TECHNICAL REPORT:

Estimating the Cost to Preserve the Nation's Public Housing Stock

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FOR PUBLIC HOUSING SUSTAINABILITY

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About PAHRC

The Public and Affordable Housing Research Corporation (PAHRC), a nonprofit, is a member of the HAI Group family of companies. PAHRC spotlights the impact, outcomes, and value that affordable housing brings to families and communities. We deliver data and tools that help researchers, practitioners, and advocates build evidence-based cases for why affordable housing matters. For more information about PAHRC, please visit www.pahrc.org.

About 10 Year Roadmap for Public Housing Sustainability

The mission of 10 Year Roadmap for Public Housing Sustainability is to engage a wide range of stakeholders to advance the continued evolution and preservation of public housing through a 10 year reinvestment plan that establishes a sustainable, affordable, and service-enriched housing platform for residents to achieve their life goals. For more information, please visit https://www.10yearroadmap.org/

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Executive Summary

This report outlines a new approach to estimate the baseline cost to preserve the remaining U.S. public housing stock before factoring in building system upgrades to reduce operating expenses and repairs designed to protect the asset and extend the life of the building. This analysis is based on costs associated with public housing properties that recently underwent conversions through the Rental Assistance Demonstration (RAD) program.

We use Ordinary Least Squares (OLS) regression, a research method for understanding linear relationships between variables, to model the association between selected property characteristics and hard construction costs, which are the labor and material expenses associated with physical building construction, including: overhead, profit, and general requirements. Estimates from the model are then used to predict hard construction costs for developments in the remaining public housing stock. Next, we apply cost adjustment factors to the predicted hard construction costs to account for soft construction costs, tenant relocation, loan payoff, and acquisition costs.

Key findings:

- **The baseline cost to preserve the nation's public housing portfolio in 2025 is estimated at $188,090 per unit, or $169.1 billion nationwide.** These costs could grow as building systems continue to age if these renovations are not completed all at once.

- **Several pre-conversion characteristics were associated with higher hard construction costs among public housing properties that underwent RAD conversions.** Hard construction costs were significantly higher for public housing properties with lower Real Estate Assessment Center (REAC) scores and lower occupancy rates two years before being converted through RAD. Older properties, those with more bedrooms per unit, and those with higher operating, capital, and rent payments per unit before conversion also faced higher costs. Location was a factor as well, with properties in California, the West, the South, and in cities with higher construction cost indexes were associated with higher hard construction costs after controlling for other property characteristics.

- **Building age was a key driver of hard construction costs for public housing properties that underwent a RAD conversion.** Compared to public housing properties less than 20 years old that were converted through RAD, hard construction expenses for properties 60 years or older cost on average $135,923 more per unit after controlling for other property characteristics.

- **Estimated preservation costs vary widely across the public housing portfolio.** Nationwide, one-quarter of public housing units have predicted baseline preservation costs under $87,701, while one-quarter have predicted baseline preservation costs exceeding $273,466 per unit.

- **Our study suggests the cost to preserve public housing has grown since the last nationwide public housing capital needs assessment conducted in 2010.** However, these reports are not directly comparable due to methodological differences and this study does not prove public housing across the country is in worse condition than in 2010. Additional research is needed to discern which factors are driving the differences in costs. Possible reasons why these estimates differ include worsening building conditions due to deferred maintenance, construction cost volatility, growing regulatory requirements, a difference in scope of repairs needed, or a combination of these elements.

- **Actual costs to preserve these units could be higher.** Due to data availability, these estimates do not capture the complete added expenses to make public housing property systems more efficient. This includes heat and cooling efficiencies, water use, response to climate hazards, and compliance with the Build America, Buy America Act.

- **Considering existing needs and future annual accrual costs, we estimate that a plan to preserve the nation's public housing stock over a ten-year period could cost approximately $183.7 billion in 2025 dollars.** This ambitious plan assumes that nearly 90,000 public housing units would be preserved each year to modernize all public housing units by 2035. Preserving the nation's public housing stock will take many years as Public Housing Authorities (PHAs) need to secure funding, build capacity, plan, and implement redevelopment efforts.

- **The preservation cost estimates presented in this report do not replace an inspection-based capital needs assessment.** Inspection-based assessments provide a more accurate description of building systems, costs, and required repairs to preserve the public housing stock. We also want to advise that the method of assessing costs detailed in this report should not be applied to an individual property.

Introduction

This section summarizes research on the need to preserve public housing, the impact of preservation for the families and communities who rely on these homes, and the tools available to protect public housing—particularly the RAD program. It also reviews factors associated with construction costs for affordable housing properties, which we used to frame our study and approach.

The Need to Preserve Public Housing

Public housing provides nearly 900,000 affordable homes to 1.5 million people (HUD, 2023b), serving as a critical source of stability for low-income households. Over 3,000 PHAs manage public housing nationwide. These homes support the nation's most vulnerable residents, with 72% of assisted households earning below 30% of the area median income. Of those living in public housing, 20% are older adults over age 62 and 35% are children under age 18. Additionally, nearly one quarter of individuals living in public housing have a disability (Center on Budget and Policy Priorities, 2024).

Compared with other affordable housing programs, public housing has more restrictive income and rent targeting requirements, ensuring affordability for the lowest-income families. The stability provided by public housing is linked to increased lifetime earnings, reduced risk of incarceration, and lower housing cost burdens for families (Andersson et al., 2010; Gold, 2021).

Public housing is found in every state and plays a particularly vital role in the affordable housing landscape in Alabama, New York, Pennsylvania, Rhode Island, Kentucky, Nebraska, and Illinois, where it makes up a quarter or more of the state's affordable rental housing stock (PAHRC, 2025). These homes are in more than 3,200 cities and towns—urban, rural, and suburban neighborhoods alike. While most public housing units are in urban areas, about one in 10 are in rural areas, where they play an outsized role in supporting low-income families in local housing markets.

Operating and capital grants fund PHAs management and maintenance of public housing. The Public Housing Operating Fund covers day-to-day operations, including procedures and systems, preventative maintenance, insurance, energy costs, policymaking, service delivery, and debt service to finance rehabilitation. Meanwhile, the Public Housing Capital Fund is used to build, modernize, and repair public housing units.

Historically, these funding sources have not kept pace with need. A 2010 evaluation found that public housing had amassed a $25.6 billion capital needs backlog, estimating that $3.4 billion annually would be needed to keep up with accruing capital needs (Finkel et al., 2010). This would amount to $103.3 billion today after adjusting for inflation in construction costs, changes in unit counts, and accrued capital needs. Further compounding the challenge, operating and administrative funds often fall short of HUD's projected costs (Hoffman, 2018). Between 2000 and 2021, the Public Housing Operating Fund failed to meet projected operating costs in 18 of 22 years (Human Rights Watch, 2022).

Evidence suggests that capital needs for public housing have grown even higher than projected in Finkel et al.'s 2010, likely due to aging, deterioration, and inflation. The nation's largest PHA, the New York City

Housing Authority (NYCHA), estimated in 2023 it needs $78.34 billion in 2023 dollars to preserve public housing across the city—an estimated average of more than $400,000 per unit (O'Hanlon & Moore, 2023). Major cost drivers identified in NYCHA's capital needs assessment include the remediation and replacement of apartments—renovating bathrooms, floors, kitchens, and doors—as well as modernizing critical building systems such as heat and hot water systems, windows, roofs, parapets, and main doors. Additionally, HUD estimated that if renovations of public housing completed through the Rental Assistance Demonstration (RAD) program between 2021 and 2023 are representative of needs for the remaining public housing stock, $115 billion would be needed to invested in the hard construction costs to preserve these units, plus additional expenses for design and transaction costs (HUD, 2023a).

Rising capital needs are likely influenced by inflation, the compounding effects of deferred maintenance, and growing material and labor costs. When estimating the annual accrual of public housing capital needs, Finkel et al. (2010) assumed that all building systems would be replaced upon the end of their useful life. In reality, chronic underfunding forces PHAs to defer maintenance that is critical to the efficient functioning of the building (Econsult, 2012). Delays can escalate costs because systems that once needed repair may eventually require full replacement (Finkel et al., 2010). A 1988 evaluation of public housing capital needs found that each year capital needs were unaddressed, future needs were projected to increase by 8.7% due to the growing cost of deferred maintenance (ICF, 1989). Further, between 2010 and 2025, construction costs rose 62%, outpacing the 48% rise in the cost of consumer goods and services over the same period (RSMeans, 2025). Maintenance and repair costs are rising across the affordable housing sector more broadly. For example, maintenance and repair costs for Low-Income Housing Tax Credit (LIHTC) properties have increased steadily since at least 2010, with repair costs rising 21.7% between 2022 and 2023 alone (Novogradac, 2024).

Funding shortfalls place PHAs under pressure to make difficult decisions when determining how to operate and maintain their public housing efficiently. Absent sufficient resources to maintain their public housing stock, buildings can fall into disrepair, reducing habitability and harming residents' quality of life (Human Rights Watch, 2022). A permanent 20% reduction in the Public Housing Capital Fund is estimated to displace 126,000 households and result in 71 cents in negative impacts for every dollar saved (Econsult, 2012). When faced with a one-time 20% reduction in capital funding, PHAs commonly report delaying the modernization of existing housing (86%), deferring maintenance (75%), and postponing building efficiency investments (70%). As of 2023, 30% of public housing units failed their latest REAC inspection score—up from 15% five years earlier—suggesting that a growing share of public housing likely requires significant capital investments (PAHRC & NLIHC, 2024). Between 2000 and 2016, HUD reported the loss of approximately 139,000 public housing homes through demolition or disposition (NLIHC, 2019). These actions can displace residents and contribute to the loss of deeply affordable homes, which are difficult to replace.

The following section describes some tools available to PHAs to support the preservation of public housing and ensure it remains a vital resource for their communities.

Public Housing Preservation Tools

Beyond the public housing capital and operating fund, PHAs have a suite of tools available to preserve their public housing stock (see Figure 1). The tools PHAs leverage often depend on eligibility, access to private capital, and whether the PHA and residents want to preserve the housing as public housing or reposition it to other forms of HUD rental assistance.

Most programs available to PHAs to invest in or reposition their public housing do not provide funding to support public housing preservation. Instead, they support preservation by allowing PHAs borrow against their capital or operating fund, leverage private capital, or reposition units into other housing assistance programs with more stable funding stream. We focus on the RAD program in this section since it is the most common public housing preservation tool and provides the basis of public housing preservation costs presented in this report.

Figure 1: Public Housing Investment and Repositioning Tools

Public Housing Investment Tools

- Operating Fund Financing Program
- Capital Fund Financing Program
- Section 30 Mortgages
- Capital Fund
    - Lead-Based Paint Capital Fund (LBPCF)
    - Housing-Related Hazards Capital Fund (HRHCF)
    - Emergency/Natural Disaster Grants
    - Emergency Safety and Security Grants
- Energy Efficiency Incentives
    - Energy Performance Contracting
    - Small Rural Frozen Rolling Base
    - Rate Reduction Incentive
- Mixed Finance Development
- Choice Neighborhoods

Public Housing Repositioning Tools

- Rental Assistance Demonstration (RAD)
- Section 18 Demo/Dispo
- RAD/Section 18 Blends
- Voluntary Conversion
- Section 32 Homeownership
- Choice Neighborhoods

Source: HUD's Office of Urban Revitalization. (2024). Mixed-Finance Development: What It Is & How It Can Help Your PHA. Retrieved from https://files.hudexchange.info/resources/documents/Public-Housing-Repositioning-Mixed-Finance-Development-Slides.pdf

Increasingly, many PHAs choose to reposition their public housing to Section 8 Project-Based Rental Assistance (PRBA) or Project-Based Voucher (PBV) funding streams through the RAD program. Since RAD's creation in 2011, 179,941 public housing units have converted to Section 8 funding streams, with another 295,601 units in the pipeline (RAD Resource Desk, 2025). RAD does not provide PHAs with new funding.

Instead, RAD converts each property's operating and capital subsidies into project-based rental assistance under the Section 8 program. PHAs can then acquire loans, private capital (like Low Income Housing Tax Credits), grants, or other funding sources to address any outstanding capital needs.

Section 8 funding is typically more insulated from funding cuts relative to the public housing program and, depending on allowed rent levels, can increase property income and provide a more stable long-term funding stream. This stability gives lenders greater confidence that PHAs can repay debt, making it easier to secure private capital (HUD, 2021; Cohen, 2022). An operating cost adjustment factor is also applied to rents annually to account for inflation.

Generally, RAD does not increase the funding PHAs receive unless the property qualifies for RAD/Section 18 blends. Tenants who live in units eligible for Section 18 receive Tenant Protection Vouchers, which provide more significant rental subsidies to support tenant relocation. When Section 18 is blended with RAD conversions, Tenant Protection Vouchers are automatically awarded to the property. To qualify for RAD/Section 18 Blends, PHAs must have less than 250 public housing units and commit to closing out their public housing program (Small PHA Blend) or demonstrate that the hard construction costs to preserve their public housing property exceed at least 30% of the cost estimated by HUD to build affordable housing in the region the property is located (Construction Blend).

To convert a property through RAD, PHAs must address their current capital needs, conduct an environmental review, use the most energy or water-efficient appliances, and comply with accessibility requirements when renovating the property (HUD, 2021). HUD underwrites each property that is converted through RAD to ensure it remains financially viable, which makes using the cost associated with these conversions an appealing option to estimate the baseline cost to preserve the remaining public housing portfolio. Properties that PHAs convert through RAD typically undergo renovations to building systems, such as HVAC, elevators, roofs, and facades, though there is variation in what each property requires.

An evaluation of RAD found that the program can help PHAs address capital needs (Econometrica, 2016). Among a sample of public housing and properties that underwent RAD conversions, average short-term capital needs for RAD properties decreased by 65% following conversions. In comparison, short-term capital needs increased for public housing properties by 133% over a similar period (Stout et al., 2019). The study concluded that short-term capital needs decreased because RAD enabled PHAs to finance construction and conduct needed repairs on converted properties. Without these investments, capital needs at these properties would be expected to increase. Despite this success, some PHAs believe RAD may not be an effective tool for preserving large and extremely distressed public housing properties and may not be feasible for small PHAs and public housing in rural communities (Econometrica, 2016). Unless properties have low capital needs, RAD alone does not provide enough resources to PHAs to address deferred maintenance (Furman Center, 2019). Properties with the highest capital needs usually depend on numerous funding sources, which can be limited and competitive. Schwartz & McClure (2021) projected that public housing properties undergoing RAD conversions will use 26% of 4 percent tax credits and 7% of 9 percent tax credits through 2029, demonstrating how the success of RAD is contingent upon funding availability for other affordable housing programs.

These factors may influence the types of properties which PHAs choose to convert through RAD. An evaluation found that while PHAs select properties with a range of capital needs, neighborhoods, and local

conditions, certain characteristics were more common among those converted through 2016. Converted properties were more likely to be owned by larger PHAs, have higher per-unit operating subsidies, lower per-unit expenses, have tenants with lower incomes, larger unit sizes, and be located in metro areas and census tracts with lower poverty rates and higher overcrowding rates (Econometrica, 2016). When selecting which properties to convert to RAD, PHAs reported considering each property's capital needs, the potential for financial challenges, and overall financial feasibility.

The following section reviews studies that examine the property, neighborhood, and organizational characteristics associated with construction costs for affordable housing properties. These studies help us hypothesize which pre-conversion characteristics public housing properties undergoing RAD conversions may be associated with hard construction costs. Because past research on characteristics associated with construction costs for public housing properties are limited, we supplemented our literature review with research on characteristics associated with construction costs from other federally assisted housing programs. Many public housing properties depend on funding from numerous affordable housing programs to make redevelopment efforts pencil out. Therefore, property and characteristics associated with development costs in one affordable housing program could be a comparable proxy for public housing properties. Once identified, these factors were included in the model presented in the methodology section to estimate the costs of modernizing the remaining public housing stock, regardless of which financing tools are used.

Factors Associated with Construction Costs and Capital Needs

Preserving affordable housing incurs both hard and soft construction costs. Hard costs are the labor and material expenses of physical building construction, including overhead, profit, payment, and general construction requirements. Hard costs typically account for 70% to 80% of total construction costs for new multifamily properties (Hoyt, 2020; RSMeans, 2024). Soft costs comprise the remaining 20% to 30% of total development costs. These include permits, property insurance, financing and marketing expenses, and architectural, engineering, developer, and legal fees. Affordable housing properties generally experience higher soft costs than market-rate multifamily housing due to the complexity of financing structures, program requirements, and remediation required to build on available land parcels (Hoyt & Schuetz, 2020b). Affordable housing preservation may also incur additional costs related to demolition, land purchase, and resident relocation. Overall, property characteristics, the local political environment, program requirements, and construction deal complexity can influence hard and soft construction costs.

Research shows that property characteristics are associated with construction costs for affordable housing properties. Most studies focus on the cost to build new affordable housing, though some also examine the cost to renovate affordable housing (GAO, 2018; Lubell & Wolff, 2018; Terner Center, 2024; Terner Center, 2024).

Multiple studies have found that affordable housing developments with more units cost less per unit to build and renovate as they can benefit from economies of scale (GAO, 2018; Lubell & Wolff, 2018; JLARC, 2019; Blue Sky Consulting Group, 2019). Properties funded by tax credits, like the Low Income Housing Tax Credit program, are more costly to build and renovate if they have 2.5 bedrooms or more per unit, likely due to the larger square footage and materials required (Lubell & Wolff, 2018). In California and Oregon, tax

credit properties that are built with elevator structures and target family populations also have higher costs per unit, on average (Newman, Blosser, & Woodward, 2014; Blosser, Preuss, & Newman, 2019).

Among new tax credit properties in California, permanent supportive housing properties cost the most to build per square foot, suggesting that construction costs could be higher among properties serving more vulnerable populations (Reid, Napolitano, & Stambuk-Torres, 2020). Permanent supportive housing properties (long-term affordable housing paired with supportive services for individuals experiencing homelessness or facing complex challenges, such as mental illness or disability) tend to cost more because they are more likely to be built in higher cost cities, include studio units which cost more to build per square foot, and incorporate more durable building designs and materials to protect them from expected additional wear and tear (Kneebone & Rein, 2021). These properties also tend to have more complex financing structures and higher operating costs, which can increase the initial cost of development by requiring the developer to save additional operational reserves upfront (Reid, Napolitano, & Stambuk-Torres, 2020).

Decisions about how properties are constructed are also linked to affordable housing construction costs. For instance, new affordable housing properties built with sustainable building materials typically raise upfront affordable housing development costs, on average (Newman, Blosser, & Woodward, 2014; Blosser, Preuss, & Newman, 2019). At the same time, these materials and systems could reduce long-term operating expenses and protect the asset in the long run (Compass PTS JV, 2020; Dutil & Rousse, 2012; Hajare & Elwakil, 2020). Programs like RAD and LIHTC often require or incentives efficiency updates to protect the property. Funding requirements imposed by local and state programs, and whether a property is rehabilitated or newly constructed, can dictate the extent to which affordable housing properties include system efficient design features. A growing share of states now require or incentivize green building standards in tax credit allocations (Yerena, 2024). Public housing properties converted through RAD after July 2023 must assess likely hazard risks, describe mitigation strategies in their scope of work, develop a property-wide disaster preparedness plan, and use a variety of operating efficient approaches in considering the rehabilitation of building systems.

The complexity of the financing structure and regulatory burden imposed by affordable housing programs can also increase development costs to build new properties (Reid, Napolintano, & Stambuk-Torres, 2020; Kneebone & Reid, 2021). Affordable housing programs, such as Low Income Housing Tax Credits and RAD, impose high regulatory burden by requiring that developers incorporate specific building design features or pay construction workers prevailing wage rates that can increase costs to build and preserve affordable housing (Littlehale, 2017; Palm & Niemeier, 2016; Terner Center, 2024). For instance, the Davis-Bacon Act requires PHAs with contracts higher than $2,000 to pay prevailing wages when building or repairing public housing properties. Nationwide, an estimated 40.6 percent of multifamily development costs are attributable to compliance with federal, state, and local regulations (National Association of Home Builders and National Multifamily Housing Council,2022).

The regulations, applications, and reporting requirements imposed by affordable housing programs can increase soft costs compared with market-rate multifamily properties. An evaluation of nine-percent tax credit properties built across 12 allocating agencies between 2011 and 2015 found that soft construction costs were 32% of total development costs for new construction properties and 27% for renovated properties (GAO, 2018). Affordable rental properties are increasingly financed with multiple funding

sources. While this helps developments "pencil out," it can increase soft costs by adding more partners to negotiate final deal terms, additional paperwork for applications and compliance, and consultant and attorney fees to close the deal (Reid, Napolitano, & Stambuk-Torres, 2020).

Where a property is located is also associated with development costs. On average, newly built and renovated tax credit properties have higher costs when located in metropolitan areas, Qualified Census Tracts (QCTs), cities with higher construction wages, and Difficult to Develop Areas (DDAs) (GAO, 2018; Lubell & Wolff, 2018; JLARC, 2019; Blue Sky Consulting Group; 2019; Reid, Napolitano, & Stambuk-Torres, 2020). Other local conditions associated with affordable housing construction costs for newly built and renovated properties include neighborhood poverty rate, unemployment rate, age of the neighborhood housing stock, and rent relative to the region (Blosser, Preuss, & Newman, 2019; GAO, 2018; JLARC, 2019). Even when land costs are excluded, construction costs are higher when affordable properties are built on costlier parcels, because developers are more likely to construct taller structures with features like underground parking (Newman, Blosser, & Woodward, 2014; Blosser, Preuss, & Newman, 2019).

Local policies and support for affordable housing can also influence construction costs. Development fees, zoning restrictions, land-use regulations, and required consulting studies increase soft construction costs, and prevailing wage requirements can influence hard construction costs (Reid, Napolitano, & Stambuk-Torres, 2020; Hoyt & Schuetz, 2020a). For instance, in California, new tax credit properties that underwent significant and required design-review changes cost 7 percent more to build (Newman, Blosser, & Woodward, 2014). Community opposition can also increase costs by delaying approvals and forcing design modifications to alleviate community concerns (Newman, Blosser, & Woodward, 2014; Blosser, Preuss, & Newman, 2019). These factors are difficult to account for at the national level because local policies and community support vary widely.

Existing property conditions and deferred maintenance can also influence development costs, particularly in public housing. The latest nationwide public housing capital needs assessment identified several property, PHA, and neighborhood characteristics associated with outstanding capital needs (Finkel et al., 2010). Public housing capital needs were higher for family developments and developments operated by larger housing authorities. Capital needs also vary substantially by region, with units in the West having the highest needs and those in the Midwest having the lowest. Differences in capital needs likely emerge due to variation in the age of properties, building type, occupancy type, and the history of redevelopment in these regions. Reid, Napolitano, & Stambuk-Torres (2020) have linked elevator structures to higher construction costs among newly built LIHTC properties. However, Finkel et al. (2010) found that public housing capital needs did not vary across building types, which suggests that building type may not be an important predictor of hard construction costs for public housing specifically.

Methodology

This section presents a new approach to estimating the cost of preserving the nation's public housing stock based on the costs associated with public housing properties that recently underwent a RAD conversion. Using RAD-converted properties as a reference point offers a more efficient and cost-effective alternative to inspection-based assessments and could enable more frequent examination of public housing preservation needs. Construction costs for public housing properties that PHAs converted through RAD were selected as a proxy for estimating the broader costs to preserve public housing properties because of the breadth of publicly available data, the reduced cost required to conduct this assessment, the large sample size available to draw conclusions from, and the thorough capital needs assessments that PHAs are required to complete prior to converting properties through RAD. It is important to note that this cost estimation approach is not intended to endorse RAD conversion as a preferred strategy for the entire public housing portfolio. According to HUD (2023a), past research has found that public housing properties participating in RAD were comparable to the remaining public housing stock prior to conversion and may be a good proxy to assess potential needs for remaining public housing units.

A total of 889 properties, 133,400 units, underwent RAD conversions between 2018 and August 2024. Of these, 741 properties with 117,699 units had sufficient data on pre-conversion characteristics to be included in the analysis.

Estimating Hard Costs

Since properties that PHAs convert through RAD may not fully represent the remaining public housing stock, the first step in our analysis is to use Ordinary Least Squares (OLS) regression, a research method for understanding the linear relationships between variables. This allows us to account for observable differences in pre-conversion property characteristics that could influence hard construction costs.

Specifically, we fit a regression of hard construction costs per unit among public housing properties that underwent RAD conversions between 2018 and August 2024, using the relevant pre-conversion property characteristics associated with hard construction costs that we identified in our literature review. This step quantified the average relationship between each property characteristic and hard construction costs. We conducted a correlation matrix analysis, assessed multicollinearity using Variance Inflation Factors (VIF), and tested various model specifications to select our final list of property characteristics (Figure 2).

Based on these analyses, we excluded both census tract poverty rate because it was highly correlated with whether a property was in a Qualified Census Tract (r=.58), and target tenant type because it was highly correlated with the number of bedrooms per unit (r=-.69). We used the Bayesian Information Criterion (BIC), a tool for comparing different statistical models, to identify which grouping of building age and type resulted in the best model fit.

We were unable to account for state or local policies, support for affordable housing, complexity of financing structure, or durability of building design due to data limitations. We used building age, REAC score, and past redevelopment through HOPE VI as proxies for the condition of each building. We

conducted sensitivity analyses to compare how the predicted costs change when we analyzed alternative sub-samples of public housing properties that underwent RAD conversions in our model.

Missing values for remaining public housing developments were imputed as the weighted average per-unit value across the public housing portfolio within the development's census region and metro area (urban vs. rural). Figure 18 in the appendix lists our data sources and the data preparation section of the appendix describes how these data were compiled.

While our model uses hard construction costs associated with public housing that underwent RAD conversions to project the baseline costs to preserve the remaining public housing stock due to data availability, PHAs could preserve these properties using other programs, such as the Public Housing Capital Fund.

We chose to examine the cost incurred by conversions that closed during the past six years based on feedback from stakeholders in the 10 Year Roadmap for Public Housing Sustainability. This aligns with the roll-out of RAD/Section 18 Blends, which expanded the range of properties PHAs could preserve using RAD. Additionally, HUD (2023a) has indicated that more recent conversions may provide a better indication for renovations PHAs may need to complete at their remaining public housing properties.

Figure 2: Pre-Conversion Property Characteristics Included in the Initial Model

Description	Potential Relationship to Per Unit Baseline Hard Costs
Closing year	Controls for time-specific factors that influence development costs for all properties.
Census region: West (excluding California), Midwest, Northeast, South, and California	Costs may vary by region due to differences in building costs or needs in different areas.
Rural location	Construction costs may differ by geographic area type due to access to financing, support for affordable housing, and access to supplies and labor to support construction.
Difficult to Develop Area (DDA)	Properties in DDAs could have higher development and land costs.
Qualified Census Tract (QCT)	QCTs are census tracts in which more than 25% of the population earns below poverty or 50% of households earn below 60% of the area median income. Past studies have found properties in QCTs have higher per unit development costs, likely due to additional tax credits these properties are eligible to receive.
RSMeans construction cost index	Construction costs may be higher in areas with higher labor and material costs.
Occupancy rate of development two years prior to conversion	Properties with lower occupancy rates may be less desirable and have higher unmet needs.
Total units: Less than 50, 50-100, more than 100	Properties with higher total unit counts may be able to leverage economies of scale during redevelopment efforts.
Average bedrooms per unit	Properties with more bedrooms per unit may have higher costs.
Multifamily building	Multifamily buildings, like high rises, may have more expensive building systems that require replacement.
Average age of buildings in development based on average date of full availability: under 20, 20-39 years, 40-59 years, 60+ years	Properties that are older may have greater outstanding needs. Additionally, building age is strongly correlated with whether an owner demolishes and rebuilds a property rather than renovating it (Figure 19).
Previous HOPE VI award	Properties that have been previously redeveloped may have lower current needs.
Most recent REAC score	Properties with lower REAC (physical inspection) scores may have more deficiencies that must be addressed.

Funding per unit per month two years prior to conversion	Properties that receive more funding may have higher operating costs, which could increase construction costs. Funding per unit includes HUD spending and total tenant payment.
PHA size: Small (Less than 250 public housing units), medium (250-1,249 units), large (1,250-6,660 units), and very large (6,600+ units)	Past studies have found that public housing preservation needs vary by PHA size.
Moving to Work (MTW) status	MTW agencies have more funding flexibility which could make it easier for them to address public housing preservation needs.
Whether New York City Housing Authority (NYCHA) owns the property	Properties owned by NYCHA tend to be much older, taller, and larger compared to non-NHYCA public housing properties. These attributes are associated with increases in construction costs.

Our second step is to use the coefficients estimated in the OLS model (the relationships between baseline characteristics and hard costs) to predict the estimated hard costs per unit for the remaining public housing stock as of 2024. The final OLS model includes only the pre-conversion characteristics from Figure 2 that are significantly associated with hard construction costs (see model 2 in Figure 20). This method adjusts for average differences in pre-conversion characteristics between public housing properties already converted through RAD and those that have not. Specifically, we applied the estimated associations between baseline attributes and hard costs from our first stage regressions to the attributes of each remaining public housing development. This process allowed us to calculate an estimated hard construction cost per unit for each remaining public housing development, based on the costs incurred by similar public housing properties that previously underwent RAD conversions. In calculating estimates, we included the average cost-inflator for the year 2024 from the estimated regressions to account for the higher average costs in the most recent year of data.[1]

Estimating Adjustment Factors

We estimated adjustment factors for relocation, loan payoff, and acquisition based on the average costs incurred by PHAs other than NYCHA to convert public housing properties through RAD between 2020 and August 2024 using summary tables published by HUD (HUD, 2024). We used this period because it was the most recent time period average property costs were available and summaries of these costs during this period was only available for properties owned by PHAs other than NYCHA. During this period, relocation costs averaged 2% of each property's hard construction costs and loan payoffs and acquisition costs averaged 9% of hard construction costs (HUD, 2024). Properties located in New York City are still reflected in the final national public housing stock preservation cost estimate.

[1] A small number of properties were predicted to have negative construction costs based on their pre-conversion property characteristics. We censored negative predicted hard construction costs at $0.

We estimated soft construction cost adjustment factors based on the average soft costs reported by the Government Accountability Office (GAO) for 9% LIHTC properties placed in service between 2011 and 2015 (GAO, 2018). LIHTC properties were chosen as a benchmark because prior research shows that soft costs for affordable properties exceed multifamily properties generally due to the additional regulations these properties are subject to (Hoyt & Schuetz, 2020b). The overlap between the two housing stocks is substantial—52% of public housing units converted through RAD during the study period received tax credits. Stakeholders that provided feedback on this report believe that soft costs for public housing properties could be even higher than LIHTC properties due to the additional requirements imposed by RAD.

GAO (2018) found that soft construction costs accounted for 27% of development costs for rehabilitated LIHTC properties and 32% of development costs for newly built LIHTC properties. Since HUD's database of RAD transactions does not include property-level data on the total development costs incurred by PHAs converting their public housing properties through RAD, we projected soft costs based on hard construction costs.[2]

We applied the new construction soft cost allocation factor to public housing properties over the age of 70 years old and the rehabilitation soft cost allocation factor to public housing properties 70 years old or less. Building age serves as a proxy for whether a public housing property would likely undergo new construction, since public housing properties over the age of 60 years old that recently underwent RAD conversions are associated with a significantly higher likelihood of undergoing new construction (Figure 19).

These cost adjustment factors and an example of how preservation costs are calculated for a fictional property are included in Figure 3. Because the methodology used to estimate cost adjustment factors is less robust than the approach used to model hard construction costs, these estimates should be interpreted with more caution.

Estimating Total Baseline Preservation Cost

We calculated the total baseline cost to preserve public housing by first estimating hard construction costs for each public housing development. We then applied the adjustment factors described above to account soft costs, tenant relocation, loan payoff, and acquisition. We then multiplied this by the number of public housing units in each development to estimate overall preservation costs for the full universe of public housing developments. The average total baseline preservation costs are weighted by the total number of units within each property.

[2] To maintain the relationships identified by the GAO, soft construction costs would be 41% of a property's hard construction costs for properties requiring rehabilitation and 52% for properties requiring new construction. For a description of this calculation, refer to the Calculating Cost Adjustment Factors section of the appendix.

Estimating Annual Accrual Costs

We also estimated public housing annual accrual costs, defined as annual costs needed to repair and replace building systems beyond routine maintenance as a properties age. These cost estimates do not account for the effects that inflation, regulations, deferred maintenance, or other factors may have on future costs to preserve public housing properties. Preserving the entire public housing stock in a single year is not feasible due to funding availability, staff capacity, labor requirements, and the logistics of relocating existing tenants during redevelopment. Each year modernization is delayed, additional building systems and components age beyond their useful lifespan, further increasing costs.

To estimate annual accrual costs, we simulated the building age of each remaining public housing property as ten years older than its current age. We used an OLS model to predict the hard costs needed for properties simulated to be ten years older and adjusted for soft construction, relocation, loan payoff, and acquisition costs as described earlier. The difference between the simulated costs if the building was ten years older and the 2025 preservation cost was divided by 10 to estimate the average annual accrual cost over the next decade. All estimates are expressed in 2025 dollars.

Estimating the Baseline Cost to Preserve Public Housing Over the Next 10 Years

Finally, we combined the 2025 baseline cost to preserve the nation's public housing stock with the estimated annual accrual factors for years one through 10. We assumed that preservation would be distributed evenly over the next decade, with approximately 89,905 public housing units modernized each year.

Figure 3: Example Calculation for Fictional Property A

Property A's Per-Unit Baseline Preservation Cost – Model Calculation					
Every Property Starts with a Baseline Hard Construction Cost of -$32,574 due to the model's specification**					
A property that is 60 years old* is associated with an *increase* in hard construction costs of	Multiplied by	Property A is 60 years or older		Change in Total Cost	Running Total
$135,923	x	1	=	$135,923	$103,349
A 1 dollar *increase* in HUD spending and TTP per month is associated with an *increase* in hard construction costs of		HUD spending and TTP per month at Property A			
$40	x	$1,000	=	$40,000	$143,349
A closing date in the current year* is associated with an *increase* in hard construction costs of		Property A is preserved in 2024			
$20,496	x	1	=	$20,496	$163,845
A property with an average of 2 bedrooms per unit* is associated with a *decrease* of hard construction costs of		Property A has 2 bedrooms per unit			
$6,521	x	1	=	-$6,521	$157,323
A Northeast property* is associated with an *increase* in hard construction costs of		Property A is in the Northeast			
$14,672	x	1	=	$14,672	$171,995
A one-point higher REAC score is associated with a *decrease* in hard construction costs of		Property A's REAC score			
$823	x	85	=	-$69,955	$102,040
A multifamily building is associated with an *increase* in hard construction costs of		Property A is multifamily			
$75,370	x	1	=	$75,370	$177,410
A one percentage point increase in the Construction Cost Index is associated with an *increase* in hard construction costs of		Construction Cost Index for Property A's jurisdiction			
$2,159	x	100	=	$215,918	$393,328

A property with 100 units or more* is associated with a *decrease* in hard construction costs of		Property A has 100 units or more			
$3,893	x	1	=	-$3,893	$389,436
A one percentage point higher occupancy rate 2 years prior to conversion is associated with a *decrease* in hard construction costs of		Property A's occupancy rate two years prior to conversion			
$2,943	x	90	=	-$264,870	$124,566
Property A's Baseline Hard Construction Cost Per Unit Is $124,566					
A property's soft construction costs are estimated to be 33% of the hard construction costs		Property A has soft construction costs			
$124,566	x	41%	=	$51,072	$175,637
A property's relocation costs are estimated to be 2% of the hard construction costs		Property A has relocation costs			
$124,566	x	2%	=	$2,491	$178,129
A property's loan payoff and acquisition costs are estimated to be 9% of the hard construction costs		Property A has loan payoff and acquisition costs			
$124,566	x	9%	=	$11,211	$189,340
Property A's Baseline Preservation Cost Per Unit Is $189,340					
With 100 Units, Property A's Baseline Preservation Cost Is $19,934,000					

Note: Numbers in red are constant factors for all properties. Numbers in blue are filled in based on property A's unique characteristics.

**Please note that these construction cost factors will differ depending on categorical characteristics at the property. The baseline property (reference group) is a property with one bedroom per unit, less than 20 years old, under 50 total units, underwent a RAD conversion in 2018, and located in the Midwest census region.*

*** The model's intercept, which in this case is the estimated base cost when all the model's variables are zero, is –$32,574. This number isn't meant to be interpreted on its own since it is not realistic for all the variables to be zero for any given property. A negative intercept is not uncommon or cause for concern in statistical modeling.*

Limitations

While this report presents a framework to estimate the cost to preserve public housing nationwide, it is not intended as a method for estimating the capital needs for individual properties. The estimates do not replace an inspection-based capital needs assessments, which provide a more accurate determination of the specific repairs and construction costs required to preserve public housing.

Our baseline preservation and annual accrual cost estimates for the public housing portfolio are based on a nonrandom sample of properties PHAs elected to convert through RAD. Although our regression model controls for pre-conversion characteristics that may influence preservation needs, additional property or neighborhood characteristics that predict hard construction costs not captured in the model could bias the results. While the results of our regression indicate the size of an association between property characteristics and hard construction costs, it does not indicate a causal relationship. Additionally, how the regression model is constructed, the choice of control variables included, and the sample of properties analyzed can influence the size and strength of associations identified. Because of this, the regression results and predicted hard construction costs represent statistical probabilities rather than certainties. It is possible that the results of our regression are due to random chance or variation in our sample of properties that underwent RAD conversions.

This approach assumes that PHAs fully addressed capital needs during RAD conversions and that the costs incurred by recently converted properties are representative of the costs of future redevelopment costs. If past redevelopment efforts did not fully address capital needs, our estimates may understate actual costs. Likewise, a more transformative redevelopment plan—such as one that demolishes all the oldest public housing properties and incorporates design principles to maximize long-term sustainability—would cost more than our estimates.

Our estimates do not include the full construction costs of making public housing building systems more operationally efficient or protect the asset from natural hazards. While some PHAs incorporate changes that could reduce energy costs and improve resiliency to climate hazards when converting public housing through RAD, these preservation efforts may not encompass deep transformative retrofits. For example, a study of low-income New York state residents found that more than 95% of residents in RAD properties reported uncomfortably hot homes, and 71% reported air quality issues —higher rates than those reported by all low-income households surveyed (Thompson, Mironova, & Stein, 2025). These findings suggest that further investments may be needed to further reduce utility costs and improve habitability

In addition, these estimates do not include unexpected or underestimated long-term capital needs for public housing properties already converted through RAD. Stout et al. (2019) conducted independent physical condition assessments before and after properties underwent RAD conversions and found that post-conversion long-term capital needs were generally higher than projected and, in some cases, exceeded operating reserves—indicating additional investment will likely be required within 20 years.

Our analysis also excludes the cost of replacing public housing units lost to demolition or disposition. As of December 2023, 1,150 housing authorities could rebuild up to 258,788 units through Faircloth authority, which allows PHAs to replace units up to their maximum allocation as of Oct. 1, 1999, should additional funding become available.

The annual accrual cost projections also have additional limitations. We do not account for how future inflation, deferred maintenance, or other changes (such as new regulations) could affect construction costs. It is possible regulations may be added or scaled back that could impact the cost to preserve these properties years from now. If maintenance continues to be deferred, costs will likely rise as systems that could have been repaired require full replacement. Our approach also assumes that property characteristics other than building age —such as inspection scores, occupancy rates, and per-unit funding—remain constant over the next decade, which may not hold true.

For these reasons, we recommend replicating and building upon the model presented in this report in the future, using cost data from more recent RAD conversions, to improve the reliability of future public housing preservation cost estimates.

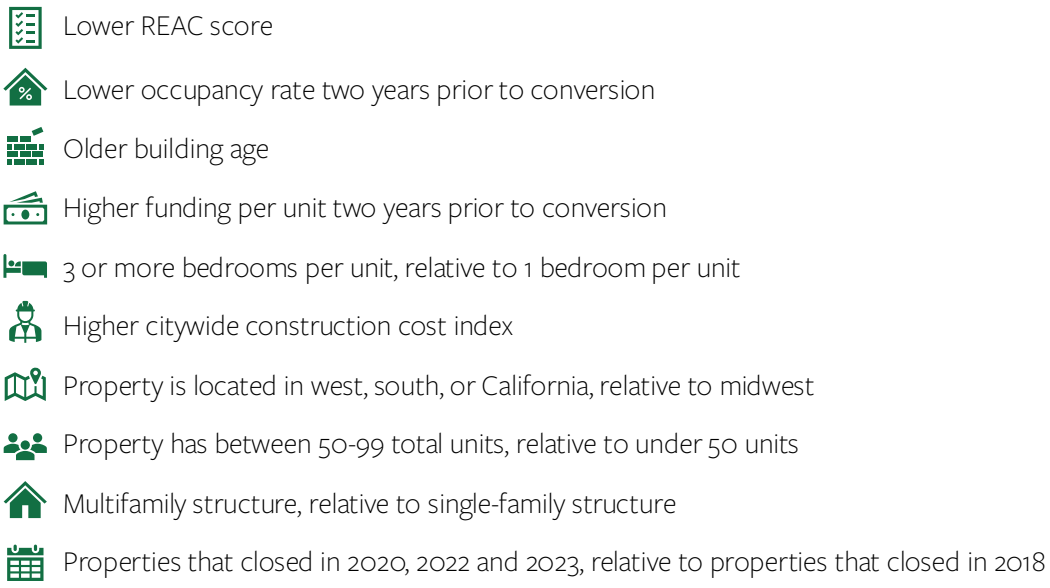
Results

This section presents the factors associated with hard construction costs for public housing properties that underwent RAD conversions. Based on these relationships, we estimate the total cost to preserve the nation's public housing stock.

Factors Associated with Hard Construction Costs for Public Housing Properties that Converted Through RAD

To better understand the factors that are associated with hard construction costs among public housing properties that underwent RAD conversions, we examined the relationship between pre-conversion characteristics and cost outcomes. Holding all else equal, higher hard construction costs per unit were, on average, associated with lower occupancy rates two years prior to conversion, lower REAC inspection scores, older buildings, more bedrooms per unit, multifamily structures, having between 50 and 99 units, higher funding per month per unit two years before conversion, and properties that underwent a RAD conversion in 2020, 2022, and 2023, relative to 2018 (see Figure 4 and 20). These associations align with our expectations based on past research. The full results of the OLS regression model are in Figure 20 in the appendix. Section 3 of the appendix discusses the pre-conversion characteristics that were not associated with hard costs among public housing properties that underwent a RAD conversion.

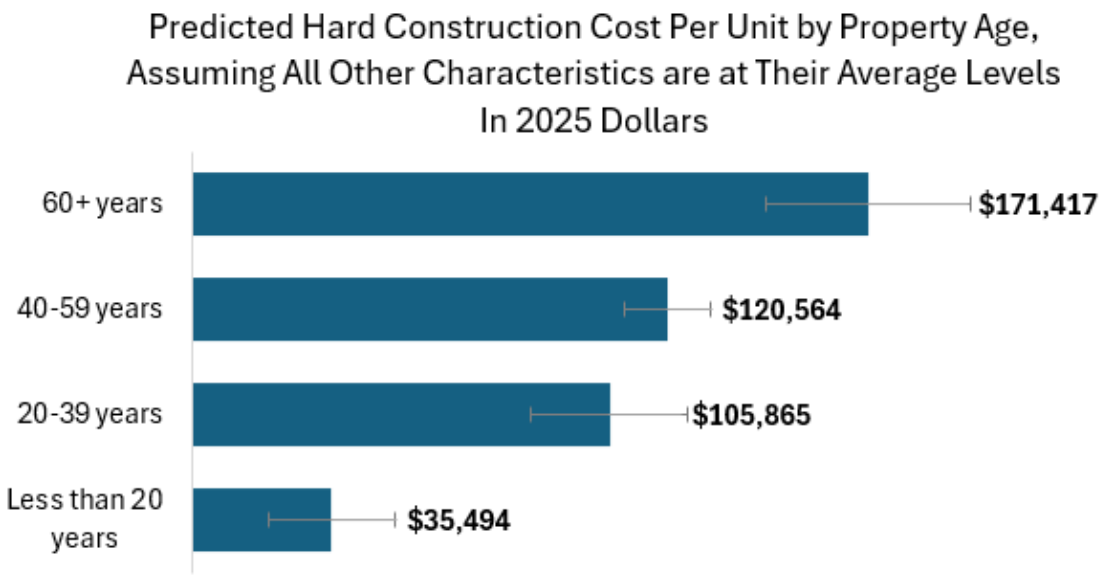
Figure 4: Pre-Conversion Property Characteristics Associated with Higher Hard Construction Costs Per Unit



Source: HUD's RAD Database matched to additional data sources. A full list of data sources is provided in the appendix.
Notes: Based off relationships presented in model 1 of Figure 20.

One of the key drivers of hard costs for public housing properties that underwent RAD conversions was property age (see Figures 5 and 20). Public housing properties that were 60 years or older before converting to RAD cost $135,923 more per unit compared to properties that were under 20 years old after controlling for other property characteristics. When we tested alternative model specifications, we found that costs were greater with every 10 years of age, but there are particularly large jumps between 10-19 years and 20-29 years, and between 50-59 years and over 60 years old (see Figure 25). Older properties may have more extensive capital needs and building systems need to be replaced, and many of those systems may need replacement after about 20 years. The jump in costs at 60 years may reflect that public housing properties of this age that underwent RAD conversions during the study period had a higher probability of being rebuilt through new construction (see Figure 19). Compared to properties under 20 years old, the probability public housing properties underwent new construction was 30 percentage points higher for properties over the age of 60, 9 percentage points higher for properties between 40-59 years, and 6 percentage points higher for properties between 20-39 years, holding all other characteristics constant. Owners of these older public housing properties may deem that it is more cost effective in the long run to rebuild rather than rehabilitate to bring the oldest buildings up to code.

Figure 5: Predicted Hard Construction Costs Per Unit by Average Property Age



Source: HUD's RAD Database matched to additional data sources. A full list of data sources is provided in the appendix.
Notes: Based off relationships presented in model 1 of Figure 20.

Location was also a significant factor. Cities with higher RSMeans construction costs index values were associated with higher per-unit hard construction costs, after controlling for other characteristics. For every 10-point increase in the RSMeans citywide construction cost index, hard construction costs rose by $21,592 per unit. The census region was associated with hard costs. Compared to properties located in the

Midwest, RAD properties in California cost $172,790 more, properties in the West (excluding California) cost $44,866 more, and properties in the South cost $35,140 more, controlling for property characteristics. There is no significant difference in hard costs for public housing properties that converted through RAD in the Northeast, compared to properties in the Midwest, after controlling for other characteristics.

Unit size was also associated with renovation costs. As the average number of bedrooms per unit rose, so did hard construction costs. Properties with an average of three or more bedrooms per unit cost $63,625 more than RAD properties with an average of one bedroom per unit pre-conversion, on average.

Hard costs also gradually rose as REAC scores and occupancy rates fall. For every 10-point increase in REAC score, hard costs were $8,225 lower per unit, on average. For every 10-percentage-point increase in a property's occupancy rate two years before conversion, hard costs were $29,431 lower per unit, on average.

The average hard construction costs to preserve public housing through RAD have increased over time relative to 2018, even after controlling for property characteristics and inflation. On average, hard construction costs for public housing properties that underwent RAD conversion in 2020, 2022, and 2023 were $29,877, $36,057, and $62,494 higher per unit, respectively, than properties that converted in 2018 after controlling for other property characteristics. Although public housing properties that underwent a RAD conversion in 2019, 2021, and 2024 had higher hard costs compared to properties that converted in 2018, on average, these differences were not statistically significant.[3] Higher costs during the pandemic may partly reflect supply chain disruptions that increased material and labor costs, though other factors suggest that elevated costs may be more sustained.

One such factor could be the introduction of the RAD/Section 18 blend, a financing introduced by HUD in 2018. This financing tool allows PHAs to combine RAD with Section 18 demolition/disposition authority, giving them access to higher voucher rents and more flexibility in leveraging private capital. The RAD/Section 18 blend provided additional funding flexibility that has made it more financially feasible for PHAs to leverage RAD to preserve public housing properties with greater capital needs. These changes could have further contributed to elevated hard costs. While introduced in 2018, PHAs did not widely adopt the blend until 2020, which may help explain the sharp rise in costs in subsequent years.

In section 4 of the appendix, we compare how remaining public housing properties differ from public housing units and properties that PHAs converted through RAD. While we find evidence that pre-conversion characteristics of public housing properties that underwent RAD conversions diverge from the remaining public housing portfolio, our approach adjusts for these differences when predicting costs.

Many of the largest differences in property characteristics are not significantly associated with hard construction costs, such as PHA size, NYCHA ownership, or whether a property is located in a QCT or a rural area. Our OLS regression model also adjusts for average differences in observable property characteristics.

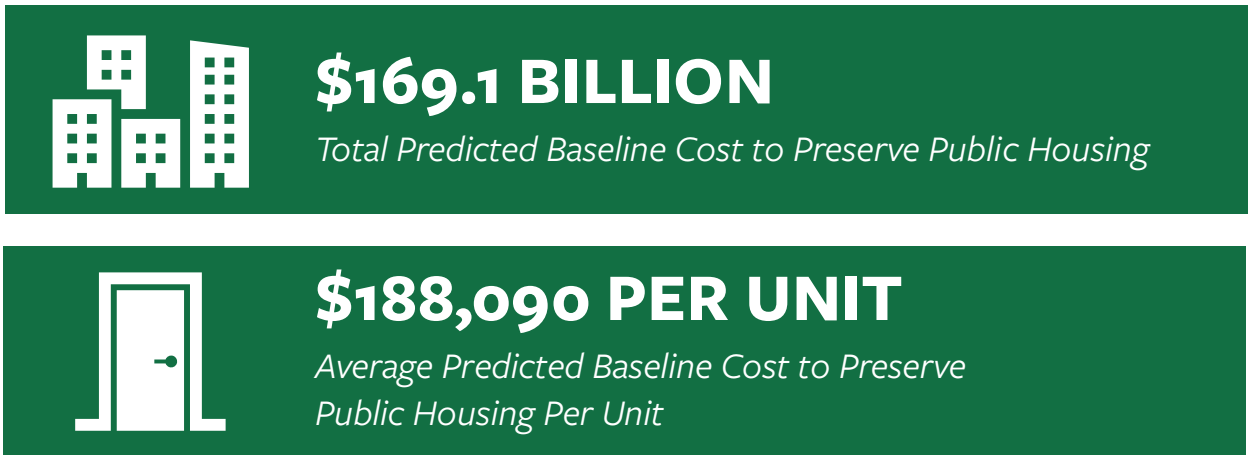
[3] Our sampling frame did not include all public housing properties that underwent a RAD conversion in 2024. Only properties that were converted between January 2024 and July 31, 2024 are included.

Estimates of Baseline Cost to Preserve Public Housing Properties

We project that the total baseline cost to preserve the nation's remaining 889,047 public housing units (as of 2024) in 2025 is $169.1 billion dollars, or $188,090 per unit (Figure 6). Figure 3 in the methodology section shows how a per-unit estimate is calculated for a fictional sample property. This does not mean that it will cost $188,090 to preserve every public housing unit. The actual cost will depend on many factors, including those that are accounted for in our model.

To account for macroeconomic and policy factors associated with construction costs for all properties within a given year, we apply a cost add-on factor for preserving public housing in the most recent year of data available (2024) after holding all other property characteristics constant. These estimates do not capture all expenses required to make these properties the most resilient to natural hazards, energy efficient, and compliant with new regulations, so the actual cost to preserve these units could be higher. The limitations section provides additional details on excluded costs.

Figure 6: Predicted Baseline Cost to Preserve the Nation's Public Housing Properties



Source: HUD's public housing and RAD databases matched to additional data sources, applying the regression coefficients provided in model 2 of Figure 20 in the appendix along with an add on factors for soft construction, tenant relocation, and loan payoff and acquisition costs.

Preserving public housing may involve several categories of expenses: purchasing labor and materials to modernize the property (hard costs), planning and professional services (soft costs), relocating tenants during construction, paying off existing loans, and acquiring property. Of these cost factors, hard construction costs are the most significant expense (see Figure 7). The average public housing unit has a predicted hard construction cost of $122,083. Other predicted per-unit expenses include soft construction costs ($52,579 per unit), loan payoff and acquisition costs ($10,987 per unit), and tenant relocation ($2,442 per unit).

Figure 7: Predicted Baseline Cost by Category

	Total Predicted Baseline Cost	Average Predicted Baseline Cost Per Unit
Hard Construction Costs	$109,757,904,009	$122,083
Soft Construction Costs	$47,270,568,835	$52,579
Tenant Relocation Costs	$2,195,158,031	$2,442
Loan Payoff and Acquisition Costs	$9,878,211,753	$10,987
Total Cost	**$169,101,842,629**	**$188,090**

Source: HUD's public housing and RAD databases matched to additional data sources, applying the regression coefficients provided in model 2 of Figure 20 in the appendix along with add on factors for soft construction, tenant relocation, loan payoff, and acquisition costs. A full list of data sources is provided in the appendix.

There is variation in the predicted costs per unit across properties. Nationwide, one-quarter of public housing units have predicted preservation costs below $87,701, and one-quarter exceed $273,466 (see Figure 8). The median baseline preservation cost is $163,928 per unit.

Figure 8: Predicted Baseline Costs to Preserve Public Housing Per Unit

Baseline Preservation Costs Per Unit (N=899,047)	
Mean	$188,090
Median	$163,928
25th percentile	$87,701
75th percentile	$273,466
Total Across All Units	**$169,101,842,629**

Source: HUD's public housing and RAD databases matched to additional data sources, applying the regression coefficients provided in model 2 of Figure 20 in the appendix along with add on factors for soft construction, tenant relocation, and loan payoff and acquisition costs. A full list of data sources is provided in the appendix.

Comparison to Previous Capital Needs Study

Our study suggests that the baseline cost to preserve public housing has grown since the latest nationwide public housing capital needs assessment conducted in 2010. When adjusting the 2010 study's average modernization needs estimate to include the 15-year annual accrual (depreciation) factor, account for construction inflation using the RSMeans Construction Cost Index, and reflect the change in the number of

public housing units, the study projected an average capital need of $114,887 per unit, totaling $103.3 billion in 2025 dollars (Finkel et al., 2010).

However, the two estimates are not directly comparable. Our analysis includes additional cost factors not accounted for in the 2010 study, including tenant relocation, loan payoff, and acquisition. Removing costs associated with tenant relocation, loan payoff, and acquisition to be more comparable with the scope of costs included in Finkel et al.'s (2010) assessment would reduce our per-unit preservation estimate to $174,661, totaling $157.0 billion in 2025 dollars. Our soft cost adjustment factor, which is based on the actual costs reported by PHAs converting public housing through RAD, is also higher than the 2010 estimate.

More fundamentally, methodological differences also limit comparability. Finkel et al. (2010) used an inspection-based approach to estimate public housing capital needs, while our study relied on costs associated with public housing properties that were recently preserved through RAD to estimate preservation needs, as an inspection-based approach was not feasible due to the time and expense required.

Although a simple comparison of the studies suggests that public housing capital needs are rising, this does not prove that public housing across the country is in worse condition than 2010. Additional research is needed to discern which factors are driving the differences in costs. While we adjust the prior estimate by the RS Means Index, this index may not fully capture cost increases. As Finkel et al. (2010) noted, it is difficult to identify a cost index that perfectly reflects changes in labor and material costs for rehabilitating public housing. Possible additional factors include worsening building conditions due to deferred maintenance, construction cost volatility, growing regulatory requirements, a difference in scope of repairs needed, or a combination of these elements.

Additionally, Finkel et al. (2010) assumed that building systems would be replaced upon the end of their useful life, which may underestimate accrued public capital needs. In practice, PHAs may defer maintenance due to long-term funding cuts. Deferring maintenance can cause systems that once needed to be repaired to be fully replaced, further escalating capital needs.

The costs presented in this report reflect the experience of preserving public housing properties and may more accurately reflect contingency costs that arise during construction. Contingencies are markups that account for any uncertainties that arise once a construction project is started, such as remediating an environmental hazard or an additional scope of work that was not anticipated. Finkel et al. (2010) included a 4% mark up for contingencies, which is below the industry average. For instance, USDA recommends that 5-10% should be included as a contingency markup for new multifamily construction and 10-15% for multifamily rehabilitation (USDA, 2015).

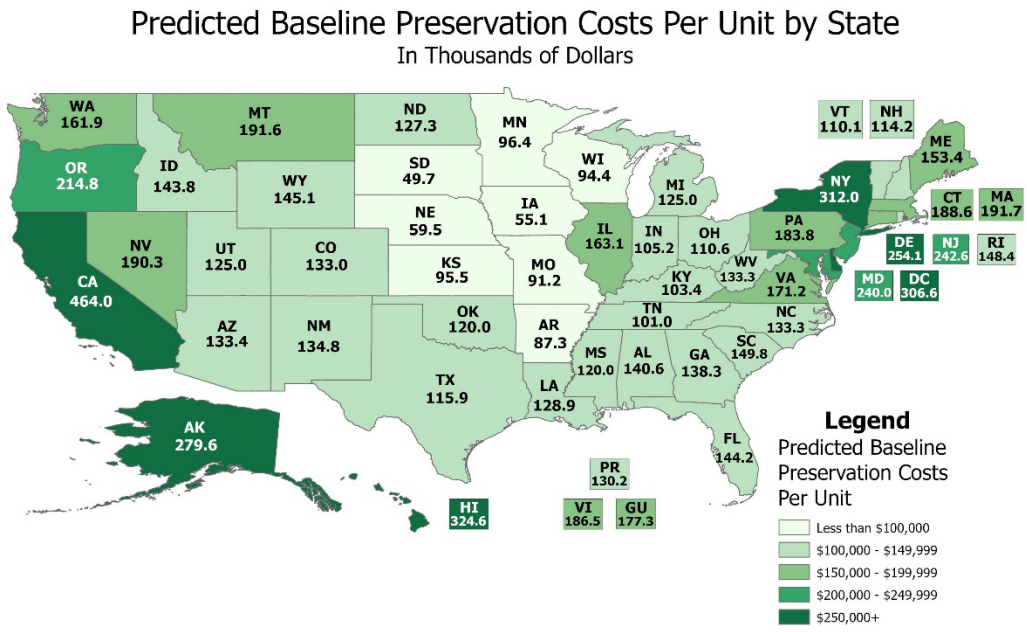
Variation by Geography

When we account for differences in public housing property and neighborhood characteristics included in our model, we find that the cost to preserve public housing varies widely by state. These differences are driven by the older age and construction costs of properties across these regions. Examining variation in the predicted costs to preserve public housing by state helps illustrate the distribution of preservation

needs across the country, which can inform the development of targeted policy tools and state funded programs, such as Minnesota Housing's Publicly Owned Housing Program (POHP).

Generally, predicted baseline preservation costs are highest in states across the West and Northeast. Estimated costs per unit are the highest in California ($464,043), Hawaii ($324,596), New York ($311,968), and the District of Columbia ($306,550) (Figure 9). Meanwhile, the lowest predicted per-unit preservation costs were for public housing properties in Midwestern states, including South Dakota ($49,704), Iowa ($55,145), and Nebraska ($59,475).

Figure 9: Average Predicted Cost to Preserve Public Housing Per Unit by State



Variation by Property Characteristics

While property attributes like PHA size were not significantly associated with construction costs after controlling for other characteristics, average predicted per-unit costs still differed across these characteristics (see Figure 10). This reflects differences across these groups associated with construction costs, such as building age, occupancy rate, and the overall construction costs of their city.

Among the remaining public housing units, the baseline cost to preserve properties that target families is $206,719 per unit, compared to $129,369 for units targeting elderly populations. Compared to semi-detached ($135,447) and single-family/detached structures ($107,608), predicted costs are also higher for elevator structures ($223,463), row or townhouse structures ($189,930), and multifamily walkups ($177,073). However, actual costs for preserving single-family structures may be higher than these estimates suggest. Single-family structures are more costly to manage and maintain (Local Housing Solutions, n.d.). Some PHAs may seek to rebuild these single-family structures as more efficient to administer housing types, which could increase redevelopment costs, while others PHAs may preserve them to promote housing

choice in their communities. Because these decisions are made locally and influenced by community needs, we they are not accounted for in our model.

Figure 10: Predicted Baseline Cost to Preserve Public Housing Per Unit by Selected Property Characteristics

	Predicted Baseline Preservation Costs Per Unit	Total Units
Target tenant type		
Family	$206,719	667,040
Elderly	$129,369	208,829
Urban rural status		
Urban	$197,258	813,101
Rural	$101,355	85,946
Census region		
West	$284,271	62,992
Midwest	$116,301	168,359
South	$138,059	284,027
Northeast	$259,515	326,855
US territory	$133,392	56,814
PHA size		
Small	$111,510	186,853
Medium	$151,193	250,710
Large	$188,449	207,118
Very large	$280,419	254,366
MTW Status		
Non-MTW	$185,034	782,661
MTW	$208,639	116,386
Building type		
Elevator Structure	$223,463	341,399
Multifamily/Walkup	$177,073	130,139
Row or Townhouse	$189,930	221,683
Sem Detached	$135,447	130,793
Single Family/Detached	$107,608	20,296
Mixed	$141,841	54,736

Source: HUD's public housing and RAD databases matched to additional data sources. A full list of data sources is provided in the appendix.

Alternative Scenarios

We conducted sensitivity analyses to assess how results change when we re-estimate our model using sub-samples of public housing properties that PHAs converted through RAD. We then applied these relationships to the restricted sub-sample of properties to re-estimate per unit preservation costs. We focused on subsamples with a larger number of RAD conversions, including public housing properties not owned by NYCHA and properties under 70 years old. We also evaluated how projections change when public housing is assumed to have at least some hard construction cost. By adjusting data inputs and assumptions, we assessed whether the model remains valid across different sub-samples and better understood how model design affects results. Correlates of costs may differ across different sets of public housing developments, which could result in different estimates depending on which sample of properties are analyzed.

Across each alternative model scenario we tested, the estimated relationships between property characteristics and hard construction costs remained stable. Figure 23 in the appendix reports the OLS regression results for each alternative scenario. While some differences in the magnitude of the relationships emerged, the characteristics significantly associated with hard construction costs—and whether they increase or decrease costs—remained generally consistent across specifications.

Our predicted per-unit cost to preserve public housing under 70 years old generated using our main model, which estimates costs based on the relationship between pre-conversion characteristics and hard costs of all public housing properties that underwent a RAD conversion, is similar to an alternative model that estimates costs based on just public housing properties that underwent a RAD conversion that were under 70 years old. Our main model estimates that it would cost $169,575 to preserve public housing under 70 years old. When we exclude public housing properties that underwent a RAD conversion that were 70 years or older when assessing the relationship between pre-conversion characteristics and costs in an alternative model scenario, the predicted baseline costs to preserve public housing under 70 years old increased by just $1,800 to $171,375 per unit compared to the main model.

More considerable differences emerge in estimating costs for public housing properties owned by housing authorities other than NYCHA, the nation's largest housing authority, depending on whether we include public housing properties owned by NYCHA in the sample of analysis. Our main model, which estimates costs based on the relationship between pre-conversion characteristics and hard costs of all public housing properties that underwent a RAD conversion, projects that it would cost $157,385 per unit to preserve public housing owned by PHAs other than NYCHA. If we exclude the public housing that underwent a RAD conversion that was owned by NYCHA when estimating the relationship between pre-conversion characteristics and costs in an alternative model scenario, the predicted baseline cost to preserve public housing owned by all other housing authorities decreases by $15,292 to $142,093 per unit compared to the main model. This suggests that there is some evidence that the predicted baseline per-unit preservation costs are sensitive to the sample of properties examined. Despite these deviations, we retained NYCHA properties in our main model because they own 18% of the nation's public housing stock and are a significant component of projected public housing preservation needs. Too few NYCHA properties completed RAD conversions during the study period to analyze NYCHA and non-NYCHA properties separately.

When the model is adjusted to assume that all properties have some hard construction costs, the estimated baseline cost to preserve public housing increases slightly. Nineteen percent of RAD-converted units in the study period reported no hard construction costs. However, our audit of HUD's publicly available RAD database suggests that hard construction costs may be underestimated, particularly for properties with no recorded hard construction costs. The data validation section of the appendix describes this in more detail. Due to these data anomalies and past research demonstrating the high public housing capital needs (Finkel et al., 2010), we ran an alternative scenario excluding RAD properties with no recorded hard construction costs from our model. In this scenario, our predicted baseline per-unit preservation costs increased by $2,311 to $190,401 relative to the main model. We assumed properties could have no hard construction costs in our main model to avoid upwardly biasing our cost projection.

Estimated Annual Accrual Costs

Each year, PHAs may face additional costs to repair and replace components of public housing properties as buildings age and systems reach the end of their useful life. Using the approach described in the methodology section, we estimate that PHAs could need an additional $3,597 per unit in 2025 dollars annually over the next 10 years to address ongoing accrual needs over the next ten years. Annual accrual needs represent the ongoing cost to repair and replace systems as building age, excluding the effects of inflation, deferred maintenance, and other changes—such as new or revised regulations—that may impact construction costs and preservation needs of public housing properties in the future.

Comparison to Previous Capital Needs Study

As noted earlier, this report is not directly comparable to the 2010 public housing capital needs assessment due to different analytical approaches, sampling frame, and cost adjustment factors. After adjusting for inflation using the RSMeans Construction Cost Index, Finkel et al. (2010) estimated that PHAs would need $5,111 per unit annually to address ongoing accrual needs, assuming all existing capital needs were met. While a simple comparison suggests that our projected annual accrual costs are lower than those in the 2010 study, it is unclear which factors explain this difference. Since the Public Housing Capital Fund has been underfunded in most years since 2010, some PHAs likely deferred maintenance, resulting in higher estimated current needs. Our study does not evaluate how building conditions changed between 2010 and 2025.

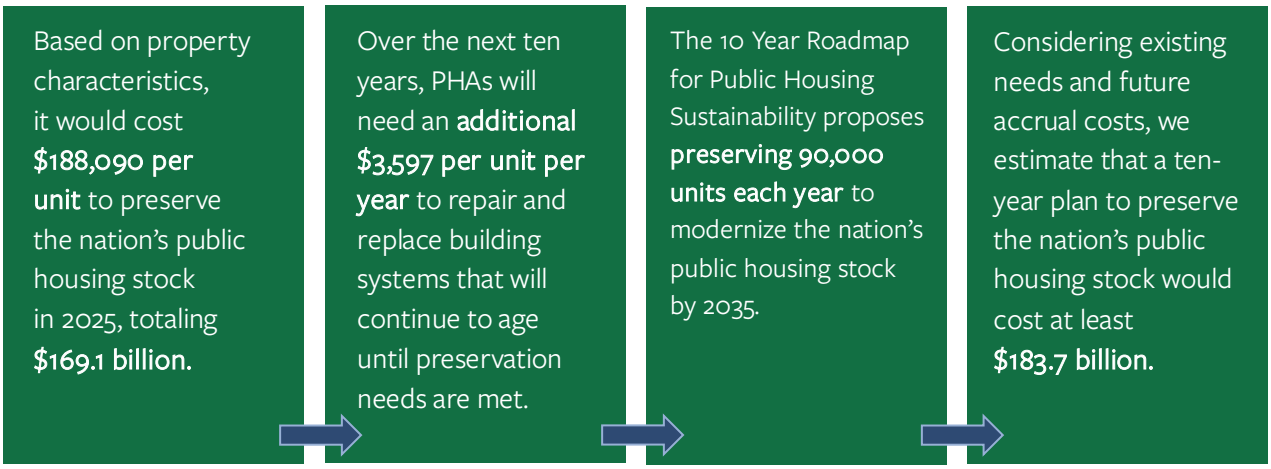
Modeling the Baseline Cost to Preserve Public Housing Over the Next 10 Years

Preserving the nation's remaining public housing cannot occur all at once. Even if dedicated funding was provided to help PHAs address capital needs, PHAs need time to scale. They may need to secure temporary housing for displaced tenants, increase staff capacity, plan redevelopment projects, obtain approvals, and complete construction. Using current financing tools, PHAs must also compete for limited funding opportunities, and, in some cases, expand technical expertise to modernize their public housing portfolios effectively.

Considering existing needs and future annual accrual costs, we estimate that a 10 year plan to preserve the nation's public housing stock would cost approximately $183.7 billion in 2025 dollars, or $204,275 per unit (see Figure 11). This estimate assumes that 89,905 units would be preserved each year, modernizing all 899,047 units by 2035. This ambitious target assumes that PHAs would preserve 4.4 times the average number of public housing units preserved through RAD annually between 2018 and 2023. Actual costs may vary due to inflation, deferred maintenance, future changes in construction costs, and the pace of preservation efforts. For this reason, we recommend replicating this study periodically using more recent RAD data to refine cost estimates over time.

Because of these uncertainties, this estimate should be interpreted with caution. We recommend replicating this study in the future to re-examine how the costs required to preserve public housing properties change overtime using a more recent sample of public housing properties through RAD.

Figure 11: Predicted Baseline Cost to Preserve the Nation's Public Housing Portfolio Over the Next 10 Years



Source: HUD's public housing and RAD databases matched to additional data sources, applying the regression coefficients provided in model 2 of Figure 20 in the appendix along with an add on factors for soft construction, tenant relocation, and loan payoff and acquisition costs. Annual accrual needs are estimated as described in the methodology section of the report. A full list of data sources is provided in the appendix. Figure 24 includes a table describing the average cost to preserve public housing units and address annual accrual needs over the next ten years.

Conclusion

Given the urgency of developing current estimates of public housing preservation needs and the practical constraints facing policymakers, this study adopted an alternative RAD-based methodology. A comprehensive, large-scale inspection-based approach, while representing the gold standard for individual property assessment, would require substantial resources and multiple years to complete across the nation's 899,000 public housing units. This RAD-based approach provides a timely, cost-effective way to generate broad nationwide estimates of baseline preservation costs and annual accrual expenses, building on similar analyses conducted in 1998, 2010, and 2023 (ICF, 1998; Finkel et al., 2010; HUD, 2023).

These results should be interpreted with appropriate caution given the methodological limitations. The costs incurred by public housing properties that underwent RAD conversions may not be fully representative of the entire national public housing stock. Although the regression model controls for observable differences in property characteristics associated with construction costs, additional variation in preservation costs may be attributable to factors not captured in our analysis, such as local market conditions, regulatory environments, or property-specific circumstances that could affect the broader applicability of these estimates.

Preserving public housing will also likely require additional investments not reflected in RAD conversion data, such as upgrades to improve cost efficiency, resilience to severe weather, and compliance with evolving regulations. These cost estimates should be viewed as a starting point for policy discussions and budget planning. More precise, property-specific assessments will ultimately be necessary for implementation.

Despite these limitations, this approach serves as a practical tool to provide a nationwide baseline estimate to support strategic public housing preservation needs planning and policy development. Based on our analysis, we estimate that preserving the nation's public housing stock in 2025 would cost $169.1 billion, or $188,090 per unit.

Preservation will take years to scale. PHAs will need to secure funding, build capacity among their staff and partners to plan and execute redevelopment projects, and expand their technical capacity. Costs will likely rise annually as more building systems reach the end of their useful life. We estimate PHAs would need an additional $3,597 per unit for each year that preservation needs go unaddressed—potentially more if construction costs continue to outpace inflation, maintenance is deferred, or regulatory requirements grow. These costs could further increase if construction costs continue to outpace inflation, PHAs are pressured to defer critical maintenance, or new regulations increase the cost of construction.

The 10 Year Roadmap for Public Housing Sustainability proposes an ambitious plan to preserve approximately 90,000 public housing units annually to modernize the nation's remaining 899,000 public housing units by 2035. Based on existing needs and projected annual accrual costs, we estimate that this ten-year plan would cost at least $183.7 billion, or $204,275 per unit. Future research should monitor how these costs change in response to shifts in funding levels, construction cost volatility, and regulatory requirements.

While this study's methodology provides important baseline estimates for policy planning, future research should also prioritize developing more comprehensive assessment approaches. This could include conducting capital needs assessments based on building inspections, referencing a larger or more recent sample of properties that underwent RAD conversions, exploring alternative regression model constructions, and examining whether there are additional local market conditions, regulatory mechanisms, or property characteristics associated with hard construction costs that were unobserved in this model. Future models can also explore accounting for other preservation expenses, such as complying with new regulations and the complete investments to make building systems the most efficient and climate resilient. Future studies can also validate these costs based on actual costs incurred by PHAs preserving these public housing properties or inspection-based capital needs assessments.

While the cost to preserve public housing poses a challenge, many housing authorities are successfully preserving their public housing stock by leveraging alternative funding sources, private capital, and forming creative partnerships. These investments allow PHAs to ensure public housing remains a stable foundation for families for generations to come. However, the extent of renovation needs, the availability of resources, capacity constraints, and barriers limit the scale PHAs can preserve their public housing portfolio. More resources and technical assistance are needed to expand the capacity of PHAs to preserve their entire public housing stock. The Interim Report published by the 10 Year Roadmap for Public Housing Sustainability outlines several preliminary recommendations to support the recapitalization of public housing, including leveraging the expansion of the LIHTC program (10 Year Roadmap for Public Housing Sustainability, 2025).

Preserving the nation's public housing stock is critical to maintaining stability for 1.5 million residents and preventing displacement of some of the nation's most vulnerable families. The security provided by public housing helps older adults age in place, people with disabilities live with independence, and families facing a set back get back on their feet. Preservation also ensures that public housing continues to serve as a platform for cross-sector partnerships to improve health, education, and workforce development outcomes for residents, maximizing long-term returns on investment (PAHRC & CLPHA, 2017; PAHRC & CLPHA; CLPHA, 2025).

Beyond housing stability, investment in public housing generates economic activity, creates jobs, and protects vital community assets across the country from decline. Every $1 spent on public housing capital improvements generates an additional $2.12 in economic activity (Econsult, 2010). Investing now is not only socially responsible but fiscally prudent, as it can prevent future costs from compounding. Preserving public housing prevents families from displacement and avoids the much higher cost of replacing them through new construction (Brennan et al., 2013). For instance, past research suggests that it costs $217,053 to rehabilitate units using the LIHTC program and $295,869 to build new units using the program after adjusting for construction cost inflation (Lubell & Wolff, 2018). This suggests that preserving public housing may be more cost effective compared to other solutions to improve housing affordability and habitability.

Preserving public housing is an investment in stronger communities that supports residents' stability, stimulates local economies, and ensures this vital public asset continues to serve future generations.

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Appendix

1: Data Preparation

HUD's RAD database and conversion crosswalk between original and converted developments was used to identify developments that underwent a RAD conversion between 2018 and August 2024 and the baseline hard costs to preserve them. Among the public housing properties that underwent a RAD conversion during this period, 59 properties representing 6,407 units were not included in HUD's RAD conversion crosswalk and were excluded from analysis. All these properties had a converted awaiting transfer (CAT) agreement, which allows PHAs to remove units from public housing before the PHA is prepared to replace these units. An additional 73 properties, representing 7,556 units, were excluded from our regression analysis for missing key pre-conversion property characteristics.

Based on input from the Capital Needs Working Group of the 10 Year Roadmap for Public Housing Sustainability, as well as program features like the introduction of Section 18 blends in 2018, we expect conversions from 2018 onward to be more representative of the needs of the remaining public housing compared to earlier conversions.

To capture the conditions of developments while they were still in the public housing program, we matched each property that underwent a RAD conversion to their property and tenant characteristics from the year before the conversion closed. A complete list of data sources is provided in Figure 18. Our analysis includes properties and units underwent a conversion via RAD/Section 18 blends.

If property or tenant characteristics were not available the year before conversion, we used characteristics from two years prior. Occupancy rate and HUD spending per unit were also collected for properties two years prior to converting to RAD. Since PHAs can split original developments into multiple RAD conversions or merge into one or numerous conversions, some RAD developments combine multiple original developments. In these instances, the characteristics of these properties were weighted based on the number of units each property contributed to the new development that the converted through RAD. If buildings included in the RAD conversion were in different census tracts, we used the characteristics of the tract in which the largest share of units were located. Properties located in California were categorized separately from properties in the West census region because the sample size of RAD conversions in California was sufficient, and multiple studies find that California leads the nation in affordable housing development costs (California Department of Housing and Community Development, 2014; GAO, 2018). This approach allowed us to more precisely account for the added cost of developing affordable housing in California relative to other regions. We adjusted hard construction costs, average income, and other characteristics measured in dollars to 2025 dollars using the Consumer Price Index for all urban consumers. We collected the same property characteristics for public housing properties that have not underwent a RAD conversion as of August 2024. We used the most recent year of data (2024) for these properties to capture current conditions. A combination of t-tests, Pearson's chi-square test, and logistic regression were conducted to assess the comparability of properties in the public housing stock as of 2024 to the pre-conversion characteristics of properties converted through RAD in the study period.

Data Validation

We audited a subsample of RAD properties with no hard construction costs to validate the accuracy of these costs as recorded in the RAD database and determine whether such properties should be included in our analysis. We matched each property against the National Housing Preservation Database (NHPD) to identify which properties received federal funding within five years of undergoing a RAD conversion. Properties in the NHPD with public housing funding alone were excluded from the match. Using fuzzy matching, properties were matched based on their property name, city, state, total units, assisted units, and property address. They were manually reviewed to select correct matches.

Matching RAD properties to subsidy allocations from the NHPD that the RAD Database may underestimate hard construction costs. Among the 155 properties that underwent a RAD conversion with no hard construction costs during the study period, 21% received LIHTC, HOME, or HUD-insured mortgage allocations five years before converting to RAD. This suggests that the properties with no hard construction costs in the RAD database may not be true zeros. Data on tax credit allocations lags by about two years, so even more of these properties could have received tax credit allocations before conversion. These discrepancies are less common among properties with non-zero hard construction costs. Only 2% of properties listed in the RAD database with non-zero hard construction costs and no tax credit allocations matched to a tax credit allocation in the NHPD.

Due to these data anomalies and past research that demonstrated high public housing capital needs (Finkel et al., 2010), we exclude RAD properties with zero construction costs recorded in the RAD database that received federal funding beyond the public housing program within five years before conversion from our analysis. This applied to 19 properties that PHAs converted through RAD in our sample.

2: Overview of RAD Property Sample

We examined the funding characteristics of RAD properties to better understand how they were financed and what their costs were prior to controlling for differences in property characteristics. Thirty-five percent of properties and 28% of units that PHAs converted through RAD between 2018 and 2024 were non-construction conversions. These properties in HUD's RAD database received no financing through HFA mortgages or tax credit equity and had hard construction costs below $10,000. This suggests that these properties had minimal capital needs that could have been addressed using the Public Housing Capital Fund. During this period, 15% of properties and 11% of units that underwent a RAD conversion had no hard construction costs.

Our sample includes properties that underwent RAD conversions are financed through a variety of sources (see Figure 12). Most properties that PHAs converted through RAD during the study period closed between 2018 and 2020. Conversions to PBVs were more common during the study period, with 64% of RAD properties converting to PBVs between 2018 and 2024. Most RAD properties were preserved rather than rebuilt, although 18% involved new construction. In some cases, only a portion of the buildings associated with these properties may have been rebuilt as new construction. Tax credits were a common funding source, with 35% of RAD properties funded by 4% tax credits and 17% by 9% tax credits during the study period. FHA mortgages (14%) and RAD Section 18 blends (18%) funded a smaller share of properties. Overall, 56% of properties that PHAs converted through RAD during the study period received either a tax credit or HUD insured mortgage to address their capital needs. A table describing the funding characteristics of all properties that underwent RAD conversions during the study period is included in Figure 22.

During the study period, hard construction costs varied considerably across RAD properties. Hard construction costs were skewed at the high and low end of capital needs. Among all properties that converted through RAD in our sample, one-quarter of units had hard construction costs under $3,224 per unit, while one quarter had costs above $198,513 per unit. Overall, public housing units that underwent RAD conversions during this period had average hard construction cost of $123,606 per unit to preserve. This varies substantially from the latest capital needs assessment conducted by Finkel et al. (2010), which found capital needs for public housing properties to range from $67,862 per unit in the 25th percentile and $138,380 per unit in the 75th percentile after adjusting for inflation using RSMeans Historical Construction Cost Index and applying capital needs annual accrual factors.

Figure 12: Descriptive Statistics of Units that Have Converted Through RAD 2018-August 2024

	Total Units (n=123,574)		Properties (n=799)	
	Number	Percent	Number	Percent
RAD closing year				
2018	23,783	19%	164	21%
2019	22,628	18%	146	18%
2020	22,532	18%	150	19%
2021	18,579	15%	109	14%
2022	17,224	14%	121	15%
2023	14,439	12%	70	9%
2024	4,389	4%	39	5%
Transfer of assistance	8,509	7%	96	12%
New construction	13,562	11%	145	18%
FHA insured	25,027	20%	112	14%
RAD Section 18 blend	34,106	28%	141	18%
Type of conversion				
PBRA	41,585	34%	278	35%
PBV	81,989	66%	521	65%
Tax credit				
None	58,015	47%	387	48%
4%	54,070	44%	280	35%
9%	11,439	9%	131	16%
Both	50	0%	1	0%
RAD closing had any hard construction costs	110,315	89%	679	85%

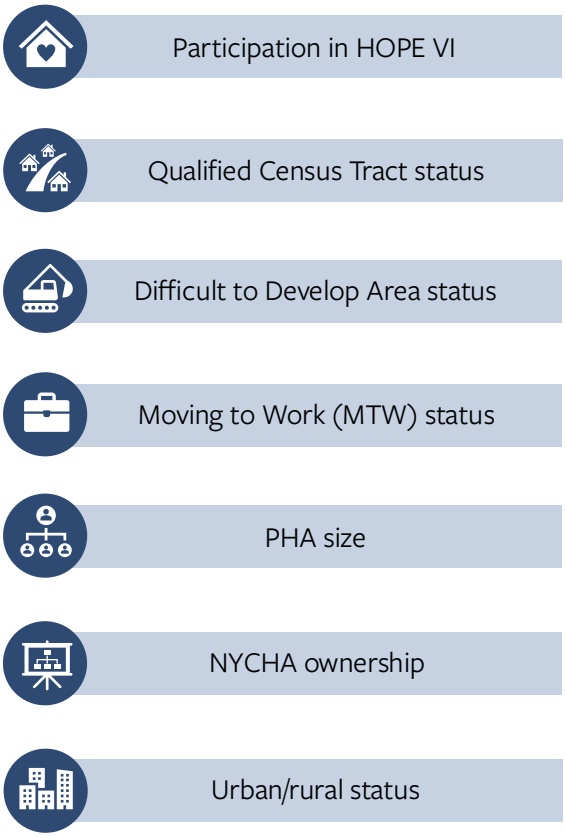
Source: HUD's RAD Database.
Note: RAD properties with zero hard construction costs that received tax credits, HOME subsidies, or FHA mortgages five years prior to conversion and RAD conversions that did not match to HUD's RAD conversion crosswalk are excluded.

3: Factors Not Associated with Hard Construction Costs

The property characteristics that were not significantly associated with hard construction costs on average (controlling for all other factors) among properties in our sample included New York City Housing Authority ownership, PHA size, Moving to Work (MTW) status, location in a DDA, QCT, or rural area, or previous participation in HOPE VI (see Figures 13 and 20).

We included these characteristics in the initial model because we hypothesized there could be a relationship between these characteristics and hard costs. However, the results did not support that assumption. In our final specification, we removed all pre-conversion characteristics without significant associations to hard costs, and the relationship between the remaining characteristics and construction costs remained stable.

Figure 13: Pre-Conversion Characteristics Not Associated with Hard Construction Costs Per Unit



Source: HUD's RAD Database matched to additional data sources. A full list of data sources is provided in the appendix.
Notes: Based off relationships presented in model 1 of Figure 20.

4: How Remaining Public Housing Compares to Public Housing Developments Converted Through RAD

Our regression model accounts for differences between the pre-conversion characteristics associated with construction costs of public housing properties that underwent RAD conversions and those that have not.

To understand how RAD-converted and non-converted public housing properties differ, we conducted a comparison of means with hypothesis testing and Pearson chi-square test for independence (see Figure 22 in the appendix) and a logistic regression (see Figure 21). Our logistic regression model compares the average relationship between each pre-conversion property characteristic, while controlling for all other observed characteristics, and whether that property converts through RAD. We compare differences at the property and unit level.

Figure 14: Pre-Conversion Property Characteristics Associated with Higher Likelihood of RAD Conversion

Not associated with hard costs

- Multifamily building type
- Did not previously participate in HOPE VI
- Not owned by Moving to Work (MTW) agency
- Larger housing authority size
- In Qualified Census Tracts
- Not owned by NYCHA
- In urban area

Associated with higher hard costs

- In the west, south and California, compared to Midwest
- Building age between 20-39 years old and 40-59 years old, compared to under 20 years old
- Lower occupancy rate
- Higher citywide construction cost index

Source: HUD's public housing and RAD databases matched to additional data sources. A full list of data sources is provided in the appendix.
Note: Based off relationships presented in the logistic regression model in Figure 21.

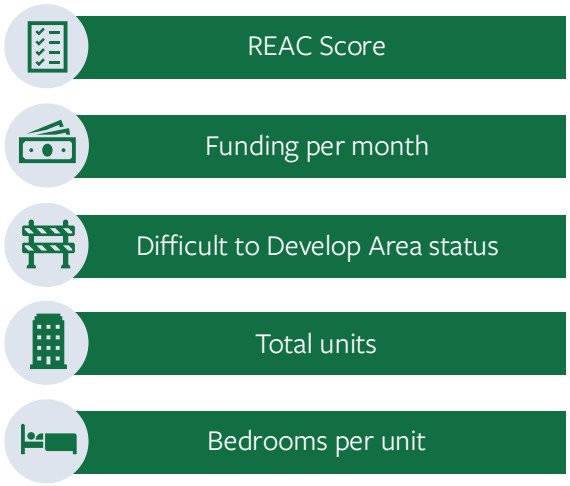
Public housing properties that underwent RAD conversions differed from properties that remained in the public housing program across numerous pre-conversion characteristics (see Figures 14 and 21). Holding all else equal, properties were more likely to convert through RAD if they had lower occupancy rates two years prior to conversion, did not previously participate in HOPE VI, and were multifamily building types. Relative to public housing properties under 20 years old, PHAs were also more likely to convert properties through

RAD if their building ages were between 20-39 and 40-59 years old after controlling for other property characteristics. Holding all else equal, properties were also more likely to undergo RAD conversions if larger housing authorities owned them, but less likely if they were owned by NYCHA or a Moving to Work agency. Location was also a significant predictor, with properties that were in areas with higher citywide construction costs, QCT, urban areas, and South and West census regions (relative to the Midwest) were more likely to undergo RAD conversions. Of these characteristics, properties with older building ages, lower occupancy rates two years prior to conversion, located in the South and West, and areas with higher citywide construction cost index values are associated with higher hard costs.

Meanwhile, PHAs were less likely to convert public housing properties in the Northeast through RAD after controlling for other property characteristics relative to properties located in the Midwest. However, this was not associated with hard construction costs. Properties that underwent RAD conversions had slightly higher funding per unit two years before conversion than other public housing properties, though these differences were not statistically significant after controlling for other characteristics (see Figure 21).

Holding all else equal, public housing properties that PHAs converted through RAD during the study period have comparable funding per unit, bedrooms per unit, REAC scores, total units, and DDA designations (see Figures 15 and 21). RAD properties also had comparable building ages, citywide construction costs, MTW ownership rates, and HOPE VI participation rates compared to public housing (see Figure 21), but slight differences emerged after controlling for other property characteristics as mentioned above (see Figure 21).

Figure 15: Pre-Conversion Property Characteristics Not Associated with Likelihood of RAD Conversion

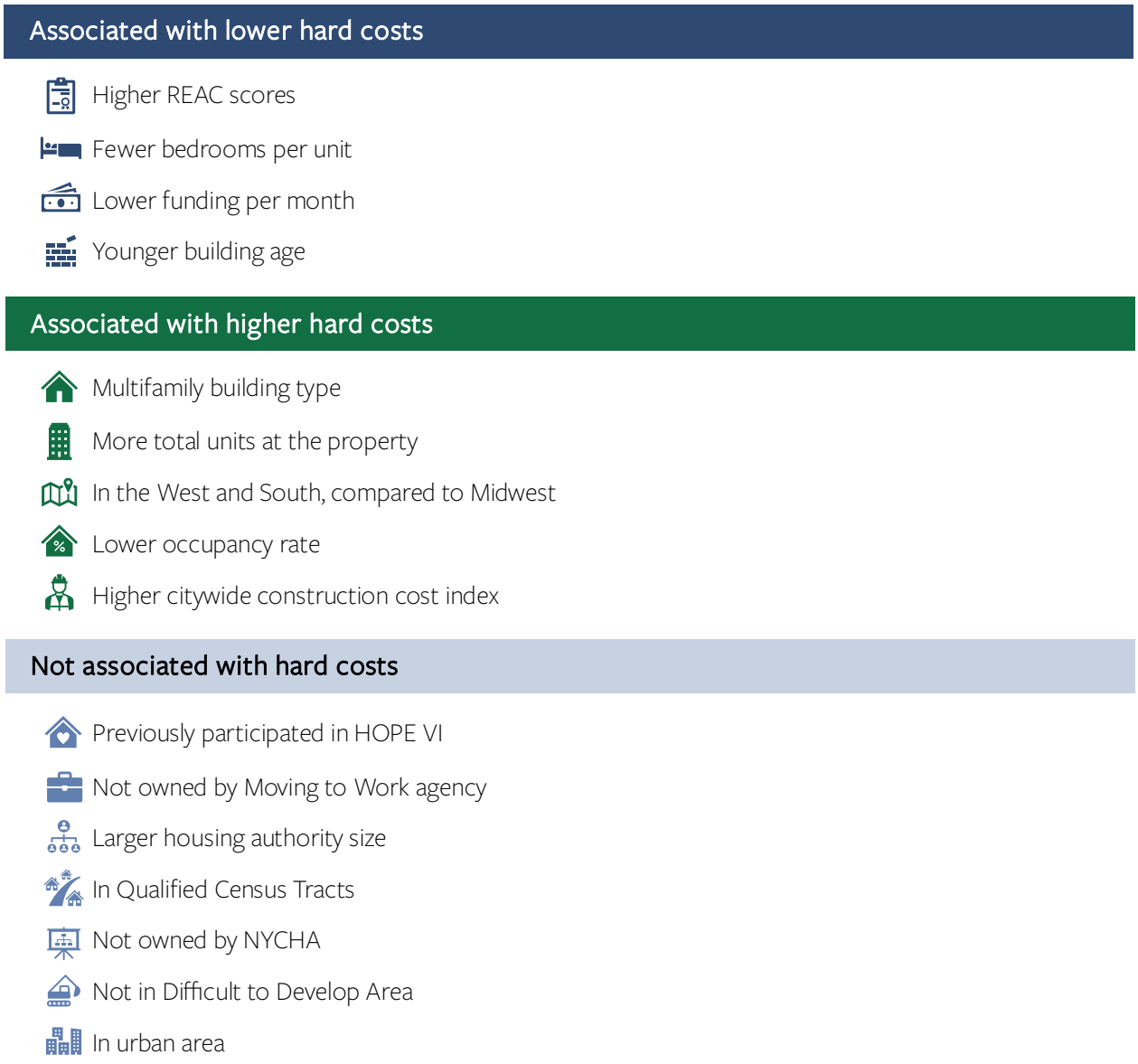


Source: HUD's public housing and RAD databases matched to additional data sources. A full list of data sources is provided in the appendix.
Note: Based off relationships presented in the logistic regression model in Figure 21.

More differences emerge when we compare remaining public housing units to those that underwent RAD conversions (Figure 16 and 21). Comparing differences at the unit level allows us to account for differences in property sizes when assessing the likelihood of converting through RAD. Holding all else equal, PHAs were more likely to convert public housing units through RAD if the property had higher REAC scores,

fewer bedrooms per unit, lower funding per unit per month, and younger building ages. These characteristics were associated with lower hard construction costs. Differences in average building age were stark in particular. Overall, 28% of public housing units were over the age of 60, compared to only 18% of public housing units that underwent RAD conversions. On the flip, PHAs were also more likely to convert public housing units to RAD if their property had multifamily building types, more units, lower occupancy rates, and higher citywide construction cost indexes after controlling for other characteristics. These characteristics were associated with higher hard construction costs.

Figure 16: Pre-Conversion Unit Characteristics Associated with Higher Likelihood of RAD Conversion



Source: HUD's public housing and RAD databases matched to additional data sources. A full list of data sources is provided in the appendix.
Note: Based off relationships presented in the logistic regression model in Figure 21.

There were also statistically significant differences in the characteristics of residents living in public housing properties that underwent RAD conversions compared to residents currently living in public housing (Figure 17). Properties that underwent RAD conversions during the study period served a larger share of households that were lower income, had children, had a member with a disability, were headed by a person aged 51-61, and were headed by a Black or Asian or Pacific Islander household member before conversion. On the other hand, properties that PHAs converted through RAD were less likely to have adults over the age of 62 before conversion compared to properties that remained in public housing. The influence of these resident demographics on public housing preservation needs is unclear but demonstrates that RAD properties tended to serve more vulnerable resident populations with greater needs before conversion. This report does not analyze how average resident characteristics changed after RAD conversion.

Figure 17: Comparison of Means for Pre-Conversion Resident Demographics of Closed RAD and Public Housing Properties

	Public Housing (N=6,381)	RAD Conversions 2018-2024 (n=799)	Significance
Earns between $1-$4,999	10%	11%	*
Earns between $5,000-$9,999	9%	29%	**
Earns between $10,000-$14,999	34%	25%	**
Earns between $15,000-$19,999	14%	12%	**
Earns $20,000 or more	33%	23%	**
Earns majority of income from wages	30%	28%	**
Earns a majority of income from welfare	3%	4%	*
Earns majority of income from other sources	62%	64%	*
Household income as a percent of local AMI	27%	24%	**
Earns below 50% AMI	88%	92%	**
Earns below 30% AMI	68%	75%	**
Head or spouse is under 25	4%	4%	
Head or spouse is 25-50	40%	41%	
Head or spouse 51-61	18%	20%	**
Head or spouse 62 or older	37%	34%	**
Headed by person of color or Hispanic/Latino householder	62%	74%	**
Headed by Black, non-Hispanic householder	41%	53%	**

Headed by Native American, non-Hispanic householder	1%	1%	*
Headed by Asian or Pacific Islander, non-Hispanic householder	2%	3%	**
Headed by white, non-Hispanic householder	39%	26%	**
Headed by Black, non-Hispanic householder	2%	1%	**
Headed by white, Hispanic householder	17%	16%	
Headed by person of another race, Hispanic householder	0%	1%	*
Headed by person that is Hispanic/Latino of any race	18%	18%	
Household includes a child	36%	39%	**
Household includes a member with a disability	38%	41%	**

*Source: HUD's public housing and RAD databases matched to additional data sources. A full list of data sources is provided in the appendix. Note: P value corresponds to t-test. Some variables had fewer observations due to missing variables. **p<.01, * p<.05.*

5: Formula to Estimate Baseline Cost to Preserve Public Housing Per Unit

We use the following formula to estimate the baseline per unit cost to preserve public housing properties:

$$PC_i = HCC_i + (HCC_i * SCC) + (HCC_i * RLC) + (HCC_i * LAC)$$

Where:

$$PC_i = Predicted\ baseline\ per\ unit\ preservation\ for\ of\ property_i$$
$$HCC_i = Predicted\ hard\ construction\ cost\ per\ unit\ of\ property_i$$
$$SCC = Soft\ cost\ factor\ (52\%\ for\ properties\ over\ 70\ years\ old, 41\%\ for\ all\ other\ properties)$$
$$RLC = Relocation\ cost\ factor\ (2\%\ for\ all\ properties)$$
$$LAC = Loan\ payoff\ and\ acquisition\ cost\ factor\ (9\%\ for\ all\ properties)$$

We use the following formula to estimate the baseline hard construction costs per unit for public housing properties:

$$HCC_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \cdots + \varepsilon_i$$

Where:

$$HCC_i = Predicted\ hard\ construction\ cost\ per\ unit\ of\ property_i$$
$$\beta_0 = Intercept$$
$$\beta_1 = Coefficient\ of\ independent\ variable\ 1\ (ex: REAC\ score)$$
$$X_{1i} = Indepdendent\ variable\ 1\ (ex: REAC\ score)\ of\ property_i$$
$$\beta_2 = Coefficient\ of\ independent\ variable\ 2\ (ex: building\ age)$$
$$X_{2i} = Indepdendent\ variable\ 2\ (ex: building\ age)\ of\ property_i$$
$$\varepsilon_i = error\ term\ for\ property_i$$

6: Calculating Cost Adjustment Factors

The adjustment factors presented in this report are relative to hard construction costs because only hard construction costs are included in HUD's property-level database of costs incurred by public housing properties that converted through RAD. The cost adjustment factor for loan payoff and acquisition, and relocation are based on the average costs incurred by non-NYCHA public housing properties that converted through RAD between 2020 and August 2024 across each category relative to the hard construction costs incurred by the average property.

Variable	Description	Value for Average Property*	Cost Adjustment Factor *Value Relative to HCC of Average Property*
HCC	Hard construction cost	$109,479	100%
LAC	Loan payoff and acquisition cost	$10,197	9%
RLC	Relocation cost	$1,727	2%

**From HUD's Sources and Uses Table for non-NYCHA properties that underwent RAD conversions between 2020 and August 2024.*

We estimated the soft construction cost adjustment factors based on the average soft costs reported by the GAO's assessment of 9% LIHTC properties placed in service between 2011 and 2015. GAO (2018) found that soft construction costs for rehabilitated LIHTC properties accounted for 27% of development costs and 32% of development costs for newly built LIHTC properties. We use building age as a proxy for whether a property will require new construction, since public housing properties that are over 70 years old and converting through RAD are associated with a higher likelihood of new construction. Since public housing properties that converted through RAD between 2020 and August 2024 incurred soft construction costs that fell below this threshold, we upwardly adjusted soft construction costs to reflect the relationships identified by the GAO. The following table presents a key that explains the values and equations for how the soft construction cost adjustment factor was calculated:

Variable	Description	Value for Average Property*	New Construction Equation(s) Properties Over Age 70	Rehab Equation(s) Properties Under Age 71
SCC	Soft construction cost	Need to calculate	SCC= .32(PCR)	SCC= .27(PCR)
GHC	GAO hard construction costs (includes loan payoff and acquisition, and relocation costs)	$121,403	GHC=HCC+LAC+RLC GHC = .68(PCR)	GHC=HCC+LAC+RLC GHC = .73(PCR)
PCR	Baseline per unit preservation costs	Need to calculate	PCR=SCC+GHC PCR=.32(PCR)+.68(PCR)	PCR=SCC+GHC PCR=.73(PCR)+.27(PCR)

**From HUD's Sources and Uses Table for non-NYCHA properties that underwent RAD conversions between 2020 and August 2024.*

New Construction

1. *Estimate PCR Using GHC*

   GHC = .68(PCR)
   Fill in GHC with value for average property
   121,403=.68(PCR)
   PCR=178,533

2. *Estimate SCC Using PCR*

   SCC= .32(PCR)
   Fill in PCR with estimated value
   SCC=.32(178,533)
   SCC=57,131

3. *Estimate Adjustment Factor for SCC Based on HCC*

   Soft Cost Adjustment Factor = SCC/HCC
   Fill in SCC with estimated value and HCC with average value
   Soft Cost Adjustment Factor = 57,131/109,479
   Soft Cost Adjustment Factor =52% of HCC

Rehab

1. *Estimate PCR using GHC*

   GHC=.73(PCR)
   Fill in GHC with value for average property
   121,403=.73(PCR)
   PCR=166,305

2. *Estimate SCC using PCR*

   SCC= .27(PCR)
   Fill in PCR with estimated value
   SCC=.27(166,305)
   SCC=44,902

3. *Estimate Adjustment Factor for SCC Based on HCC*

   Soft Cost Adjustment Factor = SCC/HCC
   Fill in SCC with estimated value and HCC with average value
   Soft Cost Adjustment Factor = 44,902/109,479
   Soft Cost Adjustment Factor =41% of HCC

7: Additional Tables

Figure 18: Data Sources

Source	Years Available	Fields Collected
HUD Public Housing Building Database	2016, 2020-2021, 2023-2024	Building type, construction date, location
HUD Public Housing Development Database	2016-2017, 2021-2024	Location, total units
HUD Picture of Subsidized Households	2017-2023	Occupancy rate, rent per unit, operating subsidy, resident demographics, bedrooms per unit, and PHA size
HUD Public Housing REAC Score Database	2017-2024	REAC score
HUD Difficult to Develop Areas (DDAs)	2017-2024	DDAs
HUD Qualified Census Tracts (QCT)	2017-2024	QCTs
HUD RAD Crosswalk	2024	PIC IDs and units affiliated to RAD conversions
HUD RAD Transactions Database	2018-2024	Total hard construction costs
HUD HOPE VI Database	2016	Redevelopment status
HUD Choice Neighborhoods Program Grantees	2024	Redevelopment status
American Community Survey (5-year estimates)	2013-2017, 2014-2018, 2015-2019, 2016-2020, 2017-2021, 2018-2022, 2019-2023	Poverty rate
National Housing Preservation Database	2024	Funding characteristics
HUD LIHTC Database	2024	Funding characteristics
HUD HOME Database	2024	Funding characteristics
HUD FHA Insured Mortgage Database	2024	Funding characteristics
Rural-Urban Continuum Codes	2013, 2023	Urban/rural status
RSMeans City Cost Index	2017-2024	Construction cost index

Figure 19: Logistic Regression Predicting Odds of Converting to RAD with New Construction

	All Predictors			Significant Predictors		
	Marginal Effects	Standard Error	Sig	Marginal Effects	Standard Error	Sig
Multifamily property (relative to single family)	0.058	-0.021	**	0.059	-0.028	*
Occupancy rate two years ago (per 10 percentage points)	-0.023	-0.010	*	-0.022	-0.012	
Bedrooms per unit (relative to 1 bedroom per unit)						
2	-0.014	-0.018		0.002	-0.015	
3+	0.139	-0.064	*	0.157	-0.076	*
Average building age (relative to less than 20 years old)						
20-39 years	0.061	-0.026	*	0.048	-0.020	*
40-59 years	0.088	-0.017	**	0.109	-0.017	**
60+ years	0.300	-0.062	**	0.339	-0.059	**
Total units (relative to under 50)						
50-99	0.102	-0.044	*	0.104	-0.050	*
More than 100	-0.053	-0.028		-0.042	-0.027	
HUD spending and TTP per month (per $100 dollars)	0.006	-0.002	**	0.007	-0.003	*
Owned by a Moving to Work (MTW) agency	-0.046	-0.018	*	-0.044	-0.022	*
REAC score (per 10 points)	0.000	-0.004				
Closing year (relative to 2018)						
2019	0.004	-0.024				
2020	-0.006	-0.021				
2021	-0.028	-0.022				
2022	-0.012	-0.022				
2023	0.048	-0.040				
2024	0.019	-0.040				
PHA size (public housing units only)						
Medium	-0.023	-0.022				
Large	-0.035	-0.025				
Very large	0.029	-0.044				
In qualified census tract	0.021	-0.017				

In difficult to develop area	0.008	-0.025				
In rural area	0.027	-0.043				
Census region (relative to Midwest)						
West	0.020	-0.032				
South	0.023	-0.023				
Northeast	0.005	-0.020				
California	0.147	-0.100				
RSMeans city construction cost index (per 10 percentage points)	-0.003	-0.011				
Participated in HOPE VI	-0.013	-0.033				
Number of observations	741					

Source: HUD's RAD Database matched to additional data sources. A full list of data sources is provided in the appendix.
*Note: Excludes RAD properties that were missing from HUD's RAD Conversion Crosswalk or had zero hard construction costs that received tax credits, HOME subsidies, or FHA mortgages five years prior to conversion. Marginal effects that are positive indicate that the probability of becoming newly constructed upon undergoing a RAD conversion increases with the dependent variable if the relationship is statistically significant. Negative marginal effects suggest that the likelihood of becoming newly constructed upon converting through RAD decreases as the independent variable values increase. Variables that are statistically significant include stars. *** p<.01, ** p<.05, *p<.1*

Figure 20: Ordinary Least Squares Models Predicting Hard Construction Costs Per Unit 2018-August 2024

	All Predictors (Model 1)			Significant Predictors (Model 2)		
	Coeff	SE	Sig	Coeff	SE	Sig
REAC score (per 10 points)	-$6,585	-$2,713	**	-$8,225	-$2,582	***
Multifamily property (relative to single family)	$76,880	-$29,875	**	$75,370	-$29,161	***
Occupancy rate two years ago (per 10 percentage points)	-$30,259	-$4,830	***	-$29,431	-$4,609	***
Bedrooms per unit (relative to 1 bedroom per unit)						
2	-$8,244	-$9,187		-$6,521	-$8,676	
3+	$63,951	-$15,296	***	$63,625	-$14,696	***
Average building age (relative to less than 20 years old)						
20-39 years	$73,507	-$13,193	***	$70,371	-$12,952	***
40-59 years	$90,899	-$11,344	***	$85,070	-$10,496	***
60+ years	$139,006	-$16,439	***	$135,923	-$16,013	***
Total units (relative to under 50)						
50-99	$51,440	-$14,008	***	$52,522	-$13,794	***
More than 100	-$9,337	-$12,139		-$3,893	-$11,815	
HUD spending and TTP per month (per $100 dollars)	$4,428	-$1,011	***	$3,981	-$964	***
Closing year (relative to 2018)						
2019	$18,218	-$11,674		$19,064	-$11,868	
2020	$27,871	-$12,213	**	$29,877	-$12,199	**
2021	$9,438	-$13,075		$11,745	-$13,121	
2022	$33,272	-$15,262	**	$36,057	-$15,465	**
2023	$61,272	-$19,329	***	$62,494	-$19,020	***
2024	$16,651	-$20,381		$20,496	-$20,131	
Census region (relative to Midwest)						
West	$46,559	-$16,993	***	$44,866	-$15,919	***
South	$34,005	-$12,291	***	$35,140	-$11,009	***
Northeast	$15,345	-$14,877		$14,672	-$13,886	
California	$177,647	-$34,214	***	$172,790	-$34,602	***

RSMeans city construction cost index (per 10 percentage points)	$19,430	-$6,829	***	$21,592	-$5,345	***
Owned by a Moving to Work (MTW) agency	-$23,830	-$16,276				
PHA size (relative to small)						
Medium	-$5,233	-$12,566				
Large	$11,019	-$14,127				
Very large	$2,975	-$20,349				
NYCHA property	$45,347	-$31,008				
In Qualified Census Tract	$6,199	-$9,696				
In Difficult to Develop Area	$2,895	-$14,666				
In rural area	-$19,586	-$16,759				
Participated in HOPE VI	$15,958	-$13,932				
Intercept	-$26,317	-$88,752		-$32,574	-$77,788	
R-squared	0.48			0.47		
Adjusted R-squared	0.46			0.46		
Number of observations	741			741		
F statistic	19			21		

Source: HUD's RAD Database matched to additional data sources. A full list of data sources is provided in the appendix.
Notes: Property characteristics with positive coefficients are associated with higher construction costs per unit, while negative coefficients are associated with lower costs per unit. Excludes RAD properties that were missing from HUD's RAD Conversion Crosswalk or had zero hard construction costs that received tax credits, HOME subsidies, or FHA mortgages five years prior to conversion. Model 1 controls for all selected property characteristics, while model 2 includes only the controls for characteristics significantly associated with costs in the first model ($p<0.05$). We tested a model that controlled for all building types. Only single-family building types were associated with hard construction costs, so we simplified the final model to control for whether a property was single family construction or not.
**** p<.01, ** p<.05, * p<.1*

Figure 21: Logit Regression Marginal Effects Predicting Likelihood of Converting to RAD

	Properties			Units		
	Marginal Effects	Standard Error	Sig	Marginal Effects	Standard Error	Sig
REAC score (per 10 points)	0.003	-0.002		0.009	0.000	**
Multifamily property (relative to single family)	0.042	-0.014	**	0.042	-0.002	**
Occupancy rate two years ago (per 10 percentage points)	-0.014	-0.004	**	-0.008	0.000	**
Bedrooms per unit (relative to 1 bedroom per unit)						
2	-0.004	-0.009		-0.027	-0.001	**
3+	-0.002	-0.012		-0.015	-0.001	**
Average building age (relative to less than 20 years old)						
20-39 years	0.055	-0.015	**	-0.043	-0.002	**
40-59 years	0.030	-0.011	**	-0.092	-0.002	**
60+ years	0.005	-0.012		-0.128	-0.002	**
Total units (relative to under 50)						
50-99	0.019	-0.011		0.042	-0.001	**
More than 100	-0.006	-0.010		0.045	-0.001	**
HUD spending and TTP per month (per $100 dollars)	0.000	-0.001		-0.006	0.000	**
Participated in HOPE VI	-0.024	-0.012	*	0.013	-0.001	**
Owned by a Moving to Work (MTW) agency	-0.050	-0.008	**	-0.074	-0.001	**
PHA size (relative to small)						
Medium	0.044	-0.009	**	0.028	-0.001	**
Large	0.031	-0.011	**	0.018	-0.001	**
Very large	0.131	-0.024	**	0.169	-0.002	**
NYCHA property	-0.054	-0.015	**	-0.065	-0.001	**
In qualified census tract	0.051	-0.008	**	0.041	-0.001	**
In difficult to develop area	0.002	-0.012		-0.032	-0.001	**
In rural area	-0.078	-0.008	**	-0.075	-0.001	**
Census region (relative to Midwest)						
West	0.047	-0.020	*	0.044	-0.002	**
South	0.043	-0.013	**	0.144	-0.002	**
Northeast	-0.044	-0.008	**	-0.076	-0.001	**

California	0.062	-0.028	*	-0.029	-0.002	**
RSMeans city construction cost index (per 10 percentage points)	0.014	-0.006	*	0.054	-0.001	**
Number of observations	6,403			960,094		

Source: HUD's public housing and RAD databases matched to additional data sources. A full list of data sources is provided in the appendix.
*Note: Negative marginal effects indicate that the likelihood of undergoing a RAD conversion decreases with the dependent variable if the relationship is statistically significant. Positive marginal effects suggest that the likelihood of undergoing a RAD conversion increases with the independent variable. Properties that underwent a RAD conversion were excluded if they were not listed in HUD's RAD Conversion Crosswalk or had zero hard construction costs and received a tax credit, HUD insured mortgage, or HOME subsidy within five years prior to conversion. ** p<.01, * p<.05*

Figure 22: Comparison of Means for Pre-Conversion Characteristics of RAD Properties that Closed Between 2018 and August 2024 and Public Housing Properties

	Properties			Units		
	Public Housing (n=6,381)	RAD Properties (n=799)	Sig	Public Housing (n=889,047)	RAD units (n=117,699)	Sig
Total units	141	159	*	434	425	**
Total units						
Under 50	29%	18%	**	5%	3%	**
50-99	24%	27%		12%	12%	
100+	48%	56%	**	83%	85%	**
Average property age	45	45		53	47	**
Average property age						
Under 20 years	17%	13%	**	5%	10%	**
20-39 years	10%	13%	*	8%	11%	**
40-59 years	57%	58%		59%	61%	**
60+ years	16%	16%		28%	18%	**
Most recent REAC score	80	79		70	74	**
Occupancy rate	94%	88%	**	93%	89%	**
Occupancy rate two years ago	94%	92%	**	93%	93%	**
Average HUD spending per month and unit	$802	$963	**	$918	$976	**
Average HUD spending per month and unit two years ago	$801	$868	**	$916	$883	**
Average total tenant payment (TTP) per month	$409	$416		$429	$444	**
Average TTP last year	$409	$415		$429	$445	**
HUD spending and TTP per month	$1,211	$1,379	**	$1,346	$1,420	**
HUD spending and TTP per month two years ago	$1,209	$1,283	**	$1,345	$1,328	**
Average bedrooms per unit	1.8	1.8		1.9	1.8	**
Bedrooms per unit						
1	32%	31%		25%	33%	**
2	56%	55%		67%	59%	**
3+	12%	14%		9%	8%	**
RSMeans city construction cost index	95	96		101.0	100.7	**
RSMeans city installation cost index	88	92	**	102.5	104.3	**
RSMeans city material cost index	99	98	**	100.0	98.2	**

Multifamily property	95%	98%	**	98%	99%	**
Property participated in HOPE VI	8%	8%		4%	8%	**
Property participated in Choice Neighborhoods	1%	4%	**	1%	4%	**
In qualified census tract	49%	68%	**	63%	74%	**
In difficult to develop area	11%	11%		20%	14%	**
In urban area	82%	95%	**	10%	3%	**
Owned by a Moving to Work (MTW) agency	14%	14%		13%	11%	**
PHA size						
Small	37%	21%	**	21%	13%	**
Medium	30%	41%	**	28%	35%	**
Large	20%	23%		23%	24%	**
Very large	12%	15%	*	28%	28%	
Census region						
West	8%	13%	**	7%	9%	**
Midwest	25%	22%		19%	20%	**
South	41%	46%	**	32%	42%	**
Northeast	22%	19%		36%	30%	**
US Territory	5%	0%	**	6%	0%	**

Source: HUD's public housing and RAD databases matched to additional data sources. A full list of data sources is provided in the appendix.
*Note: Excludes RAD properties that were missing from HUD's RAD Conversion Crosswalk or had zero hard construction costs that received tax credits, HOME subsidies, or FHA mortgages five years prior to conversion. Significance value corresponds to Pearson's chi-squared test for independence for categorical variables and T-Test for continuous variables. ** p<.01, * p<.05 Some variables had fewer observations due to missing variables.*

Figure 23: Ordinary Least Squares Models Predicting Hard Construction Costs Per Unit 2018-August 2024 for Alternative Scenarios

	Selected Model			Alternative Scenario 1: Exclude NYCHA Properties from the Model			Alternative Scenario 2: Exclude Properties 70 Years or Older from Model			Alternative Scenario 3: Assume All Properties Have Hard Construction Costs		
	Coeff	SE	Sig	Coeff	SE	Sig	Coeff	SE	Sig	Coeff	SE	Sig
REAC score (per 10 points)	-$8,225	-$2,582	***	-$7,301	-$2,763	***	-$6,763	-$2,523	***	-$7,605	-$2,767	***
Multifamily property (relative to single family)	$75,370	-$29,161	***	$78,616	-$29,459	***	$71,185	-$28,519	**	$94,593	-$34,637	***
Occupancy rate two years ago (per 10 percentage points)	-$29,431	-$4,609	***	-$30,489	-$4,677	***	-$27,595	-$4,958	***	-$29,452	-$4,732	***
Bedrooms per unit (relative to 1 per unit)												
2	-$6,521	-$8,676		-$8,589	-$8,903		-$4,994	-$8,590		-$3,336	-$9,646	
3+	$63,625	-$14,696	***	$63,878	-$14,784	***	$68,826	-$14,380	***	$62,386	-$15,802	***
Average building age (relative to under 20 years)												
20-39 years	$70,371	-$12,952	***	$70,223	-$13,083	***	$69,305	-$12,930	***	$65,333	-$15,451	***
40-59 years	$85,070	-$10,496	***	$83,727	-$10,536	***	$85,172	-$10,473	***	$72,870	-$13,533	***
60+ years	$135,923	-$16,013	***	$133,324	-$16,328	***	$136,513	-$16,911	***	$126,082	-$18,615	***
Total units (relative to under 50)												
50-99	$52,522	-$13,794	***	$53,166	-$13,884	***	$68,001	-$13,423	***	$45,940	-$16,490	***
More than 100	-$3,893	-$11,815		-$5,699	-$11,851		$7,277	-$11,239		-$14,672	-$14,584	
HUD spending and TTP per month (per $100 dollars)	$3,981	-$964	***	$4,024	-$975	***	$4,028	-$962	***	$3,412	-$1,083	***

Closing year (relative to 2018)												
2019	$19,064	-$11,868		$17,956	-$12,010		$10,695	-$11,603		$27,533	-$13,078	**
2020	$29,877	-$12,199	**	$28,295	-$12,515	**	$21,375	-$12,390	*	$34,291	-$13,415	**
2021	$11,745	-$13,121		$7,681	-$13,431		$9,463	-$13,632		$14,964	-$14,784	
2022	$36,057	-$15,465	**	$34,479	-$15,697	**	$37,025	-$15,463	**	$39,497	-$17,196	**
2023	$62,494	-$19,020	***	$61,078	-$19,751	***	$56,167	-$17,896	***	$69,428	-$19,401	***
2024	$20,496	-$20,131		$10,745	-$20,383		$17,166	-$20,386		$17,861	-$22,213	
Census region (relative to Midwest)												
West	$44,866	-$15,919	***	$42,240	-$16,000	***	$42,035	-$15,905	***	$63,655	-$18,338	***
South	$35,140	-$11,009	***	$29,977	-$11,637	**	$31,777	-$11,002	***	$35,861	-$11,660	***
Northeast	$14,672	-$13,886		$12,356	-$13,804		$15,669	-$13,993		$21,541	-$15,264	
California	$172,790	-$34,602	***	$178,393	-$35,009	***	$160,864	-$34,541	***	$178,872	-$36,040	***
City construction cost index (per 10 percentage points)	$21,592	-$5,345	***	$17,947	-$6,312	***	$20,116	-$5,392	***	$23,349	-$5,659	***
Intercept	-$32,574	-$77,788		$7,496	-$84,783		-$49,066	-$80,286		-$47,454	-82,197	
R-squared	0.47			0.47			0.47			0.47		
Number of observations	741			725			708			642		
F statistic	20.62			18.72			18.81			18.56		

Source: HUD's RAD Database matched to additional data sources. A full list of data sources is provided in the appendix.
*Notes: Property characteristics with positive coefficients are associated with higher construction costs per unit, while negative coefficients are associated with lower costs per unit. Excludes RAD properties that were missing from HUD's RAD Conversion Crosswalk or had zero hard construction costs that received tax credits, HOME subsidies, or FHA mortgages five years prior to conversion. *** p<.01, ** p<.05, * p<.1*

Figure 24: 10 Year Plan to Preserve 90,000 Public Housing Each Year to Preserve the Nation's Public Housing Stock by 2035

Year	Public Housing Units to Preserve Each Year	Average Cost to Preserve Units and Address Accrual Needs	Total Cost to Preserve Units and Address Accrual Needs
2025	89,905	$188,090	$16,910,184,013
2026	89,905	$191,687	$17,233,540,472
2027	89,905	$195,283	$17,556,896,930
2028	89,905	$198,880	$17,880,253,389
2029	89,905	$202,477	$18,203,609,847
2030	89,905	$206,073	$18,526,966,306
2031	89,905	$209,670	$18,850,322,764
2032	89,905	$213,267	$19,173,679,223
2033	89,905	$216,863	$19,497,035,681
2034	89,905	$220,460	$19,820,392,140
Total	899,047	$204,275	$183,652,880,767

Figure 25: Ordinary Least Squares Models Predicting Hard Construction Costs Per Unit 2018-2024

	All Predictors (Model 3)			Significant Predictors (Model 4)		
	Coeff	SE	Sig	Coeff	SE	Sig
REAC score (per 10 points)	-$6,513	-$2,721	**	-$8,213	-$2,601	***
Single family property (relative to multifamily)	-$72,434	-$30,926	**	-$73,089	-$30,047	**
Occupancy rate two years ago (per 10 percentage points)	-$29,825	-$4,868	***	-$29,168	-$4,693	***
Bedrooms per unit (relative to 1 bedroom per unit)						
2	-$8,192	-$9,201		-$6,593	-$8,769	
3+	$65,203	-$15,370	***	$64,075	-$14,750	***
Average building age (relative to less than 10 years old)						
10-19 years	$11,868	-$14,314		$13,510	-$14,043	
20-29 years	$66,831	-$22,837	***	$71,693	-$22,336	***
30-39 years	$90,299	-$17,033	***	$84,384	-$16,440	***
40-49 years	$99,774	-$14,307	***	$94,835	-$13,489	***
50-59 years	$102,682	-$14,958	***	$95,299	-$14,293	***
60-69 years	$148,984	-$19,420	***	$145,668	-$18,786	***
70+ years	$149,786	-$31,084	***	$146,640	-$31,268	***
Total units (relative to under 50)						
50-99	$52,507	-$13,992	***	$53,033	-$13,852	***
More than 100	-$8,698	-$12,192		-$3,729	-$11,873	
HUD spending and TTP per month (per $100 dollars)	$4,490	-$1,014	***	$4,006	-$963	***
Closing year (relative to 2018)						
2019	$18,222	-$11,759		$19,295	-$11,946	
2020	$27,786	-$12,278	**	$29,926	-$12,260	**
2021	$10,799	-$13,249		$12,989	-$13,293	
2022	$33,931	-$15,326	**	$36,625	-$15,622	**
2023	$61,088	-$19,620	***	$62,605	-$19,257	***
2024	$16,810	-$20,579		$20,526	-$20,384	
Census region (relative to Midwest)						
West	$46,223	-$17,148	***	$44,621	-$16,040	***
South	$34,253	-$12,334	***	$35,371	-$11,054	***
Northeast	$15,407	-$15,150		$14,497	-$14,165	
California	$177,036	-$34,230	***	$172,423	-$34,597	***

RSMeans city construction cost index (per 10 percentage points)	$19,477	-$6,936	***	$21,652	-$5,373	***
Owned by a Moving to Work (MTW) agency	-$24,283	-$16,372				
PHA size (relative to small)						
Medium	-$4,937	-$12,588				
Large	$11,700	-$14,191				
Very large	$2,950	-$20,358				
NYCHA	$46,425	-$31,088				
In qualified census tract	$5,916	-$9,685				
In difficult to develop area	$2,836	-$15,166				
In rural area	-$20,669	-$16,697				
Property participated in HOPE VI	$19,082	-$14,519				
Intercept	$33,486	-$83,695		$28,847	-$72,109	
Adjusted R-squared	0.46			0.46		
Number of observations	741			741		
F statistic	16.96			18.05		

*Source: HUD's RAD Database matched to additional data sources. A full list of data sources is provided in the appendix. Notes: Property characteristics with positive coefficients are associated with higher construction costs per unit, while negative coefficients are associated with lower costs per unit. Excludes RAD properties that were missing from HUD's RAD Conversion Crosswalk or had zero hard construction costs that received tax credits, HOME subsidies, or FHA mortgages five years prior to conversion. *** p<.01, ** p<.05, * p<.1*

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