



To: Council of the District of Columbia

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Date: December 7, 2021

Re: Best Practices in Housing, Transportation, and Infrastructure to Inform an Equitable COVID-19 Recovery

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Introduction

The COVID-19 pandemic has laid bare the inequities that plague our cities. People of color and families earning low wages faced disproportionately high odds of contracting the virus.¹ In the District of Columbia, Black people were **much more likely to contract COVID-19** than people of other races or ethnicities.² These groups then bore the brunt of the ensuing economic shock, including facing a higher likelihood of being laid off, not being able to pay their rent, and having trouble affording the rising costs of transportation due to increasing gas prices.³

As the United States recovers from the pandemic, cities such as Washington, DC, have the opportunity to restructure their institutions and public programs to ensure that the changes that ensue produce positive outcomes shared by all. In so doing, they can help address and remediate **past inequities**.⁴ This type of **inclusive recovery** can expand opportunities for people with low incomes and people of color and ensure better access to jobs, schools, recreation, and other needs in the coming decades.⁵

As exceptional levels of federal funds flow to DC to spur recovery from the pandemic, city leaders have an opportunity to invest in community equity goals at an unprecedented scale. The Coronavirus Aid, Relief, and Economic Security (CARES) Act in March 2020, the Coronavirus Response and Relief Supplemental Appropriations Act in December 2020, and the American Rescue Plan Act in March 2021 provided flexible and targeted aid recovery funds to state and local governments. Those funds amount to an unprecedented infusion into state and local governments that eclipse the \$280 billion that was directed to state and local governments after the Great Recession. More funds are expected from the federal **infrastructure package**⁶—which, among other investments, includes \$3 billion in roads and transit funds **for DC**⁷—and the **potential reconciliation bill**⁸ currently being negotiated in the US Congress. How those funds are invested can rectify or reinforce centuries-old patterns of inequity. To promote a truly inclusive recovery and identify where those funds will be best spent, it is necessary to lift the voices of those who have been most harmed by historic patterns of inequity and exclusion—as well as by the recent crisis.

A **recovery** that fails to close disparities would have negative impacts not only on the most vulnerable people in our communities but also on the economy overall.⁹ Persistent disparities **cause significant aggregate economic losses**—measured in trillions of dollars and several tenths of a percentage point in GDP growth.¹⁰ When job seekers cannot afford to live where employment is located or efficiently access that employment by public transit, cities experience higher **unemployment rates**,¹¹ **longer spells of joblessness**,¹² and **higher turnover and lower profits for businesses struggling to find low-wage workers**.¹³

In this memo, we focus on three areas of particular importance to a sustainable, equitable recovery: transportation, housing, and other types of infrastructure. These topics are essential to ensuring that all residents—especially those with low incomes and those who have been historically excluded—have the ability to live in safe, affordable housing and neighborhoods and access to opportunities such as jobs and high-quality education. We identify mechanisms by which DC can seize upon past successes to generate productive outcomes in these areas by pointing to approaches that have proven effective in other regions. In table 1, we summarize key questions and best practices relating to transportation, housing, and other forms of infrastructure.

TABLE 1
Summary of Key Questions and Best Practices

<p>Access to Transportation</p> <p><i>How can DC ensure the health and safety of residents when using transportation?</i></p> <ul style="list-style-type: none"> Prioritize pedestrians in allocating street space Quickly complete the city's cycling network Speed up buses <p><i>How can DC leverage transportation as a tool for a transition to environmental sustainability?</i></p> <ul style="list-style-type: none"> Incentivize a switch to e-bikes. Roll out a plan for electric vehicle charging <p><i>How can DC work regionally to improve transportation access?</i></p> <ul style="list-style-type: none"> Leverage new rail projects to target the needs of priority residents. Link investment in affordable housing with transportation options.
<p>Housing Conditions and Health</p> <p><i>How can DC improve housing quality and therefore resident health?</i></p> <ul style="list-style-type: none"> Invest in proactive, strategic code enforcement. Expand funding for households and small landlords to rehabilitate their homes. Improve the quality of public and assisted housing. <p><i>How can DC expand access to affordable housing in high-opportunity neighborhoods?</i></p> <ul style="list-style-type: none"> Remove exclusionary zoning Review inclusionary zoning regulations to balance benefits to developers and households with low incomes. Support limited-equity cooperatives and community land trusts. Reform rent control to realign incentives. Increase housing stability through long-term rental assistance and vouchers. Consider reparations for past racist housing policies.
<p>Infrastructure</p> <p><i>How does DC ensure the quality of water available to all residents?</i></p> <ul style="list-style-type: none"> Accelerate lead pipe replacement Implement permeable pavements <p><i>How can DC minimize stormwater inundation?</i></p> <ul style="list-style-type: none"> Disconnect downspouts. Implement other green infrastructure <p><i>What approaches can DC take to reduce urban heat island effects?</i></p> <ul style="list-style-type: none"> Install cool roofs

Switch to cool pavement

How can DC increase digital inclusion?

Increase online access.

How can DC maximize civic infrastructure for an inclusive recovery?

Study the success of Seattle Park District.

Address parks and affordable housing

Each of these best practices—across all the areas of infrastructure discussed here—**must be framed within equitable processes** that ensure participation and leadership from historically disenfranchised members of the community.¹⁴ Priorities must be selected with input from a representative group of residents, and the ultimate outcome must be a reduction in inequities in access to opportunity.

To do so, local leaders should continue to engage community members in every step of the decisionmaking process as programs and activities are identified for funding. Community engagement will be important not only as recovery dollars are spent but also as infrastructure and potential reconciliation dollars begin to be allocated. Community advisory boards, data walks, and focus groups are powerful **community-engaged methods** that have been used by local leaders.¹⁵ Fostering the inclusion of community members in decisionmaking at a scale commensurate with that of the incoming federal funds is critical to meeting this moment in history. Through thoughtful and diligent community engagement, District leaders have a historic opportunity to build power among historically excluded residents and rectify centuries-old legacies of inequity.

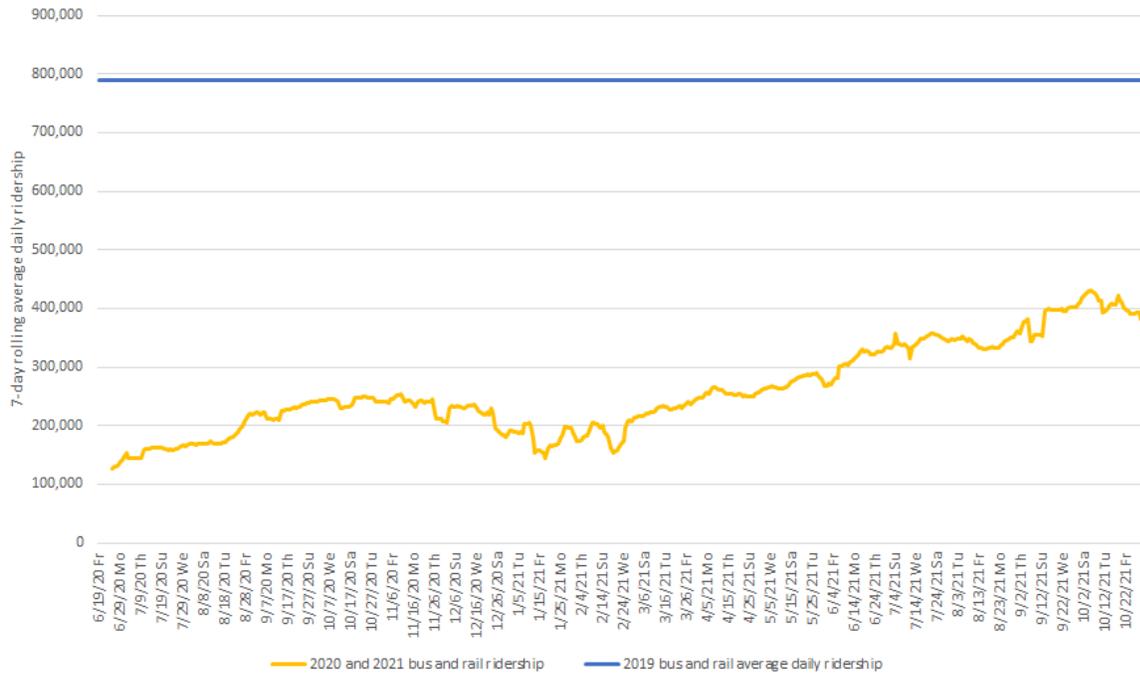
Key Questions and Best Practices: Access to Transportation

The pandemic has exacerbated disparities within the transportation system. Before the pandemic, people of color, people with disabilities, the elderly, and people with irregular work schedules **faced barriers** to finding safe and affordable means of transportation to work.¹⁶ Those challenges have continued throughout the pandemic. The transportation sector has a major influence on the quality of the environment, as well. In 2018, the **transportation sector contributed** 28 percent of total greenhouse gas emissions in the United States.¹⁷

The public transportation system in the capital region has experienced a variety of challenges since the start of the pandemic. The Washington Metropolitan Area Transit Authority's (WMATA's) overall ridership on bus and train services remains far below prepandemic levels. Although WMATA has been recovering ridership slowly since February 2021, challenges with the new railcar fleet's wheels have delayed a fast comeback. On the other hand, traffic congestion on some of the region's roadways is now **worse than it was before the pandemic**—bad news for equity of access to opportunity and for the environment.¹⁸ To address the difficulties currently facing the transportation system in the Washington region, best practices indicate that DC can take proactive steps to promote investments in the streetscape that prioritize non-automobile commuting, identify new mechanisms to decarbonize the transportation fleet, and work with regional transportation agencies to improve access. Those approaches can help ensure that the city is able to recover inclusively from the COVID-19 pandemic.

FIGURE 1

WMATA Ridership, while Recovering, Still has a Long Way to Go to Reach Prepandemic Levels



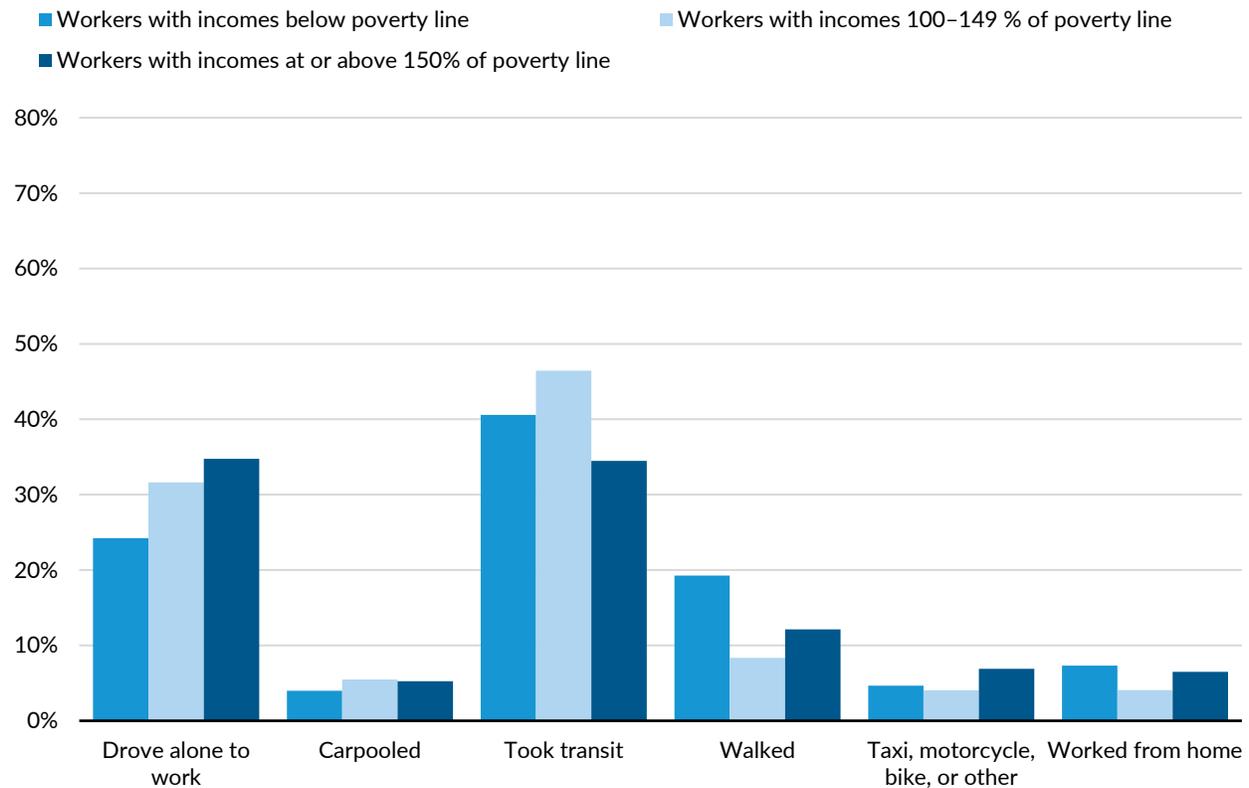
Source: "COVID-19 Public Information," WMATA, accessed November 10, 2021. <https://www.wmata.com/service/covid19/covid-19-public-information.cfm>.

How Can DC Ensure the Health and Safety of Residents Using Transportation?

In 2015, Mayor Muriel Bowser adopted the goal of "Vision Zero"—that the city would eliminate traffic deaths and major injuries from the roadways by 2024.¹⁹ If achieved, Vision Zero would help extend the lifespans of DC residents, encourage more people to take advantage of healthy travel options such as walking and biking, and reduce particulate and carbon pollution.

FIGURE 2

Commute Mode to Work in Washington, DC, by Poverty Level



Source: US American Community Survey, 2015-19.

Unfortunately, despite its interest in promoting Vision Zero, DC has failed thus far to **cut down on traffic fatalities**.²⁰ City residents—young, old, and middle age—are **too often** killed by speeding drivers taking advantage of wide vehicular lanes and poor traffic enforcement.²¹ Traffic deaths are the sign of an unsafe transportation environment, and they also reflect the continued primacy of automobiles in the city.

DC devotes a large share of the public right-of-way to car users, even though less than 35 percent of prepandemic commuters in the city drive to work, according to data from the US Census Bureau American Community Survey. From an equity perspective, less than 25 percent of those commuters in poverty in the city drive to work; they are much more likely to take transit or walk. An equity approach should reallocate public space to meet the needs of those who are most vulnerable.

Best practices show that to address the negative equity, safety, and environmental impacts of a transportation system that is now too focused on car travel, the city can prioritize pedestrians in allocating street space, quickly complete its cycling network, and use its control over the streets to speed up bus service. Involving the voices of community members in the process of choosing how to redesign the transportation system would help further dialogue and ensure that a variety of points of view are incorporated into the planning process.

Prioritize Pedestrians in Allocating Street Space

DC can allocate increased street space for pedestrians to address a shortfall in equitable access to healthy, nonmotorized forms of mobility. Currently, major disparities in access exist among neighborhoods. In 2015, the majority of DC **residents who walked or biked to work** (36,861) were clustered at the city's

center, compared with just 1,794 residents who did so and live east of the Anacostia River.²² Many of those who live east of the river are Black, work outside their neighborhoods, and have longer commute times compared with those who live west of Rock Creek. These residents have fewer options for transportation because of where employment is located, and poor pedestrian infrastructure quality can lead to numerous problems.

Several of DC's recent investments and plans have not met the goal of better allocating street space for pedestrians. In reconstructing Black Lives Matter Plaza in late 2021, the city converted what had been a fully pedestrian-only space where people were free to walk and cycle as they wished into a new road, prioritizing the travel needs of automobiles to the businesses and upscale hotels along the street.²³ The renovated street has no dedicated travel lanes for cyclists.

The city's current plans for the reconstruction of the Florida/New York Avenues intersection (see image below), has pedestrians heading northwest on Florida Avenue from the NoMa-Gallaudet Metro station to the People's Building and crossing 12 lanes of traffic. Those conditions would replicate the unsafe and unwelcome environment for pedestrians that already exists here, in a city where pedestrians suffer from high casualty rates.²⁴ The city should reconsider the need for creating an intersection that increases the number of lanes for cars and instead identify mechanisms to increase pedestrian safety.

FIGURE 3
Map of Florida Avenue and New York Avenue Intersection



Source: District of Columbia Department of Transportation.

The city of Alexandria is a local example of effective implementation of pedestrian-only corridors. The city had redeveloped King Street in Old Town at the start of the pandemic to allow businesses and residents to better take advantage of outdoor space. That measure was widely popular, with 92 percent of surveyed residents and visitors expressing that they wanted the closure to continue. In October 2021, the city council voted to permanently close a block of King Street to car traffic, thus converting it to a

pedestrian promenade. The president of the Old Town Civic Association, [Steve Malone](#), said that the pedestrian-only corridor will likely be responsible for “saving many of the historic neighborhood’s businesses.”²⁵ Washington can look to Alexandria as a model in implementing similar strategies and practices.

Similarly, cities in Europe, such as Lisbon, have [moved toward more effective traffic and pedestrian solutions](#) by widening streets, allocating more space for pedestrians.²⁶ Historically, Lisbon dedicated a large share of its street space to car and parking traffic. Research demonstrated that narrow sidewalks were problematic for pedestrians, particularly for those with walking aids or baby strollers. The expansion of sidewalks has significantly improved safety and accessibility.

Quickly Complete the City’s Cycling Network

DC has committed to the rollout of a significant cycling network that ensures accessibility to virtually all areas of the city. In the [20 by 22 Bikeway plan](#),²⁷ the city funded a major expansion of infrastructure to key neighborhoods, yet more must be done to ensure that cyclists have safe options to get around. According to the DC Department of Transportation, about [265 crashes involving bicycles and 600 involving pedestrians](#) are reported each year.²⁸ Major commuting corridors—such as Minnesota Avenue Southeast, New York and Rhode Island Avenues Northeast, and Massachusetts Avenue and 16th Street Northwest—have no provisions for safe movement by cyclists now despite those corridors being some of the best-connected streets in the city. Each of those streets has been specifically identified in DC’s [long-term bicycling plan](#) as a corridor appropriate for improved biking facilities.²⁹

The good news is that the DC Council [passed a law in 2020](#) requiring that street reconstructions be associated with investments in cycling infrastructure where the bike plan has received recommended investment.³⁰ That is an important first step to ensure that cyclists are able to feel comfortable enough to use the city’s streets.

Best practice from other cities indicates that DC could improve upon its approach by being explicit about when infrastructure improvements are coming. In Cambridge, Massachusetts, the city’s 2020 [cycling safety ordinance](#) sets deadlines for the completion of protected bike lanes throughout the community.³¹ The majority of the network is required to be completed by 2026. To ensure that it meets its goals, DC should clearly identify what streets need improvements and when the DC Department of Transportation will invest in improvements of them.

Speed Up Buses

DC is funding [bus lanes along 16th Street Northwest](#),³² an essential improvement for one of the city’s most popular bus services. The improvements will improve access for bus riders who are disproportionately people of color and people with lower incomes. Construction began in 2021 after [eight years of planning](#).³³

This timeline could be expedited to allow for improved bus infrastructure in the city. Seventy-two [percent of DC voters](#) support the addition of rapid bus lanes.³⁴ DC should work with WMATA to identify the bus routes that serve the most riders and that are most in need of reliability and speed improvements to expand access for the city’s most vulnerable residents. Examples include the Georgia Avenue corridor (bus routes 70 and 79 served about [17,000 daily riders](#) prepandemic) and the Florida Avenue/8th Street corridor (bus routes 90 and 92 served about [11,000 daily riders](#) prepandemic).³⁵

New York City provides a best practice for developing a plan to speed up bus service citywide. The city worked with the Metropolitan Transportation Authority, a state agency, to develop a plan to create bus lanes, implement traffic signal priority for buses, develop improved bus shelters, and better manage traffic. The [Select Bus Service](#) program has rolled out improved bus service on lines all over that city—and more routes are coming in the years ahead.³⁶ Preliminary results indicate that bus speeds improved up to 30 percent. The Select Bus Service routes also experience increased ridership, by 10 percent on average. A key takeaway from New York City is to prioritize bus services and lanes and expand existing routes.

How Can DC Leverage Transportation as a Tool for a Transition to Environmental Sustainability?

DC has committed to reducing citywide carbon emissions to 50 percent of 2006 levels by 2032 and eliminating them entirely by 2050. The transportation sector must play an important role in speeding that transition, as transport represents a quarter of citywide climate change-producing emissions. More than 80 percent of those transportation emissions are derived from personal passenger vehicles, such as automobiles.

To help ease that transition, DC can focus its planning policies to electrify bus fleets and encourage residents to switch to non-automobile transportation options. The shift away from automobiles can be supported through better infrastructure options, as discussed above, but also through fleet electrification, on which we focus this section. The two issues are related.

Incentivize a Switch to E-Bikes

Although DC has successfully improved its biking infrastructure over the past few years, the city can do more to encourage residents and businesses to switch to e-bikes as an alternative means to automobile travel. E-bikes [have several advantages](#).³⁷ First, they allow people to ride up the hills that cut through central Washington without the difficulty that makes such travel off-limits to people who are older or have physical disabilities. Second, compared with car travel, traveling by e-bike is cheaper. Third, they can be effective as cargo bikes, replacing deliveries from parcel trucks on short routes. In each case, promoting e-bike access can result in less car travel and, ultimately, less pollution.

As part of the federal reconciliation bill, in discussion in the US Congress as of February 2022, people would be able to [benefit from a tax subsidy](#) to reduce the cost of purchasing e-bikes.³⁸ Other states and cities have taken more initiative to promote and incentivize buying e-bikes. In California, the Air Resources Board will soon develop a [rebate program for e-bikes](#).³⁹

In France, [the city of Paris](#)⁴⁰ and the [regional government](#)⁴¹ work together to provide residents with funds worth up to 83 percent of the cost of a new e-bike; those funds can also be used for [cargo bikes](#).⁴² The investments are paying off. As of April 2021, Amazon took the initiative to use clean vehicles, such as e-bikes and electric trucks, to make [two-thirds of its deliveries in Paris](#).⁴³ E-bikes now account for [more than one-half of bike sales](#) in France.⁴⁴

Similar programs could support DC residents. Such programs could be especially beneficial for families with low incomes, allowing them to access expanded mobility without having to worry about gas costs. It could also support small businesses looking to invest in sustainable mobility options. In both cases, the effectiveness of the switch is reliant on access to safe cycling infrastructure, such as that described above.

Roll Out a Plan for Electric Vehicle Charging

Electric vehicles (EVs) are becoming more common in the United States, and they offer considerable opportunity to aid to the sustainability and equity of the transportation system. EVs eliminate point-source tailpipe emissions, meaning they are less likely to pollute the air in the neighborhoods through which they are driven. Because they can be powered by sustainably sourced electricity (such as solar and wind), they can also contribute to lessening dependence on carbon-based energy sources and reducing the emissions of climate change-producing greenhouse gases.

Although some of the most popular EVs are expensive cars, such as Teslas, a [number of cheaper options](#) are available that are affordable to a wider segment of the population.⁴⁵ Research demonstrates that EVs are in high demand, and forecasts indicate that EVs will represent [48 percent](#) of all new cars sold by 2030.⁴⁶ Those options can be more affordable over the long term than gas-powered cars because the [cost of electricity is lower per mile driven than gas](#).⁴⁷ Even so, EVs currently account for [less than 5 percent](#) of the US new-car market.⁴⁸ One big explanation is the difficulty of charging the cars—a particular

concern in DC, where many residents rely on on-street parking and do not have the ability to use a personal garage for a charger.

The new federal infrastructure bill provides [\\$7.5 billion for vehicle charging](#), however, and DC should develop a plan for leveraging those funds to improve access to charging, which will improve the confidence of potential EV purchasers that they will have access to charging infrastructure when needed.⁴⁹ On-street charging will likely [continue to be difficult](#)⁵⁰ to implement citywide because of the cost of upgrading the electric grid and the challenges of not impeding onto sidewalk or roadway space, but cities such as New York have [begun installing](#) on-street chargers.⁵¹

How Can DC Work Regionally to Improve Transportation Access?

Although the city government has considerable oversight over a number of realms related to transportation, in the DC region, several regional and out-of-state entities play major roles in investing in transit infrastructure. Ensuring that the transportation network best serves the needs of DC residents could mean building on best practices from communities elsewhere involving how to work with regional agencies to design new services, build new stations, and better support the potential for development around lines. Essentially, residents need to be able to navigate and get around the region. People living in DC work in Maryland and Virginia, and vice versa. The regional transit system must reflect this reality.

Leverage New Rail Projects to Target the Needs of Priority Residents

As of fall 2021, WMATA is considering [a series of potential routes](#) for new Metrorail service in central DC and other parts of suburban Maryland and Virginia, which could include new Blue or Silver Line alignments through the northeastern section of the city.⁵² Those routes could help reduce congestion on existing Metro lines, open up access to new DC neighborhoods, and offer the possibility for additional transit-oriented development. As it currently stands, the new route's alignment through the city has yet to be finalized, so the city has considerable opportunities to influence where it is built.

From this perspective, DC can learn from Los Angeles, where the choice about [where to locate new rail lines elicited considerable debate](#) but also raised important questions about expanding racial and social equity through transportation.⁵³ Nonprofit groups in Los Angeles worked in association with city and regional officials to emphasize the needs of many of the region's most transit-dependent residents and helped push to ensure that new investments would benefit them. In Washington, DC, such collaborative efforts could be undertaken to position new rail lines.

Similarly, DC can take advantage of the potential for improved commuter rail services. The Greater Washington Partnership has [developed a vision](#) for expanding MARC (Maryland Area Regional Commuter) train and VRE (Virginia Railway Express) service so that they run more frequently and link Maryland and Virginia without having to change trains.⁵⁴ Currently, passengers who want to take such a bistate trip must get off at Union Station and wait for another train.

In cities such as Toronto, the regional transit authority is funding [improvements to the commuter rail system](#) that will allow lines to run at least every 15 minutes all day, in both directions.⁵⁵ The transit system is also working with the city to develop [new infill stations](#) along the commuter rail lines to provide better access within the city.⁵⁶

Those best practices could also be applied to the Washington region. Infill stations along the MARC commuter rail lines at Ivy City and South Dakota Avenue Northeast would increase service to a part of Washington that is currently far from excellent transit and that suffers from high levels of poverty. Commuters in those areas would get new links to downtown Washington and to places such as Baltimore and New Carrollton. At the same time, if linked with VRE service, those neighborhoods would become connected to job opportunities not only in central Washington but also in places such as Arlington and Alexandria.

Link Investment in Affordable Housing with Transportation Options

DC has done an admirable job encouraging the development of parcels adjacent to the Metrorail system. Examples include new development in communities such as Friendship Heights, Navy Yard, NoMa, and Petworth. Even so, opportunities to encourage more investment in affordable housing around Metro stations remain. Housing that is affordable to families with low incomes has the benefit of [encouraging higher levels of transit ridership](#)—including during unique periods such as the pandemic—and of further reducing the cost of living for those who are most in need.⁵⁷ Some of the neighborhoods surrounding Metro stations in DC—such as at Benning Road, Deanwood, and Fort Totten—continue to be underdeveloped, with surface parking lots very close to stations.

Several communities have developed innovative approaches to encouraging such transit-oriented development. In California, a [2018 law](#) gave the Bay Area Rapid Transit (BART) District the ability to build new housing surrounding its stations.⁵⁸ The agency has chosen to [prioritize affordable housing](#) in the projects that it completes.⁵⁹ DC could work with WMATA to encourage similar types of development around stations throughout the city.

Key Questions and Best Practices: Housing Conditions and Health

Perhaps one of the most glaring racial and ethnic inequities in our nation is the disparity in access to life itself. In DC, Black men have a [life expectancy of 68 years](#), whereas white men are projected to live until 83, on average.⁶⁰ In addition, Black women are expected to live nine years fewer than white women.

Addressing these health inequities takes not only a focus on reducing gaps in access to health care but also a focus on reducing gaps in the social determinants of our health, such as housing, because where we live is one of the main social determinants of our health. Having access to safe, stable housing in high-opportunity neighborhoods is a prerequisite for upward economic mobility and affects both mental and physical health. As such, this section highlights best practices related to housing and health, with a focus on equity.

How Can DC Improve Housing Quality and Therefore Resident Health?

Poor conditions of our homes and neighborhoods can negatively affect our [respiratory health](#),⁶¹ [cognition](#),⁶² [behavioral health](#),⁶³ [physical fitness](#),⁶⁴ [mental stress](#),⁶⁵ and physical safety.⁶⁶ DC has the tools to improve homes and neighborhoods—for example, through code enforcement and housing rehab funds. This section highlights some of those opportunities.

Invest in Proactive, Strategic Code Enforcement

One of the primary strategies for addressing substandard housing is ensuring that property owners and other responsible entities repair, rehabilitate, and maintain their properties consistent with relevant state and local housing codes. Local housing code enforcement (HCE) agencies are the primary entities for administering and enforcing a wide array of housing, building, and property maintenance codes that apply to the habitability and maintenance of single-family and multifamily dwellings. If done effectively, HCE agencies can help improve the health of the population and reduce crime through improvements to the quality of homes and neighborhoods, reductions in levels of disorder, and increases in economic investment in neighborhoods.

Housing and property maintenance codes, along with HCE strategies and practices, however, do not always explicitly focus on the public health dimensions of their work. Although housing and building codes were originally designed to address serious public health problems caused by tenement housing of the early 20th century, HCE agencies today often focus more on the technical language of the code and less on the broader socioeconomic and health impacts and outcomes that flow from the day-to-day operations of administering and enforcing the codes. HCE agencies often respond to individual complaints about particular properties and do not always have the resources, legal authority, data, or managerial capacities to take more proactive, coordinated actions.

DC could consider reviewing the city's code enforcement practices and processes to identify areas in which HCEs could become more strategic and target housing quality issues that are related to negative longer term health outcomes and inequities. Stacy and colleagues (2018)⁶⁷ make [the following recommendations](#):

1. Create a system that prioritizes health-related violations and interior health and safety issues.
2. Enforce this prioritization through adoption of the housing code enforcement policies and procedures manual and through automatic prioritization in the city's data system.
3. Identify violations and neighborhoods that are underserved through code enforcement, and expand coverage to those concerns and areas.
4. Fill gaps in inspection, investigation, and enforcement coverage through updates to local and state laws—such as for bed bugs, lead-based paint, and mold—and develop a written protocol outlining which agency is responsible for each type of violation.
5. Increase community-based education, awareness, and training for residents and home health workers regarding health-related housing issues and code enforcement services and for code inspectors regarding healthy homes.
6. Identify ways to enhance resources available for expanding code coverage and for repairing health-related violations in homes.
7. Institute a formal system of proactive sweeps of problem multifamily properties and neighborhoods, focusing particularly on underserved neighborhoods.
8. Review current landlord/tenant laws and procedures to determine whether they provide needed protections and remedies to promote and protect health and housing habitability standards and protect tenants from homelessness. Update those laws and procedures if they do not.
9. Increase coordination and collaboration between code enforcement, the health department, and other organizations that touch on housing and health to reduce duplication of services, fill in gaps in services, explore mechanisms for improved referral and navigation of housing systems, and secure adequate funding and resources.
10. Consider synchronizing the data systems of various agencies so that data are shared in real time.
11. Use this and other real-time data to deploy strategic interventions.

Another way DC's housing code enforcement agencies could be more strategic is if they were to consistently conduct proactive inspections of problem properties. Urban Institute researchers argue that the complaint-based system of most code enforcement agencies frequently [overlooks asthma-related triggers](#)—such as mold, smoke, and leaks—because the mechanism of trigger-induced asthma is a less obvious threat to health and safety.⁶⁸ Proactive sweeps would help inspectors catch conditions that may not otherwise have been reported by a tenant or neighbor, but such sweeps must be followed up with timely and effective enforcement.

Expand Funding for Households and Small Landlords to Rehabilitate Their Homes

Improving housing quality and health also requires increased investments in repairs because many housing quality issues, such as mold, are expensive to remediate. Although DC invests a considerable amount in housing and community development, these public resources may not be sufficient to tackle issues related to substandard housing citywide. The city should therefore determine whether additional funds are needed for housing repair and, if so, explore innovative ways of financing those enhancements, such as through the formation of a dedicated revolving loan fund or a housing trust fund to provide grants to homeowners and low-interest loans to landlords for repairs. Recovery dollars and dollars from the infrastructure package and possible reconciliation bill might also be useful for funding such initiatives.

DC's [current rehabilitation program](#) provides grants for roof repairs, exterior roofing and gutter work, and improvements for accessibility modifications needed to alter physical barriers within a home for persons with mobility or other physical impairments.⁶⁹ The city could consider expanding those programs to include other types of repairs. For instance, [Maryland's WholeHome grants and loans](#) can be used to upgrade to energy-efficient appliances, repair or replace heating and cooling systems, replace insulation,

add accessibility features for seniors or those with special needs, remove lead paint, upgrade plumbing, and address structural and maintenance issues.⁷⁰

Improve the Quality of Public and Assisted Housing

Another realm of housing quality that the DC government could influence is the quality of public housing in the city. Public housing provides stable, affordable housing for **7,000 residents in Washington**. **Four out of five public housing units** in the city are in need of repair because of insufficient federal funding, with many households living in unsafe conditions.⁷¹ The vacancy rate in District of Columbia Housing Authority (DCHA) units is high as a result of units being left vacant while waiting for renovations, exacerbating poor conditions for current residents. Given that **90 percent of public housing residents are Black**, the city's ability to ensure that residents have quality, safe public housing is not only a health issue but a racial equity issue.⁷² The DC Council passed **\$50 million for public housing repairs for FY 2021**;⁷³ however, the DCHA reports that immediate repairs cost **\$323 million**,⁷⁴ and long-term repairs will cost close to \$2.5 billion. Cities across the US face similar long-standing issues with public housing conditions. Most cities do not invest the needed amount of local dollars and rely on federal funding, which is significant but does not fully cover public housing costs. The DC Council and DCHA could be a national example by investing adequate local funding to public housing.

To address those issues in DC public housing, the city could allocate additional local dollars to address the capital backlog of repairs. Research suggests that **\$60 million of local funds per year**⁷⁵ would help with the most urgent repairs. If the **Build Back Better bill passes** with the housing money intact, DC could provide additional funding for repairs, speed up the redevelopment construction, and increase human capital services.⁷⁶ In the meantime, DC could provide resources for DCHA residents who are facing temporary or permanent relocation. To create permanent units for displaced DCHA residents, DC could support DCHA to move forward and speed up the New Communities Initiative, which is city funded.⁷⁷ In addition, the council could ensure that the **Greenleaf redevelopment** moves forward with a more equitable strategy, including a build-first plan, one-for-one unit replacement, and adequate resident engagement.⁷⁸

How Can DC Expand Access to Affordable Housing in High-Opportunity Neighborhoods?

Although housing quality matters for our health, housing cost is just as pressing an issue affecting housing and health in DC. For decades, households with low incomes have **struggled to find affordable housing** in Washington, where housing and living costs continue to rise.⁷⁹ During the COVID-19 pandemic, **households that lacked stable and safe housing** have been unable to social distance and have therefore been more likely to contract the disease.⁸⁰ As a result of systemic racism, people of color have been disproportionately affected by both housing instability and COVID-19-related unemployment, resulting in even **worse housing and health inequities**.⁸¹

The pandemic recovery period and the unprecedented flow of funds from the federal government to local governments provide a prime opportunity to invest in safe, affordable housing in high-opportunity neighborhoods for households with low incomes and Black and Brown communities that have faced decades of **displacement and unsafe housing conditions** in Washington.⁸²

Stable, affordable housing provides benefits to families with low incomes and to local economies. For families, it **improves educational outcomes for youth**;⁸³ maintains **health, daily functioning, quality of life, and maximum independence** for adults as they age,⁸⁴ and delivers developmental and health benefits that can **improve children's long-term life chances** and reduce costs in other public programs.⁸⁵ Affordable housing also supports economies as a whole by **allowing employers to better recruit employees**⁸⁶ and supporting employment **growth and stability**.⁸⁷

Washington, DC leaders have prioritized affordable housing for decades by implementing rent control, the Housing Production Trust Fund (HPTF), and inclusionary zoning. As housing costs increase and the pandemic continues, the city should continue to address the housing affordability crisis with new policies or reforms to existing policies. This effort requires preserving existing affordable housing, building new affordable housing, and reforming zoning to encourage increased supply.

Removing Exclusionary Zoning

One way to increase affordability is for cities such as DC to loosen land-use restrictions to encourage development, which should, in the long run, reduce housing prices and increase equity and inclusion. Many housing economists have posited that the lack of affordable housing supply stems from [overly restrictive land-use regulations](#)⁸⁸ and that [loosening those restrictions](#)⁸⁹ might allow [housing production to increase and, therefore, prices to decrease](#).⁹⁰ Research on [housing filtering](#) (or the process by which properties age and depreciate into affordability)⁹¹ shows that new construction (even if sold at a high price) eventually [creates openings in less expensive housing](#) for lower-income residents, usually farther outside the city center but in the same market.⁹² In the short run, however, the effect that land-use reforms have on housing market supply and price is unclear. To ensure that land-use reforms do not cause displacement in the short run, therefore, reforms should be paired with direct investments or requirements for the development of affordable housing.⁹³

DC now allows [accessory dwelling units \(ADUs\)](#)⁹⁴ and has [redeveloped industrial areas](#)⁹⁵ into high-density neighborhoods in the past decade, which are steps toward densification; however, [research shows](#) that DC neighborhoods with rising housing costs and more restrictive zoning have not built new housing.⁹⁶ Also, [very few ADUs have been developed in DC](#) due to a lack of familiarity with ADUs among the public, along with complications related to financing their construction, the difficulty of navigating conflicting building codes, and the requirement that owners live on the property.⁹⁷ To meet the goal of 36,000 new homes by 2025, Schuetz (2019)⁹⁸ suggests allowing higher-density redevelopment in high-opportunity neighborhoods with single-family detached homes, such as neighborhoods west of Rock Creek Park. Although a strong base zoning code is key to laying the groundwork for development, supply increases when housing advocates and policymakers address the barriers to production that stem from a larger network of laws, practices, and regulations. Zoning reforms alone may not result in significant supply increases. If a city tries to address a housing shortage with only this approach, it may overlook the complex and interconnected factors that created the shortage in the first place. To set up a reform for successful implementation that produces the newly legalized units, people involved in the initial passage should consider and address the various factors that affect a city's housing supply.

Review Inclusionary Zoning Regulations to Balance Benefits to Developers and Households with Low Incomes

Cities can also increase the supply of affordable housing by using inclusionary zoning (IZ), which requires or offers incentives to developers to set aside a share of units in new developments to be rented or sold at below-market rates. Some IZ laws also allow developers to pay a fee in lieu of developing affordable units or to build the units in a separate location from the main development. As of 2016, IZ laws existed in [886 jurisdictions in 25 states and the District of Columbia](#).⁹⁹

IZ regulations vary widely, however, and the ways in which they affect the supply of housing that is affordable to residents with low incomes depends on a policy's features and the conditions of the housing market in which they are implemented.¹⁰⁰ In Washington, the local IZ program requires developers of new or rehabilitated residential projects of [10 or more units to make 8 to 10 percent of their units affordable](#) to families earning 50 to 80 percent of the city's median family income (MFI).¹⁰¹ The housing costs of people who live in IZ units may not exceed 50 percent of their annual income. For a household of three people in 2020, this sum amounted to a maximum annual income of \$56,700 to \$90,700 (50 to 80 percent of MFI).

When affordable units are required to be built on site, IZ can address the dual goals of producing affordable housing and reducing income segregation, particularly in neighborhoods undergoing redevelopment. Many stakeholders, however, are skeptical about whether [IZ in its current form can produce the level of affordability needed](#) to reach the people with the lowest incomes.¹⁰² Many tenant advocates believe that the incentives given to developers to create these units far outweigh the benefits of the units for households with low incomes. As one [tenant advocate noted to us in a recent study](#), “[The IZ development] didn’t even fit into anybody’s—Black people, especially—notions of affordable housing.”

That's why we were like, we can't even campaign for or against this. This is just a waste of people's time."¹⁰³

Although IZ still serves a valuable purpose in providing moderately affordable units in properties where none may otherwise have been created, DC could review its IZ policies and examine whether they appropriately balance benefits to developers and to households with low incomes to see whether IZ can be even more beneficial. As an example, the city of Chicago [recently reviewed and reformed](#) its IZ policy.¹⁰⁴ The new policy increases the proportion of affordable units that must be built in high-cost neighborhoods from 10 percent to 20 percent and in more affordable neighborhoods from 25 percent to 50 percent, reduces the number of units that may be paid out with in-lieu fees from 75 percent to 50 percent, and requires incomes to be at 60 percent and 50 percent area median income (AMI) tiers. DC could follow suit by increasing the number of units that are required to be affordable in IZ developments and lowering the AMI tiers for eligible residents. Recently, DC's attorney general, [Karl Racine](#),¹⁰⁵ proposed to decrease the maximum income threshold from [80 to 70 percent AMI](#) and require one unit to be for families earning 30 percent AMI or lower in a push to give lower-income residents access to housing through DC's IZ policy.¹⁰⁶ Those are important changes; however, increasing the proportion of units that need to be affordable in the development, such as Chicago's increase to 20 percent of units, would be a crucial addition to Racine's proposal.

Some stakeholders are also concerned that many IZ units go to young people with high family wealth but who currently have lower incomes because they are just starting out in their careers. This occurrence could be happening because developers of IZ units strategically target advertisements for affordable units to those types of households. One way to increase the chance that IZ units go to vulnerable households is for the city to create a continuously maintained [list of lower-income households that are eligible for IZ units](#) that developers could use to fill units.¹⁰⁷ Not only would this practice allow the city to target ads to historically excluded populations but it would also reduce costs for developers to try to find income-eligible households to fill their units.

Support Limited Equity Cooperatives and Community Land Trusts

In addition to building new affordable housing, cities can preserve existing affordable housing through Limited Equity Cooperatives (LECs) and Community Land Trusts (CLTs). LECs prevent displacement and build stable housing for moderate- to low-income residents across Washington through the Tenant Opportunity to Purchase Act (TOPA), particularly in gentrifying areas. A [co-op member in Northwest DC](#) noted in a recent study that co-ops are "a model of affordability and collective homeownership which should be more widespread in this District and elsewhere."¹⁰⁸

The organizational and financial aspects of LECs, however, are often challenging for tenants. Community-based organizations funded by the city are often unable to provide technical assistance to small buildings because of limited capacity, resulting in real estate brokers and attorneys helping larger TOPA properties instead. Although real estate brokers and attorneys increase the number of TOPA properties, [TOPA units often lose affordability](#).¹⁰⁹ Additional funding from the city to increase funding for community-based organizations or tenant groups would increase TOPA services, resulting in more successful, affordable LECs. The city budgeted [\\$2 million for tenants to use their TOPA rights](#) and form LECs.¹¹⁰ Furthermore, additional funding for the First Right Purchase Program, DC Housing Preservation Fund, and Local Rent Supplement Program would increase the capacity for tenants to acquire and renovate TOPA buildings.¹¹¹

CLTs are also an effective tool for preserving affordable housing. CLTs are nonprofit organizations governed by community members that acquire property with a renewable ground lease, such as Washington's Douglas Community Land Trust, which Mayor Bowser committed [\\$2 million to support with funds from the American Rescue Plan Act](#).¹¹² Properties covered by land trusts do not appreciate in value; thus, homeowner and rental units remain affordable, [resisting gentrification and preventing displacement](#) of residents.¹¹³ Local governments can support CLTs by [removing regulatory barriers and funding the](#)

nonprofits that spearhead CLTs, while ensuring that community members make decisions in the public-private-community partnership.¹¹⁴

Reform Rent Control to Realign Incentives

Cities can also preserve affordable rental units through rent control. DC could consider reforming its rent control regulations to better preserve affordability. Saint Paul, Minnesota, for example, recently passed [one of the most stringent rent stabilization policies](#) in the nation;¹¹⁵ landlords cannot raise rents more than [3 percent every 12 months, and this limitation holds with new tenants](#).¹¹⁶ This practice is known as vacancy control. Unlike in Saint Paul, housing providers in Washington can raise rent by up to [10 percent](#) of what was charged to a former tenant when that tenant moves out or to a similar market value as comparable rentals but by [no more than 30 percent](#).¹¹⁷ This type of vacancy decontrol misaligns incentives and encourages poor treatment of tenants who pay relatively lower rents by landlords because if they move out, the landlord earns more money.

Research demonstrates that jurisdictions with vacancy decontrol, such as Washington, are [less affordable and tend to disproportionately displace Black and Latinx¹ renters](#) compared with jurisdictions that have vacancy control.¹¹⁸ Furthermore, landlords are more likely to [evict and harass tenants in places with vacancy decontrol](#),¹¹⁹ and landlords easily find loopholes around just-cause eviction requirements, which cities usually implement to prevent evictions in rent-controlled units. Eliminating vacancy decontrol may therefore be the most viable way to ensure stability and prevent evictions, and it is something the city may want to consider.

Increase Housing Stability through Long-Term Rental Assistance and Vouchers

The US Centers for Disease Control and Prevention implemented an eviction moratorium in September 2020, which expired July 31, 2021, after multiple extensions. [Recent research](#) shows that this and state-based eviction moratoria prevented COVID-19 cases, but as eviction moratoriums were lifted, COVID-19 cases and deaths increased.¹²⁰ In December 2020 and March 2021, Congress approved \$47 billion for the Emergency Rental Assistance Program (ERAP). Washington's ERAP program, STAY DC, ran out of federal funding and closed its portal on October 27, 2021, after distributing [\\$165.78 million](#) in rental funds and [\\$8.31 million](#) in utility funds.¹²¹

An estimated [39,000 District households](#), however, are still behind on rent.¹²² On January 7th, 2022, the US Treasury announced the reallocation of ERA 1 funds, allocating \$17.8 million to DC, after the District initially asked for \$238.7 million additional dollars in ERA.¹²³ A recent letter from over 30 local organizations called on DC to use a portion of its substantial FY 2021 surplus, reserves, and/or other available sources of funds for rental assistance and Rapid ReHousing.¹²⁴

Housing vouchers and long-term rental assistance in the form of cash transfers are [two permanent solutions](#) to stabilize households and prevent expensive evictions and homelessness services.¹²⁵ Although housing choice vouchers rely on federal funding, the city could increase funding for the Local Rent Supplement Program. This type of funding should be targeted toward neighborhoods with the greatest need.¹²⁶ Black households are the [most burdened with late rent fees and eviction filing fees](#) in the eviction process, so addressing this challenge and providing funds to support rent payments will have long-term equity implications as well.¹²⁷

In designing any of these regulations or assistance, care should be taken to not disproportionately harm landlords, particularly small landlords. If designed correctly, such programs could help support both renters and landlords, providing support for increased housing supply and reductions in home prices overall.

¹ This memo uses the term Latinx to describe people of Latin American origin or descent. The authors use this term because it helps us provide a more consistent and gender-neutral identifier that respects the diversity of this population.

Consider Reparations for Past Racist Housing Policies

Racist housing policy, spanning from redlining in the 1920s to tax-incentive developments that spur gentrification today, have stripped Black residents of wealth and displaced many. Cities are beginning to distribute reparations to address the historical and current remnants of racist housing policies. In Evanston, Illinois, Black households and their direct descendants, who lived in Evanston between 1919 and 1969 (during which the local zoning ordinance enforced housing discrimination), are receiving grants of up to [\\$25,000 for down payments or home repairs](#).¹²⁸ Although these reparations account for only housing discrimination—not slavery, racialized acts of violence, or other systemic racist policies—research shows that down payment grants would [substantially help Black residents with initial equity](#).¹²⁹ Evanston’s reparations apply only to those who own a home. Expanding such programs to Black renters—especially in Washington, where property is more expensive and a majority of people are renters—would improve the equity of a housing reparations program.

Key Questions and Best Practices: Other Infrastructure

Transportation and housing investments are key to ensuring an equitable recovery from the COVID-19 pandemic, but the city must also invest in several other areas of infrastructure to ensure an equitable recovery. We highlight key potential areas of investment in water, stormwater, tree coverage, broadband, and civic infrastructure in this section.

How Does DC Ensure the Quality of Water Available to All Residents?

DC’s current plans aim to ensure [clean water to 100 percent of residents by 2032](#).¹³⁰ Residents, especially low-income families that may not have the means to buy clean water, should not have to wait another decade for safe and affordable drinking water. There are steps DC could take to speed up this process.

Accelerate Lead Pipe Replacement

Quickly replacing the city’s lead pipes is integral to fostering safe and equitable infrastructure. The city has a [detailed plan in place and aims to complete the project by 2030](#),¹³¹ and the newly passed federal infrastructure law allocates \$15 billion to replace lead pipes nationwide—resources that would support DC and other communities in expediting the process.

Newark, New Jersey, is set to complete its lead pipe replacement project [in less than three years](#).¹³² A key takeaway from Newark’s success is the importance of prioritizing community input. The urgency with which city officials created and executed this plan would likely not have happened [had it not been for protests and grievances aired by Newark residents related to the slow pace of improvements](#).¹³³

[Like Newark, Washington is a majority-renter city](#).¹³⁴ Instead of tracking down limited liability corporations and landlords to make repairs, which would have added significant time to the project, Newark passed an ordinance that allowed tenants to provide access to buildings, essentially giving workers permission to replace pipes without the owner’s consent. Paying for the replacement was an obstacle that Newark overcame by leveraging the county’s triple-A bond rating. [The \\$120 million the city raised allowed it to replace as many as 120 lines a day, at a cost of \\$7,000 each](#).¹³⁵ To further expedite the process, Newark trained about 75 formerly unemployed or underemployed residents to work on this project, which not only helped speed the timeline but also created needed jobs.

DC’s lead pipe replacement plan reports that around [28,000 service lines](#) with lead pipe need to be replaced,¹³⁶ which is only slightly above the [23,000 that Newark replaced in less than three years](#).¹³⁷ If DC is able to match Newark’s pace of replacing up to 120 lines a day, finishing the project well before 2030 is in reach.

Although a project to replace lead pipes is under way, getting clean water to DC residents—especially those living in low-income communities and communities of color—is important to prioritize. In 2019,

Newark began [handing out bottled water to residents who qualified](#), including those with lead service lines, those who used city-provided filters, and those who lived in the most at-risk areas of the city.¹³⁸ Bottled water was also delivered to the elderly and disabled.

Newark can serve as a model not only to Washington but also to the entire country to combat the urgent and toxic lead pipe problem that communities in all 50 states are experiencing.

Implement Permeable Pavements

As stormwater travels along impervious surfaces, it collects myriad different pollutants along the way, ultimately resulting in poor water quality. These pollutants range from [toxic chemicals to litter](#).¹³⁹ Decreasing stormwater runoff or implementing a filtering strategy is imperative to reducing water pollution, especially when some untreated stormwater ends up in bodies of water. In Washington's case, unfiltered water pollutes [the Potomac and Anacostia rivers](#).¹⁴⁰

Although permeable pavements are typically thought of as a flood mitigation strategy, they double as an effective method to [decrease water pollution](#).¹⁴¹ Recently, DC accepted applications for a [Permeable Surface Rebate Program](#), which funded homeowners who replaced impermeable surfaces with either permeable pavement or vegetation. Expanding those efforts to implement permeable pavements in low-traffic areas will aid in reducing water pollution.¹⁴²

One example to consider is in the Village of Lakewood, New York, which recently concluded its [Chautauqua Avenue Green Street Retrofit Project](#) after a few months of construction.¹⁴³ The project consisted of implementing permeable concrete at three intersections and in curb areas, tree trenches, and porous flexible pavement tree surrounds. It also funded 11 stormwater street trees, new stormwater drainage features and curbs, and native plantings. Those strategies were put in place to improve the water quality entering Chautauqua Lake by increasing infiltration and biofiltration of stormwater. Including small green infrastructure additions such as these has the potential to make a big difference. Should DC decide to implement a similar project, small sections of the city should be retrofitted at a time because this type of project necessitates road closures.

Permeable pavement is one of the two pavement strategies that serve as viable options for enhancing DC's infrastructure, improving resident's quality of life, and benefiting the environment. DC should consider implementing cool pavement, which will be further discussed in the urban-heat section, *in conjunction with* permeable pavement.

How Can DC Minimize Stormwater Inundation?

As climate conditions continue to worsen, it has become evident that old infrastructure is not equipped to handle increases in rainfall. It is thus imperative for cities nationwide to prepare for the consequences. Over the past 90 years, water levels in the Potomac and Anacostia Rivers have [increased by 11 inches](#), resulting in a 300-percent increase in riverfront flooding.¹⁴⁴ Unsurprisingly, DC's flooding problem is projected to worsen in the coming years. One strategy to combat flooding and reduce stormwater inundation is implementing or increasing the availability of [green infrastructure](#),¹⁴⁵ such as rain gardens, green roofs, permeable pavement, sidewalk planters, and [bioretention](#).¹⁴⁶ Not only can green infrastructure mitigate flooding, but it has the added ability to [reduce water pollution](#) that occurs when rainwater lands on impervious surfaces, as noted above.¹⁴⁷ Overall, green infrastructure increases water quality, decreases flooding and the urban heat island effect (see below), and reduces costs that accrue from other water management strategies.

Prioritizing low-income communities and communities of color must be a chief concern for implementing flood reduction strategies. Parts of Ward 7, including areas around Watts Branch, [face some of the highest flood risks in the city](#).¹⁴⁸ Ward 7 is [91.7 percent Black](#), with a median household income of \$42,201, compared with a DC median household income of \$91,414.¹⁴⁹ Not only is Ward 7 at higher risk for flooding than other neighborhoods, but housing in poor condition is also more likely to face challenges from excess rain. Prioritizing investments in lower-income communities is therefore necessary.

Downspout Disconnection

Implementing a widespread and strategic downspout disconnection program to divert runoff from impervious surfaces is a valuable strategy to reduce stormwater inundation. Impervious surfaces dramatically increase rain runoff as well as water pollution. Rainwater is usually directed into streets or into pipes that connect to [storm drains or sanitary sewers](#).¹⁵⁰ As mentioned, rain runoff picks up pollutants as it travels down these surfaces. Disconnecting downspouts from pipes or paved surfaces and redirecting water into pervious surfaces or rain barrels allows water to either [infiltrate the ground](#) or accumulate in a barrel to be reused instead of creating polluted stormwater inundation.¹⁵¹ Not only is this practice an eco-friendly stormwater control strategy, it is also [inexpensive](#).¹⁵² Expanding DC's downspout disconnection program will also help expand its [rain barrel program](#), doubling the environmental benefits.¹⁵³

DC Water is planning to spend \$60 million on green infrastructure to green the city by 2030, and decreasing stormwater runoff is a primary goal. The city's [Sustainable DC 2.0 Plan](#) places little to no emphasis on the potential value of downspout disconnection,¹⁵⁴ and DC Water's [Drain the Rain Downspout Disconnection Program](#)¹⁵⁵ is not expansive enough because it is [voluntary and limited in geographic scope](#).¹⁵⁶ Disconnecting downspouts is a simple process that has substantial benefits, and residents can even do it themselves if their homes are eligible; therefore, DC would benefit by investing more time into expanding this program and implementing it into all eligible homes.

Portland, Oregon, is one city that has reaped the benefits of this strategy. Between 1993 and 2011, Portland's Downspout Disconnection Program diverted an estimated annual 1.2 billion gallons of stormwater from the city's sewage system into the ground. Although [Portland's Downspout Disconnection Program](#) took 18 years to achieve this success, its strategy could serve as a model for DC to work from and expedite.¹⁵⁷ Portland's program began with a two-year pilot before the launch to assess safety, evaluate methodology, and estimate effectiveness, which Portland's Bureau of Environmental Services classified as essential. If DC chooses to pursue a downspout disconnection program that is larger in scope like Portland's, a trial period should be considered to evaluate and improve the plan, as well as gather and consider community input, before launching.

Milwaukee, Wisconsin, is another city that has capitalized on the benefits of downspout disconnection. The Milwaukee Metropolitan Sewerage District implemented its Downspout Disconnection Program by amending its rules and regulations to [require downspout disconnection at residential properties of four units or fewer](#) that meet other eligibility criteria in all combined sewer system areas.¹⁵⁸ In Shorewood, a village of Milwaukee, roof drains connected to combined sewers will be [prohibited after January 1, 2025](#), in eligible homes.¹⁵⁹ Pursuing the aforementioned pilot period would allow DC to evaluate and [expand the previously defined geographic areas](#) and homes to determine which are eligible and suitable for downspout disconnection and subsequently require them to implement this plan before a reasonable date.¹⁶⁰ The current plan is voluntary, which will yield fewer results and therefore be less effective than a requirement.

Other Green Infrastructure

Whereas reducing impervious surface area is vital to decreasing flooding, another approach is to expand the construction of green roofs. According to the Natural Resources Defense Council, between [40 and 80 percent](#) of the total volume of rain that falls on green roofs can be retained without ending up in the storm sewer.¹⁶¹ Green roofs release rainwater more slowly, which reduces flooding risk. And green roofs reduce cooling and heating costs. The Natural Resources Defense Council reported that for a one-story building, a green roof can reduce average daily cooling costs of more than 75 percent. On top of that, one study found that putting green roofs on one-half of Toronto's available roof space would lower temperatures by as much as 3.8 degrees Fahrenheit; therefore, not only are green roofs beneficial for reducing flooding but they also can also help mitigate the urban heat island effect and decrease energy costs.

Encouraging more residents to build rain gardens is a simple way to reduce flooding. The Groundwater Foundation found that [rain gardens allow for 30 percent more water to absorb](#) into the ground than do

regular lawns.¹⁶² A typical 10-by-12-foot rain garden is estimated to filter [30,000 gallons of water per year](#).¹⁶³ Inexpensive and effective, rain gardens along city sidewalks and adjacent to residential homes are viable options to curb flooding.

What Approaches Can DC Take to Reduce Urban Heat Island Effects?

Urban heat islands increase the temperature in densely populated areas and have significant negative consequences. These areas can be [2 to 9 degrees hotter](#) than less-developed areas, and this temperature difference can be fatal, especially as temperatures continue to rise.¹⁶⁴ Shindell and colleagues (2020) estimate that [27,000 deaths a year occur in the United States](#)¹⁶⁵ due to [excessive heat](#).¹⁶⁶ Many of the flood risk mitigation strategies we noted above also serve as approaches for reducing urban heat island effects. As with addressing high flood-risk areas, low-income communities and communities of color must be prioritized when implementing infrastructure to decrease the urban heat island effect. Not only are some low-income neighborhoods exposed to higher heat risks as a result of their geographic locations, but residents in those neighborhoods also typically have fewer resources to afford amenities such as air conditioning. Reducing city temperatures [benefits air quality](#), which improves residents' overall health, which is especially important for underresourced communities that may not have equal access to health care.¹⁶⁷

The city has begun taking steps in the right direction with the [Climate Ready DC Plan](#), but faster and more extensive action could be taken to save lives and decrease inequality.¹⁶⁸ Potential strategies could be as simple as [adding more bus shelters](#) so that low-income residents are not sweltering in the sun.¹⁶⁹ Other, more substantial possibilities include providing access to air conditioning and installing cool roofs and cool pavements in underresourced, high-risk communities.

Cool Roofs

In addition to green roofs, cool roofs have the potential to mitigate urban heat island effects by [reducing the amount of heat transferred from roofs to the air](#).¹⁷⁰ Cool roofs are painted with reflective material and therefore transfer less heat into buildings than typical roofing materials. These roofs also reduce air temperature as a result of their high reflectivity. In 2009, New York City launched the [NYC CoolRoofs](#) program with the goal of coating one million square feet of rooftops per year with white paint.¹⁷¹ Installing cool roofs can [reduce air conditioning costs in buildings by up to 30 percent, while simultaneously reducing internal building temperatures by 30 percent in the summer](#).¹⁷² The program has coated more than 6.7 million square feet of rooftop space and eliminated about 2,690 metric tons of carbon dioxide equivalent emissions. Not only has New York City capitalized on the environmental benefits of cool roofs, but it also used this program as an opportunity to provide jobs for the unemployed. The city is offering a 10-week training and work experience program installing these cool roofs for 70 people per year. After workers complete the program, New York connects them to permanent employment opportunities. Lastly, in 2017, CoolRoofs NYC launched a plan to concentrate \$2.6 million dollars in highly vulnerable neighborhoods. If DC chooses to implement this strategy, underserved high-risk neighborhoods should be prioritized.

Cool Pavement

Cool pavements can also help curb urban heat island effects. Like cool roofs, cool pavements are light-colored pavements that reflect the sun's radiation and absorb less heat. A [New York City simulation](#) found that reflective pavements used alongside cool roofs and tree plantings can lower ambient temperatures by 4 to 9 degrees Fahrenheit.¹⁷³ Research has also shown that cool pavement has the potential to [reduce the frequency of heat waves by 41 percent across the US](#).¹⁷⁴

Phoenix, Arizona, began its [Cool Pavement Program in 2020](#).¹⁷⁵ In its first year, the program showed that cool pavement surface temperatures were on average [10.5 to 12 degrees cooler](#) during daylight hours than asphalt or concrete.¹⁷⁶ Nighttime air temperatures were an average of 0.5 degrees lower with cool pavement than non-treated surfaces at six feet high. Although the preliminary findings showing the

surface temperature reductions were much stronger than air temperature reductions, this strategy—especially when used in conjunction with other strategies—can be effective in urban heat island mitigation efforts.¹⁷⁷ The study also found that implementing cool pavement reduced greenhouse gas emissions by 6 percent and has the potential to decrease its carbon dioxide emissions by 6 percent over 50 years.¹⁷⁸ The important findings from this study can provide an impetus for DC to consider implementing a similar program.

How Can DC Increase Digital Inclusion?

Inequities in broadband access became abundantly apparent during the COVID-19 pandemic and the associated transition to online learning and work.¹⁷⁹ Increasing access to the internet combats “digital redlining”¹⁸⁰ and increases opportunity for excluded people—necessary for social equity and economic growth. In 2014–18, 17.81 percent of DC’s households had no internet access.¹⁸¹ The eastern part of the city experiences the greatest inequality, with no internet access in 38.79 percent of households in the River Terrace, Benning, Greenway, and Dupont Park neighborhoods. Rectifying those inequities must be a top priority, as it directly relates to the well-being of DC’s residents, particularly the underserved.

Increase Online Access

Some cities have found ways to increase online access. In Boston, policies incentivized competition between tech companies by offering more internet and cable options, thus reducing the price of internet access for all.¹⁸² Los Angeles now requires an equal number of new installations of 5G networks in wealthy neighborhoods and “digitally impoverished” areas.¹⁸³ Before equitable digital access is attained, however, non-internet strategies for digital communication must be implemented by city governments, such as dial-in options for online gatherings, text banking, and phone banking.

How Can DC Maximize Civic Infrastructure for an Inclusive Recovery?

Cities may also increase inclusion by investing in civic infrastructure during a recovery period. Civic infrastructure is usually defined as infrastructure that is invisible or intangible, such as social and cultural aspects of a community, as well as the physical spaces to facilitate that infrastructure. Greenspan and Mason (2017) describe civic infrastructure as a “city’s public spaces and civic assets (collection of physical sites and buildings) as well as the social processes and cultural practices animating those places.”¹⁸⁴ More concisely, “Civic infrastructure is the invisible structures and processes through which the social contract is written and rewritten in communities.”¹⁸⁵ Concrete examples of civic infrastructure include parks and squares, recreation centers, and libraries. Examples of the more intangible aspects of civic infrastructure include tourism, arts and cultural programming, and local sporting events.

The goal of investing in civic infrastructure is to intentionally enable civic capacity, without which the society is more likely to serve a narrow and elite constituency in which moneyed interests overtake the interests of the general public. Blair and Kopell (2015) argue that a civic infrastructure must be designed to “broaden participation and, particularly, to engage those on the margins.”¹⁸⁶ Otherwise, an elite cadre of interests will fill the vacuum.

Many frameworks have emerged to promote civic infrastructure using the concept of “place” or “placemaking.” Commonly used frameworks, however, often focus on temporary programming, such as “tactical placemaking” or “creative placemaking.” Although popular, these programs advocate for cheap, pop-up, short-term efforts and activities for communities, such as beer gardens or temporary art installations. Common frameworks also often fail to define measurement and evaluation, which can exacerbate those inequalities they attempt to address. To address those critiques, Greenspan and Mason (2017) argue for a new concept of “place-keeping,” which acknowledges the weaknesses of placemaking, advocates for the role of community engagement in creating civic infrastructure, rethinks the way that civic-asset reinvestment should be attained, and argues for long-term development.¹⁸⁷

Seattle Park District

The Seattle, Washington, parks and recreation department has been working to develop this more inclusive civic infrastructure through the Seattle Park District.¹⁸⁸ In 2017, the Seattle Park District launched new programs to address the growing diversity of the city and to work toward increased inclusion by investing in youth of color, reducing barriers to access, and developing culturally relevant programming. The city's trails program engages with youth of color through the public school system's service learning program; the city's community center hours were extended in underserved communities; and women's single-gender swims were offered to those women who for cultural, personal, or religious reasons choose to swim in single-sex environments.

Parks and Affordable Housing

Although investing in inclusive civic infrastructure is important, care must also be taken to ensure that community assets do not lead to increases in housing costs that can then displace and inadvertently harm lower-income communities and communities of color. For example, with more traditional civic infrastructure such as parks and transit, new investments can—absent proper efforts to mitigate displacement—lead to an increase in housing prices and a lack of affordable rental units for low-income renters, who are more likely to be people of color.¹⁸⁹ Infrastructure investments (and potential subsequent gentrification) may displace and increase inequitable outcomes for people and communities who could have benefited the most from that infrastructure.¹⁹⁰

In 2011, DC launched its [11th Street Bridge Equitable Development](#) project.¹⁹¹ The first aim of the project was to convert an out-of-use bridge into a public park to connect [low- and high-income neighborhoods](#) on the opposite sides of the river from one another.¹⁹² The second aim was to increase equity, especially for the Black residents in Wards 7 and 8, focusing on supporting small businesses, creating and advertising for affordable housing, developing the workforce, and amplifying culture. From 2017 to 2019, 104 small Ward 7 and 8 businesses were assisted by Bridge Park's partner, the Washington Area Community Investment Fund; and 31 Bridge Park-sponsored construction trainees from Wards 6, 7, and 8 got full-time jobs, among other achievements. DC should look to their equitable planning process, which [relied heavily on community involvement](#), to implement strategies similar to this in other parts of the city.¹⁹³

Investing in preserving and developing affordable housing in high-opportunity neighborhoods and in neighborhoods that will receive community assets can help ensure that lower-income residents are able to remain in place and benefit from this civic infrastructure.

Conclusion

Through recent legislation, the federal government is investing unprecedented levels of funds in states and localities, and jurisdictions such as Washington, DC, have a once-in-a-generation opportunity to leverage those funds to implement recovery plans that directly address social and racial disparities. To ensure that the recovery reduces inequities rather than reinforcing them, states and localities need to intentionally center equity in their recovery efforts, targeting resources not only to those most affected by the pandemic but also to those who faced inequities before the pandemic. Recovery plans that address long-standing patterns of inequity will not only benefit the historically disinvested but also regenerate economies at a scale that will be felt by all.

DC can restructure its infrastructure and housing policies and projects inclusively and equitably in response to the COVID-19 pandemic—not only because times of upheaval are prime moments to rethink systems and institutions but also because of the massive influx of federal funding that the city will soon have available. The city should seize this opportunity to improve equity for generations to come by investing in improved transportation systems, affordable and safe housing, and equitable infrastructure more broadly.

Notes

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- ¹ Samantha Artiga, Rachel Garfield, and Kendal Orgera, “Communities of Color at Higher Risk for Health and Economic Challenges due to COVID-19” (San Francisco: Kaiser Family Foundation, 2020); Shikha Garg, Lindsay Kim, Michael Whitaker, Alissa O’Halloran, Charisse Cummings, Rachel Holstein, Mila Prill, et al., “Hospitalization Rates and Characteristics of Patients Hospitalized with Laboratory-Confirmed Coronavirus Disease 2019—COVID-NET, 14 States, March 1–30, 2020” *Morbidity and Mortality Weekly Report* 69, no. 15 (2020): 458.
 - ² ReOpen DC Committee, “Equity and Vulnerable Populations,” Government of the District of Columbia, updated July 30, 2020, <https://coronavirus.dc.gov/page/reopen-dc-committee-equity-and-vulnerable-populations>.
 - ³ “Tracking COVID-19’s Effects by Race and Ethnicity: Questionnaire One: Updates on People’s Health, Housing, and Livelihoods between April 23 and July 21,” Urban Institute, updated July 30, 2020, <https://www.urban.org/features/tracking-covid-19s-effects-race-and-ethnicity-questionnaire-one>.
 - ⁴ “Washington, DC,” Urban Institute, April 25, 2018, updated September 15, 2020, https://apps.urban.org/features/inclusion/index.html?city=washington_DC.
 - ⁵ Erika C. Poethig, Solomon Greene, Christina Plerhoples Stacy, Tanaya Srin, and Brady Meixell, *Inclusive Recovery in US Cities* (Washington, DC: Urban Institute, 2018).
 - ⁶ Infrastructure Investment and Jobs Act, H. Rept. 3684 (2021), <https://www.congress.gov/bill/117th-congress/house-bill/3684/text>.
 - ⁷ US Department of Transportation Office of Public Affairs, “The Bipartisan Infrastructure Law Will Deliver for the District of Columbia,” news release, 2021.
 - ⁸ Tony Romm, “With Infrastructure Victory in Hand, Democrats Brace for Next Battle over \$2 Trillion Spending Bill,” *Washington Post*, November 6, 2021.
 - ⁹ Christina Plerhoples Stacy, Wilton Oliver, Rebecca Dedert, Nikhita Airi, and Alena Stern, *How Equity Helps Lift All Boats* (Washington, DC: Urban Institute, 2021).
 - ¹⁰ Gregory Acs, Rolf Pendall, Mark Treskon, and Amy Khare, *The Cost of Segregation: National Trends and the Case of Chicago, 1990-2010* (Washington, DC: Urban Institute, 2017).
 - ¹¹ Jan K. Brueckner and Yves Zenou, “Space and Unemployment: The Labor-Market Effects of Spatial Mismatch,” *Journal of Labor Economics* 21, no. 1 (January 2003): 242–62.
 - ¹² Fredrik Andersson, John C. Haltiwanger, Mark J. Kutzbach, Henry O. Pollakowski, and Daniel H. Weinberg, “Job Displacement and the Duration of Joblessness: The Role of Spatial Mismatch,” Working paper 2006, National Bureau of Economic Research, Cambridge, MA, 2014.
 - ¹³ Christina Stacy, Brady Meixell, and Serena Lei, *Too Far from Jobs: Spatial Mismatch and Hourly Workers* (Washington, DC: Urban Institute, 2019).
 - ¹⁴ Christina Plerhoples Stacy and Olivia Fiol, “Inclusive Recovery to Increase Equity: A Review of the Literature to Inform City Recovery Efforts Following the COVID-19 Pandemic” (Washington, DC: Urban Institute, 2021).
 - ¹⁵ Urban Institute, “Community Engaged Methods,” accessed November 10, 2021, <https://www.urban.org/research-area/community-engaged-methods>.
 - ¹⁶ Susan Shaheen and Stephen Wong, “Public Transit and Shared Mobility COVID-19 Recovery: Policy Recommendations and Research Needs” (Washington, DC: Urban Institute, 2020).
 - ¹⁷ Christina Plerhoples Stacy, Yipeng Su, Eleanor Noble, Alena Stern, Kristin Blagg, Macy Rainer, and Richard Ezike, *Access to Opportunity through Equitable Transportation: Lessons from Four Metropolitan Regions* (Washington, DC: Urban Institute, 2020).
 - ¹⁸ Tom Roussey, “New Data Reveals Traffic on Some Major Roads in DC Area Worse than Before the Pandemic,” ABC 7 News, November 12, 2021.
 - ¹⁹ Government of the District of Columbia, “The Vision Zero Initiative,” accessed November 10, 2021, <https://ddot.dc.gov/page/vision-zero-initiative>.
 - ²⁰ Jordan Pascale, “D.C. Auditor Looking Into Vision Zero Program, Which Has Only Reduced Traffic Fatality Total Once In Six Years,” *DCist*, WAMU, September 22, 2021.

-
- ²¹ Editorial Board, “Opinion: It’s Time to Get Serious About Reducing Traffic Deaths,” *Washington Post*, October 7, 2021.
- ²² Yesim Sayin Taylor, “The Demographics of Walking and Biking to Work Tell Yet Another Story of Gentrification” (Washington, DC: DC Policy Center, November 17, 2021).
- ²³ Julie Zauzmer Weil, “D.C.’s Black Lives Matter Plaza, Created Overnight, Is Now a Permanent Multimillion-Dollar Concrete Installation,” *Washington Post*, October 28, 2021.
- ²⁴ Paige Hopkins, “Pedestrians Face Greater Danger as D.C. Reopens,” *Axios*, September 20, 2021.
- ²⁵ Luke Lukert, “Alexandria Closes Block Permanently for Pedestrian Use,” *WTOP News*, October 17, 2021.
- ²⁶ Petra Gust-Kazakos, “How to Make Cities More Walkable,” PTV Group, January 10, 2020.
- ²⁷ “20 by 22 Bikeways” (map), District of Columbia Department of Transportation, December 11, 2020).
- ²⁸ “Bicycle Program,” District of Columbia Department of Transportation, accessed November 10, 2021, <https://ddot.dc.gov/page/bicycle-program>.
- ²⁹ “District of Columbia Bicycle Master Plan Proposed Bicycle Facilities Map,” DC Department of Transportation, April 2005).
- ³⁰ Josh Kramer, “D.C.’s New Vision Zero Law Could Be a Boon for Bike Lanes,” *Bloomberg CityLab*, February 2, 2021.
- ³¹ “Cambridge Bicycle Safety,” accessed November 10, 2021, <https://www.cambridgebikesafety.org/>.
- ³² “16th Street NW Bus Lanes Project,” DC Department of Transportation, accessed November 10, 2021, <https://ddot-cp-16-st-nw-bus-dcgis.hub.arcgis.com/>.
- ³³ Jordan Pascale, “Construction Begins on D.C.’s Longest Bus Lane On 16th Street,” *DCist*, WAMU, March 17, 2021.
- ³⁴ Keya Chatterjee, Delia Houseal, and Robb Dooling, “Here’s What We Can Do to Make Transit More Equitable in DC,” *Greater Greater Washington*, February 23, 2021.
- ³⁵ “Bus Ridership Data Viewer,” Washington Metropolitan Area Transit Authority, accessed November 10, 2021 <https://www.wmata.com/initiatives/ridership-portal/Bus-Data-Portal.cfm>.
- ³⁶ “Improving Bus Service Across New York City,” Metropolitan Transportation Authority, updated June 30, 2021, <https://new.mta.info/projects/bus-improvements>.
- ³⁷ Reid Sigety and Edwin Bull, “Why E-Bikes Are at the Forefront of Future Urban Mobility,” Panasonic Corporation of North America, accessed November 10, 2021.
- ³⁸ Micah Toll, “Proposed US Tax Credit for Electric Bikes Back up to 30%, Capped at \$1,500 Incentive,” *Electrek*, October 28, 2021.
- ³⁹ This is a promising practice that is currently being developed. Susan Carpenter, “California Will Offer E-Bike Rebates with New Electric Bicycle Incentive Project,” *Spectrum News*, September 1, 2021.
- ⁴⁰ “Financial Aid to Encourage Clean Mobility,” Paris, updated November 29, 2021, <https://www.paris.fr/pages/lutte-contre-la-pollution-les-aides-a-la-mobilite-5373>.
- ⁴¹ “Purchase Premium for Bicycles,” Île-de-France Mobilités, <https://www.iledefrance-mobilites.fr/le-reseau/services-de-mobilite/velo/prime-achat-velo>.
- ⁴² Scott Taylor, “What Is a Cargo Bike and Why You Should Want One?” Argo, accessed November 10, 2021, <https://argobikes.com/pages/about-us>.
- ⁴³ Nicolas Maviel, “Paris: Amazon Relies on Own Deliveries,” *Le Parisien*, November 9, 2021.
- ⁴⁴ “France Sets New Record with over 50% E-Bike Market Share Value,” *Bike Europe*, April 15, 2021, <https://www.bike-eu.com/market/nieuws/2021/04/france-sets-new-record-with-over-50-e-bike-market-share-value-10140311>.
- ⁴⁵ Rory Carroll, “Five Myths About Electric Vehicles,” *Washington Post*, September 24, 2021.
- ⁴⁶ “Electric Vehicle Market Outlook in 2021 and Beyond: New Product Developments, Growth of the Charging Infrastructure and Market Share Data for the Major Vehicle Manufacturers— ResearchAndMarkets.com,” *Business Wire*, October 11, 2021.

-
- ⁴⁷ Benjamin Preston, “EVs Offer Big Savings Over Traditional Gas-Powered Cars,” *Consumer Reports*, October 08, 2020.
- ⁴⁸ Mark Kane, “US: All-Electric Car Market Share Expands To 2.5% In H1 2021,” *Inside EVs*, August 14, 2021.
- ⁴⁹ Claudia Assis, “Billions of Dollars in Infrastructure Bill for Charging Could Supercharge Electric Vehicle Adoption,” *Market Watch*, November 11, 2021.
- ⁵⁰ Henry Grabar, “Where the Heck Are We Going to Charge All of the Electric Cars?” *Slate*, October 28, 2021.
- ⁵¹ Ian Lovett, “New York City Installs First Curbside Electric-Vehicle Charging Station,” *Wall Street Journal*, June 24, 2021.
- ⁵² “Blue Orange Silver Capacity & Reliability Study,” Washington Metropolitan Area Transit Authority, accessed November 10, 2021, <https://www.wmata.com/initiatives/plans/BOS-Study.cfm>.
- ⁵³ Michael Manville, “Measure M and the Potential Transformation of Mobility in Los Angeles,” Research report, University of California Institute of Transportation Studies, January 2019.
- ⁵⁴ Greater Washington Partnership, “Capital Region Rail Vision,” accessed November 10, 2021, <https://greaterwashingtonpartnership.com/capital-region-rail-vision/>.
- ⁵⁵ Metrolinx, “GO Expansion,” *Metrolinx Engage*, accessed November 10, 2021, <https://www.metrolinxengage.com/en/participation-opportunities/current?collection=106>.
- ⁵⁶ Metrolinx, “Overview: New Stations and Station Access,” *Metrolinx Engage*, accessed November 10, 2021, <https://www.metrolinxengage.com/en/content/overview-new-stations-and-station-access>.
- ⁵⁷ Yonah Freemark, Jorge González-Hermoso, Jorge Morales-Burnett, Preeti Shankar, Cyatharine Alias, and Heidy Persaud, *On the Horizon: Planning for Post-Pandemic Travel* (Washington, DC: Urban Institute, November 9, 2021).
- ⁵⁸ Bryan W. Wenter, “New Law Provides Land Use Authority to BART to Create Transit-Oriented Development Near Stations,” *Miller Starr Regalia Land Use Developments* (blog), October 3, 2018.
- ⁵⁹ “BART Prioritizes Affordable Housing with TOD Policy Update,” Bay Area Rapid Transit, April 24, 2020.
- ⁶⁰ Christina Sturdevant, “Report: Life Expectancy In D.C. Differs Greatly By Race,” *DCist*, WAMU, July 5, 2016.
- ⁶¹ David Mudarri and William J. Fisk, “Public Health and Economic Impact of Dampness and Mold,” *Indoor Air* 17, no. 3: 226–35.
- ⁶² Claudia J. Coulton, Francisca Richter, Seok-Joo Kim, Robert Fischer, and Youngmin Cho, “Temporal Effects of Distressed Housing on Early Childhood Risk Factors and Kindergarten Readiness,” *Children and Youth Services Review* 68 (2016): 59–72.
- ⁶³ Amy M Burdette, Terrence D. Hill, and Lauren Hale, “Household Disrepair and the Mental Health of Low-Income Urban Women,” *Journal of Urban Health* 88, no. 1 (2011): 142–53.
- ⁶⁴ Jack P Shonkoff, W. Thomas Boyce, and Bruce S. McEwen, “Neuroscience, Molecular Biology, and the Childhood Roots of Health Disparities: Building a New Framework for Health Promotion and Disease Prevention,” *Journal of the American Medical Association* 301, no. 21 (June 3, 2009): 2252–9.
- ⁶⁵ Samiya A. Bashir, “Home Is Where the Harm Is: Inadequate Housing as a Public Health Crisis,” *American Journal of Public Health* 92, no. 5 (May 2002): 733–8.
- ⁶⁶ See Virginia A. Rauh, Ginger R. Chew, and Robin S. Garfinkel, “Deteriorated Housing Contributes to High Cockroach Allergen Levels in Inner-City Households,” *Environmental Health Perspectives* 110, no. 2 (2002); Joshua Sharfstein, Megan Sandel, Robert Kahn, and Howard Bauchner, “Is Child Health at Risk while Families Wait for Housing Vouchers?” *American Journal of Public Health* 91, no. 8 (2001): 1191–92; Mary Shaw, “Housing and Public Health” *Annual Review of Public Health* 25 (2004): 397–418; Claudia J. Coulton, Francisca Richter, Seok-Joo Kim, Robert Fischer, and Youngmin Cho, “Temporal Effects of Distressed Housing on Early Childhood Risk Factors and Kindergarten Readiness,” *Children and Youth Services Review* 68 (2016): 59–72; Samiya A. Bashir, “Home Is Where the Harm Is: Inadequate Housing as a Public Health Crisis,” *American Journal of Public Health* 92, no. 5 (2002): 733–38; Earle C. Chambers and Emily Rosenbaum, “Cardiovascular Health Outcomes of Latinos in the Affordable Housing as an Obesity Mediating Environment (AHOME) Study: A Study of Rental Assistance Use,” *Journal of Urban Health* 91 (2014): 489–98; Judith Bell, Gabriella Mora, Erin Hagan, Victor Rubin, and Allison Karpyn, “Access to Healthy Food and Why It Matters: A Review of the Research” (Oakland, CA: PolicyLink, 2013); Deborah A. Cohen, Karen Mason, Ariane Bedimo, Richard Scribner, Victoria Basolo, and Thomas A. Farley, “Neighborhood Physical

-
- Conditions and Health.” *American Journal of Public Health* 93, no. 3 (2003): 467–71; Christina Stacy, “The Effect of Vacant Building Demolitions on Crime under Depopulation” (Washington, DC: Urban Institute, 2017).
- ⁶⁷ Christina Stacy, Joseph Schilling, Steve Barlow, Ruth Gourevitch, Brady Meixell, Stephanie Modert, Christina Crutchfield, Esther Sykes-Wood, and Richard Urban, *Strategic Housing Code Enforcement and Public Health: A Health Impact Assessment in Memphis, Tennessee* (Washington, DC: Urban Institute, 2018).
- ⁶⁸ Erwin de Leon and Joseph Schilling, *Urban Blight and Public Health Addressing the Impact of Substandard Housing, Abandoned Buildings, and Vacant Lots* (Washington, DC: Urban Institute, April 11, 2017).
- ⁶⁹ DC Department of Housing and Community Development, November 17, 2022. <https://dhcd.dc.gov/node/987732>.
- ⁷⁰ “Improving Your Home with Maryland WholeHome,” Maryland Department of Housing and Community Development, November 17, 2021, <https://dhcd.maryland.gov/Residents/Pages/WholeHome.aspx>.
- ⁷¹ Doni Crawford, *Affordable Housing: All Residents, Especially Longtime Black and Brown Native DC Residents, Have a Safe and Affordable Place to Call Home* (Washington, DC: DC Fiscal Policy Institute, February 5, 2020).
- ⁷² Susie McClannahan, “ERC Testifies at DC Housing Authority Performance Oversight Hearing,” Equal Rights Center, March 16, 2021.
- ⁷³ “Council Again Unanimously Advances Ambitious and Meaningful Budget, Including Bump in Public Safety Spending,” Council of the District of Columbia, August 4, 2021.
- ⁷⁴ Crawford, *Affordable Housing*.
- ⁷⁵ Crawford, *Affordable Housing*.
- ⁷⁶ Ann Oliva, “BBB Includes Major Investments in Housing Affordability,” *Off the Charts* (blog), Center on Budget and Policy Priorities, November 4, 2021.
- ⁷⁷ “New Communities Initiative (NCI),” Office of the Deputy Mayor for Planning and Economic Development, November 7, 2021. <https://dmped.dc.gov/page/new-communities-initiative-nci>.
- ⁷⁸ Nena Perry-Brown, “Greenleaf Residents Are Left on Edge as Build-First Redevelopment Plan Falls Apart,” Greater Washington, May 20, 2021.
- ⁷⁹ Margery Austin Turner, Leah Hendeby, Maya Brennan, Peter Tatian, and Kathryn Reynolds, *Meeting the Washington Region’s Future Housing Needs: A Framework for Regional Deliberations* (Washington, DC: Urban Institute, September 4, 2019).
- ⁸⁰ Ingrid Ellen, Erin Graves, Katherine O’Regan, and Jenny Schuetz, *Strategies for Increasing Affordable Housing Amid the COVID-19 Economic Crisis* (Washington, DC: Brookings Institution, June 8, 2020).
- ⁸¹ Stacy, Schilling, et al., *Strategic Housing Code Enforcement and Public Health*.
- ⁸² Christina Stacy and Olivia Fiol, *Inclusive Recovery to Increase Equity: A Review of the Literature to Inform City Recovery Efforts Following the COVID-19 Pandemic* (Washington, DC: Urban Institute, May 2021).
- ⁸³ Mary Cunningham and Graham MacDonald, *Housing as a Platform for Improving Education Outcomes Among Low-Income Children* (Washington, DC: Urban Institute, May 2012).
- ⁸⁴ Brenda C. Spillman, Jennifer Biess, and Graham MacDonald, *Housing as a Platform for Improving Outcomes for Older Renters* (Washington, DC: Urban Institute, April 2012).
- ⁸⁵ Will Fischer, *Research Shows Housing Vouchers Reduce Hardship and Provide Platform for Long-Term Gains Among Children*, Center on Budget and Policy Priorities, October 7, 2015.
- ⁸⁶ Wael Altali, Jonathan Hillman, and Sarah Tekleab, *Assessing Affordable Housing Availability and its Effects on Employers’ Ability to Recruit and Retain Employees in Greater Boston* (Boston: Northeastern University, April 2017).
- ⁸⁷ Ritashree Chakrabarti and Junfu Zhang, “Unaffordable Housing and Local Employment Growth: Evidence from California Municipalities,” *Urban Studies* 52, no. 6: 1134–51.
- ⁸⁸ Edward L. Glaeser, Joseph Gyourko, and Raven E. Saks, “Why Have Housing Prices Gone Up?” November 8, 2021. https://inequality.stanford.edu/sites/default/files/media/_media/pdf/Reference%20Media/Glaeser_Gyourko_Saks_2005.pdf.

-
- ⁸⁹ Stephen Malpezzi, "Housing Prices, Externalities, and Regulation in U.S. Metropolitan Areas," *Journal of Housing Research* 7, no. 2 (1996).
- ⁹⁰ John M. Quigley and Steven Raphael, "Regulation and the High Cost of Housing in California," *American Economic Review* 95, no. 2 (February 2005): 323–8.
- ⁹¹ Liyi Liu, Douglas A. McManus, and Elias Yannopoulos, "Geographic and Temporal Variation in Housing Filtering Rates," November 2021.
- ⁹² Evan Mast, "The Effect of New Market-Rate Housing Construction on the Low-Income Housing Market," Working paper 19-307, (Upjohn Institute, Kalamazoo, MI, July 1, 2019).
- ⁹³ Christina Stacy, Chris Davis, Yonah Freemark, Lydia Lo, Graham Macdonald, Vivian Zheng, and Rolf Pendall, "Land-Use Reforms and Housing Costs: Does Allowing for Increased Density Lead to Greater Affordability?" Working paper.
- ⁹⁴ Maura Brophy, "DC Now Allows Accessory Apartments to Be Built in Residential Zones. What Happens Next?" Greater Washington, October 16, 2017.
- ⁹⁵ Nena Perry-Brown, "DC's Busiest Development Neighborhood in 2021: The 20 Projects in the Works for NoMa," *Urban Turf*, July 28, 2021.
- ⁹⁶ Jenny Schuetz, *Restrictive Zoning Is Impeding DC's Goal to Build More Housing* (Washington, DC: Brookings Institution, October 8, 2019).
- ⁹⁷ Lydia R. P. Lo, Eleanor Noble, Diane K. Levy, and Rolf Pendall, *Land Use Reforms for Housing Supply: Case Studies on the Process for Passing and Implementing Regulation Changes* (Washington, DC: Urban Institute, October 2020).
- ⁹⁸ Jenny Schuetz, *Restrictive Zoning Is Impeding DC's Goal to Build More Housing*.
- ⁹⁹ Emily Thaden and Ruoniu Wang, "Inclusionary Housing in the United States: Prevalence, Impact, and Practices," Working paper, Lincoln Institute of Land Policy, Cambridge, MA, September 2017.
- ¹⁰⁰ See Vicki Been, Ingrid Gould Ellen, and Sophia House, "Laboratories of Regulation: Understanding the Diversity of Rent Regulation Laws," *Fordham Urban Law Journal* 46 (2019): 1041; Vinit Mukhija, Ashok Das, Lara Regus, and Sara Slovin Tsay, "The Tradeoffs of Inclusionary Zoning: What Do We Know and What Do We Need to Know?" *Planning Practice and Research* 30, no. 2 (2015): 222–35; Kriti Ramakrishnan, Mark Treskon, and Solomon Greene, *Inclusionary Zoning: What Does the Research Tell Us about the Effectiveness of Local Action?* (Washington, DC: Urban Institute, 2019).
- ¹⁰¹ "Inclusionary Zoning (IZ) Affordable Housing Program," DC Department of Housing and Community Development, November 8, 2021. <https://dhcd.dc.gov/service/inclusionary-zoning-iz-affordable-housing-program>.
- ¹⁰² Christina Plerhoples Stacy, Jorge Morales-Burnett, Eleanor Noble, Timothy Hodge, and Timothy Komarek, *Inclusionary Zoning: How Different IZ Policies Affect Tenant, Landlord, and Developer Behaviors* (Washington, DC: Urban Institute, July 2021).
- ¹⁰³ Stacy et al., *Inclusionary Zoning*.
- ¹⁰⁴ Chicago Department of Housing, "City Council Approves Revised Affordable Requirements Ordinance," April 21, 2021, <https://www.chicago.gov/city/en/depts/doh/provdrs/developers/news/2021/march/mayor-lightfoot-and-department-of-housing-introduce-revised-affo.html>.
- ¹⁰⁵ Michael Brice-Saddler, "D.C. Attorney General's Office Takes on New Role in Affordable Housing Advocacy," *Washington Post*, December 2, 2021.
- ¹⁰⁶ Government of the District of Columbia Office of the Attorney General, *OAG Text Amendment Petition to the Zoning Commission: Z.C. Case No. 21-XX—Increased Affordability for Inclusionary Zoning*, December 2, 2021.
- ¹⁰⁷ Stacy et al., *Inclusionary Zoning*.
- ¹⁰⁸ Kathryn Howell, Scott Bruton, and Anna Clemens, *Creating and Sustaining Limited Equity Cooperatives in the District of Columbia* (Washington, DC: Coalition for Nonprofit Housing and Economic Development, February 2020).
- ¹⁰⁹ Howell, Bruton, and Clemens, *Creating and Sustaining Limited Equity Cooperatives*.
- ¹¹⁰ Government of the District of Columbia, "Mayor Muriel Bowser's FY 2021–FY 2025 Federal Recovery Budget," June 2, 2021.

https://mayor.dc.gov/sites/default/files/dc/sites/mayorbmb/page_content/attachments/Federal%20Recovery%20Budget%20Narrative.pdf.

- ¹¹¹ Suggestions from May 21, 2021, Safety Net Hearing Policy Recommendations.
- ¹¹² Government of the District of Columbia, “Federal Recovery Budget.”
- ¹¹³ Gabriella Velasco, “How Community Land Trusts Can Advance Racial and Economic Justice: An Expert Q&A,” *Housing Matters*, February 26, 2020.
- ¹¹⁴ Velasco, “How Community Land Trusts Can Advance Racial and Economic Justice.”
- ¹¹⁵ Britta Green, “Voters in St. Paul, Minnesota, to Decide on Strict Rent Control Proposal,” *Marketplace*, October 27, 2021.
- ¹¹⁶ “Creating Chapter 193A of the Legislative Code (Title XIX) pertaining to Residential Rent Stabilization,” <https://s3.documentcloud.org/documents/21045803/proposed-saint-paul-ord.pdf>.
- ¹¹⁷ “What You Should Know About Rent Control in the District of Columbia,” Government of the District of Columbia Department of Housing and Community Development, accessed March 2, 2022, <https://dhcd.dc.gov/sites/default/files/dc/sites/dhcd/publication/attachments/RentControlFactSheet.pdf>.
- ¹¹⁸ Christina Plerhoples Stacy, Eleanor Noble, Jorge Morales-Burnett, Timothy Hodge, and Timothy Komarek, *Rent Control: Key Policy Components and Their Equity Implications* (Washington, DC: Urban Institute, July 2021).
- ¹¹⁹ Stacy, Noble et al., *Rent Control*.
- ¹²⁰ Kathryn M. Leifheit, Sabriya L. Linton, Julia Raifman, Gabriel L. Schwartz, Emily A. Benfer, Frederick J. Zimmerman, and Craig Evan Pollack, “Expiring Eviction Moratoriums and COVID-19 Incidence and Mortality,” *American Journal of Epidemiology* 190, no. 12 (December 2021): 2503–10.
- ¹²¹ Government of the District of Columbia, “DHS COVID-19 Reports,” *StayDC Dashboard*, November 8, 2021. <https://stay.dc.gov/dashboard>.
- ¹²² Center on Budget and Policy Priorities, *Tracking the COVID-19 Economy’s Effects on Food, Housing, and Employment Hardships*, COVID Hardship Watch (Washington, DC: Center on Budget and Policy Priorities, updated November 10, 2021).
- ¹²³ U.S. Department of the Treasury, ERA 1 Round 1 Reallocation, accessed January 2022.
- ¹²⁴ See letter from DC Organizations to Mayor Bowser, November 10, 2021, <https://www.dcfpi.org/wp-content/uploads/2021/11/STAY-DC-Eviction-Prevention-Funding-Letter-to-Mayor-Bowser-1.pdf>.
- ¹²⁵ Mary K. Cunningham, “It’s Time to Reinforce the Housing Safety Net by Adopting Universal Vouchers for Low-Income Renters” *Urban Wire* (blog), Urban Institute, April 7, 2020.
- ¹²⁶ Suggestions from May 21, 2021, Safety Net Hearing Policy Recommendations.
- ¹²⁷ Carl Romer, Andre M. Perry, and Kristen Broady, *The Coming Eviction Crisis Will Hit Black Communities the Hardest* (Washington, DC: Brookings Institution, August 2, 2021).
- ¹²⁸ Rachel Treisman, “In Likely First, Chicago Suburb of Evanston Approves Reparations for Black Residents,” *NPR*, March 23, 2021.
- ¹²⁹ Rashawn Ray and Andre M. Perry, “Why We Need Reparations for Black Americans,” Brookings Institution, April 15, 2020.
- ¹³⁰ “Sustainable DC 2.0 Plan,” Government of the District of Columbia, accessed November 10, 2021, https://sustainable.dc.gov/sites/default/files/dc/sites/sustainable/page_content/attachments/sdc%202.0%20Edits%20V5_web_0.pdf.
- ¹³¹ Vince Morris, “DC Water Announces Lead Pipe Replacement Plan: DC Water Releases Plan to Remove All Lead Service Lines in the District by 2030,” PC-DC/Office of the People’s Council, June 7, 2021.
- ¹³² Karen Yi, “Newark Has Replaced Nearly All Its Lead Pipes in Record Time,” *WNYC News*, October 6, 2021.
- ¹³³ “Replacing Lead Pipes—A Newark Success Story,” *The Economist*, April 17, 2021.
- ¹³⁴ Michael Bailey, Eric LaRose, and Jenny Schuetz, *What Will It Cost To Save Washington, D.C.’s Renters from COVID-19 Eviction?* (Washington, DC: Brookings Institution, July 23, 2020).

-
- ¹³⁵ David Porter, “After Drinking Water Crisis, Newark is Winning War on Lead,” *ABC News*, November 7, 2021.
- ¹³⁶ DC Water, *DC Water’s Lead Service Line Replacement Plan*, June 2021, https://www.dewater.com/sites/default/files/documents/lfdc_summary_6_7_21x.pdf.
- ¹³⁷ Kevin Armstrong, “‘Hallelujah Moment’: How This City Overcame Its Lead Crisis,” *New York Times*, August 11, 2021.
- ¹³⁸ Clare Fieseler and Brady Dennis, “Newark Begins Giving Residents Bottled Water Amid Ongoing Lead Problems,” *Washington Post*, August 12, 2019.
- ¹³⁹ Melissa Denchak, “Green Infrastructure: How to Manage Water in a Sustainable Way,” Natural Resources Defense Council, March 4, 2019.
- ¹⁴⁰ Government of the District of Columbia Department of Energy and Environment, “Why Is Stormwater a Problem?” accessed November 10, 2021, <https://doee.dc.gov/service/why-stormwater-problem>.
- ¹⁴¹ US Environmental Protection Agency, “Soak Up the Rain: Permeable Pavement,” accessed November 10, 2021, <https://www.epa.gov/soakuptherain/soak-rain-permeable-pavement>.
- ¹⁴² Government of the District of Columbia Department of Energy and Environment, “2021 Permeable Surface Rebate Program,” accessed November 10, 2021, <https://doee.dc.gov/service/permeablesurfacerebate>.
- ¹⁴³ Katrina Fuller, “Village of Lakewood Completes Chaut. Avenue Green Street Retrofit Project,” *The Post-Journal*, November 19, 2021.
- ¹⁴⁴ Government of the District of Columbia Department of Energy and Environment, “Climate Ready DC: The District of Columbia’s Plan to Adapt to a Changing Climate,” accessed November 10, 2021, https://doee.dc.gov/sites/default/files/dc/sites/d DOE/service_content/attachments/CRDC-Report-FINAL-Web.pdf.
- ¹⁴⁵ US Environmental Protection Agency, “Manage Flood Risk,” accessed November 10, 2021, <https://www.epa.gov/green-infrastructure/manage-flood-risk>.
- ¹⁴⁶ Kit Un, “Fact Sheet: Bioretention Areas,” Metropolitan Area Planning Council, September 15, 2016.
- ¹⁴⁷ Denchak, “Green Infrastructure.”
- ¹⁴⁸ Jenny Gathright, “Climate Change Won’t Affect All Washingtonians Equally,” *DCist*, September 19, 2019.
- ¹⁴⁹ DC Health Matters, “2021 Demographics: Summary Data for Ward: Ward 7,” updated January 2021, <https://www.dchealthmatters.org/demographicdata?id=131494>.
- ¹⁵⁰ US Environmental Protection Agency, “Soak Up the Rain: Disconnect/Redirect Downspouts,” accessed November 10, 2021, <https://www.epa.gov/soakuptherain/soak-rain-disconnect-redirect-downspouts>.
- ¹⁵¹ Scott Einberger, “Community Spotlight: Tavon Garner-Lundy, Downspout Disconnect Green Infrastructure Supervisor,” Rock Creek Conservancy, May 22, 2018.
- ¹⁵² Nelly Ruiz, Jason Vogel, and Saleh Taghvaeian, “Minimizing Stormwater Runoff by Disconnecting Residential Downspouts,” *OSU Extension*, May 2017.
- ¹⁵³ “RiverSmart Homes—Rain Barrels,” Government of the District of Columbia Department of Energy and Environment, accessed November 10, 2021, <https://doee.dc.gov/service/riversmart-homes-rain-barrels>.
- ¹⁵⁴ Government of the District of Columbia, “Sustainable DC 2.0 Plan.”
- ¹⁵⁵ DC Water, “Drain the Rain!” 2021, <https://www.dewater.com/sites/default/files/project/documents/2021%20Downspout%20Disconnection%20Factsheet.pdf>.
- ¹⁵⁶ DC Water, “Downspout Disconnection Program,” accessed November 10, 2021, <https://dewater.com/projects/downspout-disconnection-program>.
- ¹⁵⁷ Natural Resources Defense Council, “Portland, Oregon, Case Study of How Green Infrastructure Is Helping Manage Urban Stormwater Challenges,” *Rooftops to Rivers II* (New York: Natural Resources Defense Council, 2013).
- ¹⁵⁸ City of Milwaukee, “Milwaukee Downspout Disconnection Program,” accessed November 10, 2021, <https://city.milwaukee.gov/SWMP/DDP>.

-
- ¹⁵⁹ Milwaukee Metropolitan Sewerage District, “Chapter 3: Management, Operations, and Maintenance of Tributary Sewers,” May 2014, <https://www.mmsd.com/application/files/2414/8191/7481/Chapter3May2014.pdf>.
- ¹⁶⁰ DC Water, “Downspout Disconnection Program.”
- ¹⁶¹ Denchak, “Green Infrastructure.”
- ¹⁶² Groundwater Foundation, “All About Rain Gardens,” accessed November 10, 2021, <https://www.groundwater.org/action/home/raingardens.html>.
- ¹⁶³ “Benefits of Rain Gardens: Prevent Flooding and Reduce Water Pollution with Rain Gardens,” 12,000 Rain Gardens in Puget Sound, Washington State University, and Stewardship Partners, accessed November 10, 2021, <https://www.12000raingardens.org/about-rain-gardens/benefits/#>.
- ¹⁶⁴ Jorge Reyes and Marty Rosen, *Heat Island Effect Reduction Through Materials Usage & Design*, New Jersey Department of Environmental Protection, September 2007.
- ¹⁶⁵ Drew Shindell, Yuqiang Zhang, Melissa Scott, Muye Ru, Krista Stark, and Kristie L. Ebi, “The Effects of Heat Exposure on Human Mortality Throughout the United States,” *GeoHealth* 3 (2020), <https://socialequity.duke.edu/wp-content/uploads/2020/04/Melissa-Scott.pdf>.
- ¹⁶⁶ Sadie E. Francis, “DC: Planting for the Climate of the Future: Washington, DC’s Efforts to Counter Urban Heat Islands,” Chesapeake Tree Canopy Network, 2021.
- ¹⁶⁷ Global Cool Cities Alliance, *Practical Guide to Cool Roofs and Cool Pavements*, January 2012.
- ¹⁶⁸ Government of the District of Columbia Department of Energy and Environment, *Climate Ready DC*, 2021.
- ¹⁶⁹ Marcelo Jauregui-Volpe, Leul Bulcha, Alex Martin, Isabella Padilla, David Lopez Mendez, Madison E. Goldberg, David H. Moreno, Marco Gutiérrez, and Amanda Chirinos, “Cooling D.C. Requires Thinking About Who’s Most Vulnerable to Heat” (Washington, DC: Pulitzer Center, August 30, 2021).
- ¹⁷⁰ Heat Island Group, “Cool Roofs,” Berkeley Lab, accessed November 10, 2021.
- ¹⁷¹ City of New York, *Cool Neighborhoods NYC: A Comprehensive Approach to Keep Communities Safe in Extreme Heat*, June 14, 2017.
- ¹⁷² City of New York, *Cool Neighborhoods NYC*.
- ¹⁷³ City of New York, *Cool Neighborhoods NYC*.
- ¹⁷⁴ Randolph E. Kirchain and Hessam AzariJafari, “Lighter Pavement Really Can Cool Cities,” *GreenBiz*, July 20, 2021.
- ¹⁷⁵ City of Phoenix, “Cool Pavement Program,” accessed November 10, 2021, <https://www.phoenix.gov/streets/coolpavement>.
- ¹⁷⁶ City of Phoenix and Arizona State University Urban Climate Research Center, *Cool Pavement Pilot Program*, September 2021.
- ¹⁷⁷ City of Phoenix and Arizona State University Urban Climate Research Center, *Cool Pavement Pilot Program*.
- ¹⁷⁸ Andrew Logan, “Countering Climate Change With Cool Pavements,” *MIT News*, August 22, 2021.
- ¹⁷⁹ “Can We Alleviate Racism and Systemic Inequality by Expanding Broadband During COVID-19?” Brookings Institution, accessed December 18, 2020, <https://www.brookings.edu/events/can-we-alleviate-racism-and-systemic-inequality-by-expanding-broadband-during-covid-19/>.
- ¹⁸⁰ Bill Callahan, “AT&T’s Digital Redlining of Cleveland,” National Digital Inclusion Alliance, March 10, 2017, <https://www.digitalinclusion.org/blog/2017/03/10/atts-digital-redlining-of-cleveland/>.
- ¹⁸¹ “Greater DC,” (map), Urban Institute, accessed November 10, 2021, <https://greaterdc.urban.org/data-explorer?geography=cl17&indicator=PctBroadband&topic=connection&year=2014-18>.
- ¹⁸² City of Boston, “Broadband and Digital Equity,” accessed December 18, 2020, <https://www.boston.gov/innovation-and-technology/broadband-and-digital-equity>.
- ¹⁸³ Kim Hart, “How 5G May Widen the Rural-Urban Digital Divide,” *Axios*, September 22, 2018, <https://www.axios.com/5g-digital-divide-19b70d34-4978-44df-a1cb-ae9222d113ef.html>.

-
- ¹⁸⁴ Elizabeth Greenspan and Randall Mason, *Civic Infrastructure: A Model for Civic Asset Reinvestment* (Philadelphia: William Penn Foundation, 2017), https://williampennfoundation.org/sites/default/files/reports/PennPraxis_CivicInfrastructure_April%202017.pdf.
- ¹⁸⁵ Elizabeth A. Walsh, William J. Becker, Alexandra Judelsohn, and Enjoli Hall, "Civic Infrastructure and Sustainable Regional Planning," *Cityscape* 19, no. 3 (2017): 63–92, <https://www.huduser.gov/portal/periodicals/cityscpe/vol19num3/ch3.pdf>.
- ¹⁸⁶ Jill Blair and Malka Kopell, *21st Century Civic Infrastructure: Under Construction* (Washington, DC: Aspen Institute, 2015), <https://aspencommunitysolutions.org/wp-content/uploads/2013/06/21st-Century-Report-FINAL-NoBlanks.pdf>.
- ¹⁸⁷ Elizabeth Greenspan and Randall Mason, *Civic Infrastructure: A Model for Civic Asset Reinvestment* (Philadelphia: William Penn Foundation, 2017).
- ¹⁸⁸ Christina Hirsch, "Seattle Parks and Recreation Focuses on Inclusiveness and Equity," *Seattle Parks and Recreation*, January 20, 2017, <https://parkways.seattle.gov/2017/01/20/7559/>.
- ¹⁸⁹ Isaac William Martin and Kevin Beck, "Gentrification, Property Tax Limitation, and Displacement," *Urban Affairs Review* 54, no. 1 (2018): 33–73, <https://doi.org/10.1177%2F1078087416666959>; NLIHC (National Low Income Housing Coalition), *Out of Reach* (Washington, DC: NLIHC, 2019), <https://reports.nlihc.org/oor/2019>.
- ¹⁹⁰ Lisa Rayle, "Investigating the Connection Between Transit-Oriented Development and Displacement: Four Hypotheses," *Housing Policy Debate* 25, no. 3 (2015): 531–48, <https://doi.org/10.1080/10511482.2014.951674>; Nick Revington, "Gentrification, Transit, and Land Use: Moving Beyond Neoclassical Theory," *Geography Compass* 9, no. 3 (2015): 152–63, <https://doi.org/10.1111/gec3.12203>.
- ¹⁹¹ Urban–Greater DC, "11th Street Bridge Park Equitable Development," Urban Institute, accessed November 10, 2021, <https://greaterdc.urban.org/11th-street-bridge-park-equitable-development>.
- ¹⁹² Mary Bogle, Somala Diby, and Mychal Cohen, *How DC's Bridge Park and Other Stakeholders Can Successfully Drive Equitable Development Amid Past, Present, and Future Challenges* (Washington, DC: Urban Institute, March 15, 2019).
- ¹⁹³ Mary Bogle, Somala Diby, and Eric Burnstein, *Equitable Development Planning and Urban Park Space: Early Insights from DC's 11th Street Bridge Park Project* (Washington, DC: Urban Institute, July 2016).