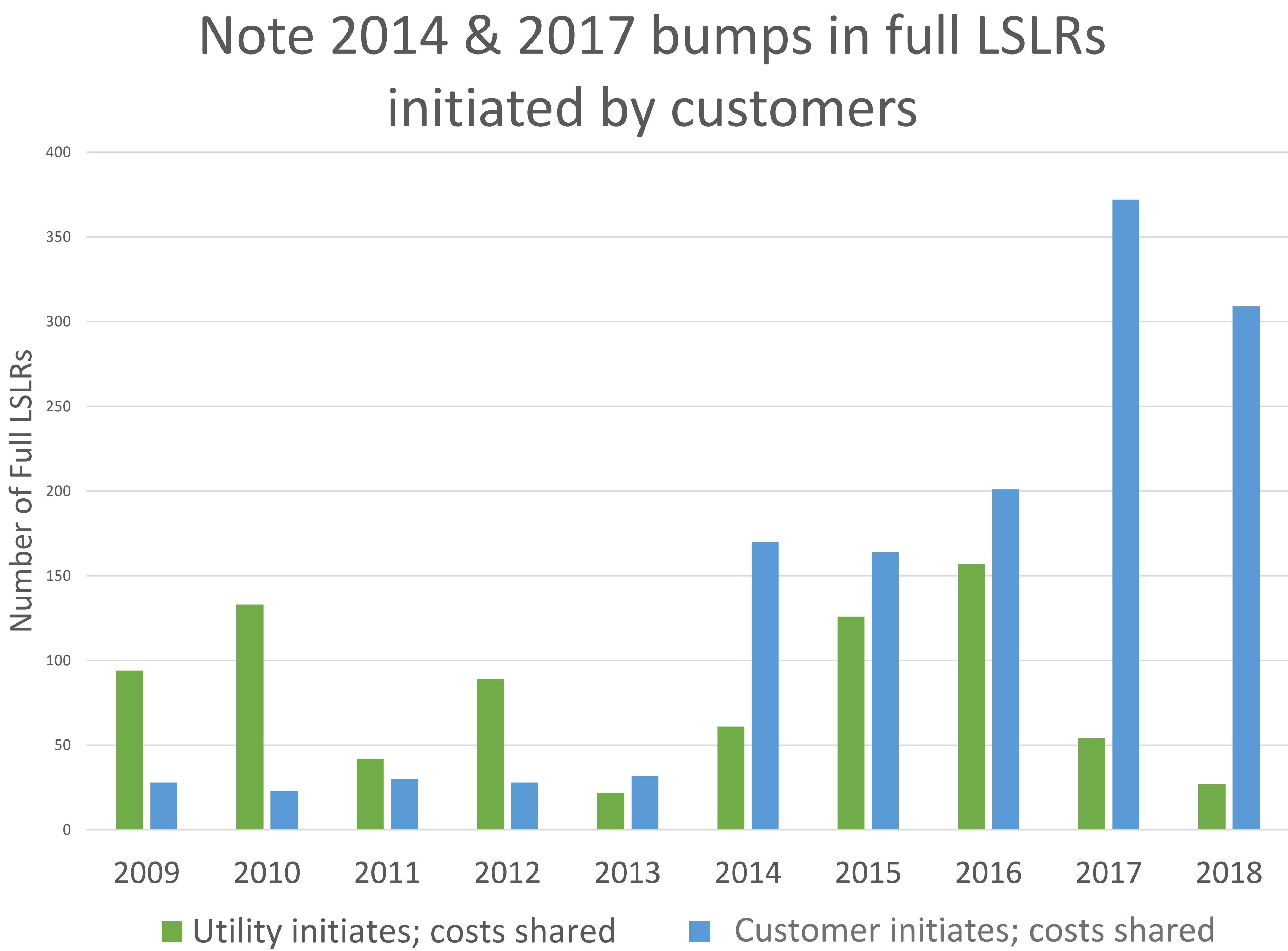
Note 2014 & 2017 bumps in full LSLRs initiated by customers
Number of Full LSLRs
0
50
100
150
200
250
300
350
400
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
Utility initiates; costs shared
Customer initiates; costs shared

Full replacements vary by ward