



The Research Bureau

# BUILDING THE FUTURE

Investing in Worcester Public Schools  
Facilities

REPORT 24-03

February 2024

In Partnership with

Worcester  
Education  
Collaborative 





## EXECUTIVE SUMMARY

**RENEWED POLICY DISCUSSIONS** on school facilities investments in Worcester Public Schools underscore the pressing need for strategic action. This report delves into three key areas: state and local partnerships, local discretionary spending, and an analysis of the District’s 2017 Facilities Master Plan. The Bureau’s work seeks to inform public debate in preparation for the District’s next Facilities

Master Plan. It is vital that the City and District continue to address issues such as aged school infrastructure, deferred maintenance, and limited revenue streams. By prioritizing collaborative, data-driven decision-making, with a focus on equitable resource allocation, Worcester can continue to improve its learning environments and enhance learning outcomes for its students.

### PAGES 3-4 | INTRODUCTION: WHY DO SCHOOL FACILITIES MATTER? A LITERATURE REVIEW

- Reviews the literature on school facilities, highlighting important studies on the subject.
- Examines key topics, including student performance, health, climate-friendly construction, community engagement, equitable resource allocation, and school safety.
- **While the District addresses aging buildings and deferred maintenance issues, city leaders have made progress through initiatives such as HVAC upgrade and the commission of a safety audit, aiming to improve learning environments.**

### PAGES 5-11 | THE MSBA AND WPS: IMPROVING SCHOOLS THROUGH STATE AND LOCAL COLLABORATION

- Examines the collaborative efforts between the Massachusetts School Building Authority (MSBA) and Worcester to address challenges related to aging infrastructure and budget constraints.
- Explains the necessary steps to complete an MSBA project.
- Analyzes the MSBA’s statewide involvement, then compares Worcester to peer Gateway Cities across the Commonwealth.
- **Despite facing challenges like budget overruns, Worcester has consistently collaborated with the MSBA, marking its position as one of the leading Gateway Cities in enhancing educational infrastructure.**

### PAGES 11– 14 | LOCAL SCHOOL FACILITIES SPENDING: A FOCUS ON MUNICIPAL INVESTMENTS

- Analyzes trends in facilities-related spending across recent WPS budgets.
- Examines the City’s Capital Improvement Plan (CIP) allocation to WPS
- Highlights the continuous efforts of the City and District to enhance educational facilities through FY 2024.
- **Student enrollment projections highlight shifts across the District, emphasizing the necessity for strategic planning in future school consolidation and construction projects.**
- **In 2023, notable efforts include the City allocating \$1 million in new tax growth for school facility maintenance, the District adding a facilities section to its new five-year Strategic Plan, and conducting a safety audit for district-wide improvements.**

### PAGES 14-19 | ANALYSIS OF THE WORCESTER PUBLIC SCHOOL’S 2017 FACILITIES MASTER PLAN

- Overviews the District’s 2017 Facilities Master Plan, including cost evaluations and recommendations for the oldest schools.
- Analyzes the report’s findings, providing secondary analysis and deeper insights.
- **Square footage emerges as the most significant factor correlating with higher repair costs for schools.**
- **Strong correlations exist between higher repair costs and increased numbers of Hispanic, African American, and Economically Disadvantaged students across the 28 schools in the Master Plan. No such correlation is found for White students. Further investigation is required to understand the underlying factors contributing to these disparities and to ensure equitable resource allocation. Note that correlation does not imply causation.**
- All findings are based on 2017 demographic data and 2018 cost projections.

### PAGES 19-20 | CONCLUSION AND RECOMMENDATIONS

- Summarizes the importance of improving school facilities, which will drive student learning outcomes, and make recommendations for local leaders to consider.
- **The Bureau’s Recommendations: 1) develop a data-driven priority list of the district’s neediest schools, 2) ensure a transparent, and equitable selection process for school construction and repair projects, 3) further analyze correlations between schools with higher numbers of students from historically underserved backgrounds and higher repair costs, 4) consolidate pre-WWII schools as necessary, and 5) advocate for increased state investment in school facilities for Gateway Cities to address inflation, ADA, and land acquisition costs.**



## **INTRODUCTION: WHY DO SCHOOL FACILITIES MATTER?**

School facilities serve as the physical foundation of education, shaping the academic, health, and social outcomes of students. From classroom design to indoor air quality, every aspect of the built environment can significantly impact student well-being and achievement. This section provides an overview of the multi-disciplinary field of school facilities. In summary, the quality of school facilities has crucial implications for student outcomes, health, safety, climate, community engagement, diversity, equity, and inclusion.

### **STUDENT PERFORMANCE**

A recent study stands out as particularly informative on the relationship between investments in school facilities and student performance. [“What Works and For Whom? Effectiveness and Efficiency of School Capital Investments Across the U.S.”](#) by Barbara Biasi, Julien Lafortune, and David Schönholzer, studied local public policy decision making on school facilities utilizing advanced statistical methods.

**The paper, published in 2023, investigated the impact of investments in school capital projects on student learning outcomes and real estate markets.** The authors explore two primary outcomes: student learning (measured by test scores) and housing prices. The authors were careful to examine capital projects by type: infrastructure improvements, Science, Technology, Engineering, and Math (STEM) equipment, and athletic facilities. The study also accounts for the variation in funding rules across the United States, but this procedural element does not matter as much for the purposes of this report. What is important to know is that **Massachusetts is one of nine states that funds capital projects primarily with state dollars and one of three states for which voter approval is not required to issue bonds for school districts.**

Here is a summary of the study’s central findings, which focus primarily on the impact of the types of authorized projects and their real-world outcomes:

- 1. The approval of capital investments into school facilities is found to have a positive impact on both student test scores and housing prices.**
- 2. Investments in projects such as Heating, Ventilation, and Air Conditioning (HVAC) systems and safety improvements produce significant increases in test scores, nation-wide. Investments in amenities such as athletic facilities and classroom space only drive up housing prices.**

- 3. Districts that serve more socio-economically disadvantaged students tend to benefit more from facilities investments, experiencing larger increases in both test scores and housing prices.**
- 4. Despite variations in funding rules and district demographics, the study suggests that investment in school capital projects are generally beneficial for students and communities, with positive impacts on both student outcomes and housing markets.**

The strong relationship between school facilities and educational outcomes is further evidenced throughout the academic literature on the subject. [Penn State’s Center for Evaluation and Education Policy](#) compiled a useful literature review in 2015, which outlined various essential considerations for designing school facilities that are conducive for student learning and educational attainment: acoustics and noise, air quality, lighting, temperature control, classroom size and space, and the shift to 21st century learning. This last item addresses how technological advancements can aid and facilitate core skills such as teamwork, collaboration, and effective communication for K-12 learners. Lafortune & Schönholzer’s work from 2018 also supports the strong association between school facility investments and upward trends in performance.

The field of school facilities also branches into several other categories of importance for educators, city leaders, and policy advocates to consider.

### **HEALTH AND WELL-BEING**

There is also robust evidence connecting the quality of school facilities to the physical and psychological health of students and staff. Mendell et al. (2013) underscore the importance of indoor air quality and ventilation systems in promoting student health and reducing illness-related absences. Other studies have focused particularly on the incidence of asthma and general respiratory problems in schools (Smedje & Norback, 1999). Buckley, Schneider, and Shand (2004) underscore the multi-faceted challenge of teacher retention in urban districts, acknowledging the importance of classroom and school infrastructure in teacher satisfaction and health.



## **CLIMATE-FRIENDLY CONSTRUCTION**

[The Center for Green Schools at the U.S. Green Building Council](#) has been at the forefront of promoting eco-friendly construction practices in school facilities through studies such as [“Greening America’s Schools: Costs and Benefits”](#) (Kats, 2006). The Center highlights the benefits of green building technologies in reducing environmental harms and improving indoor air quality. Patnaik et al. (2017) and Tsoulou et al. (2021) contribute to this discourse by exploring the adoption of green building technologies among construction firms and the impact of energy-efficient buildings on indoor air quality. Sustainable construction practices have become an important academic and policy subject to help mitigate climate change and promote healthier environments.

## **COMMUNITY ENGAGEMENT**

Anderson (2016) and Tahbaldar (2007) draw attention to disparities in school facilities and advocate for policies to ensure throughout the planning and construction processes of n new school projects. Carter’s work (2013) delves into the roots of inequality in education and proposes strategies for closing opportunity gaps. More broadly, the literature on education policy has touted the importance of the political process, analyzing which groups enjoy the benefits of substantial investments. An equitable future requires supporting the communities in with the most need, whose neighborhoods may have been deprived of substantial investments in the past.

## **SCHOOL SAFETY**

It is essential to underscore the various dimensions of school safety. Mayer et al.’s (2021) work delves into five general important lenses by which to bolster safety in schools: conceptual foundations, disparate treatment of non-White racial and ethnic groups, the role of school resource officers, the effects of disciplinary action on school climate, and bullying prevention. Leveraging the studies from Mayer et al.’s review, schools can take preventative action against bullying and violence that undermines the safety and wellbeing of students and staff.

Bevan (2019) and the [U.S. Department of Education’s Readiness and Emergency Management Schools \(REMS\) Center](#) provide operational guides to enhance school safety, such as threat assessment models. A proactive approach requires built-in safety infrastructure rather than reactionary policies. School safety requires, on the one hand, a strong safety culture, which ensures effective communication between the superintendent, principals, teachers, and all other school staff. On the other hand, it

requires modern infrastructure and security systems that are deemed appropriate and necessary, with consent from parents and guardians of students. Adopting new safety technologies in schools should balance the need for safety with principles that protect students’ privacy and freedom.

## **WHAT DOES THIS MEAN FOR WORCESTER?**

It is essential to inform Worcester’s policymakers and community members about data-driven approaches to enhance school facilities. All of the topics outlined in the literature review are relevant for the Worcester Public Schools system.

Across the District’s 45 schools, there are several buildings built in the 1800s and early 1900s, which require new HVAC systems and suffer from deferred maintenance. Lack of air conditioning across the District’s schools and broken heat pumps has caused delays in educational delivery. These problems have consequences for student outcomes and health and well-being.

While the City has limited resources to solve these large-scale problems, Worcester’s leaders have sought creative solutions to make improvements. For example, when the COVID-19 pandemic brought a renewed focus to issues of air quality and ventilation in schools, **the City invested \$15 million in HVAC upgrades while students learned remotely.**

Furthermore, the District commissioned Guide Post Solutions, a safety and construction consulting firm, to complete a safety audit of school facilities and identify key areas for improvement. They emphasized the importance of door locking hardware, emergency communications, control of school access, proper exterior lighting, emergency management training, and perimeter protection.

This report elaborates on these and various other initiatives that the City, District, and state have undertaken to address the needs of Worcester’s public school facilities. The Bureau pursued a three-pronged approach. **First, this report it examines Worcester’s collaborative history with the Massachusetts School Building Authority**, comparing its projects to those of Boston and similar Gateway Cities. **Secondly, it analyzes trends in facilities-related spending within the WPS FY 2024 Budget and the City’s Capital Budget**, supporting the WPS’ Capital Investment Plan for deferred maintenance. **Lastly, The Bureau provides secondary analysis of the 2017 WPS Facilities Master Plan, contributing to public discourse in anticipation of the next plan.**



## THE MSBA AND WORCESTER: IMPROVING SCHOOLS THROUGH STATE AND LOCAL COLLABORATION

Established in 2004, the Massachusetts School Building Authority (MSBA) is a quasi-public agency with a vital role in guaranteeing the quality and safety of educational infrastructure throughout Massachusetts. The MSBA is funded with one penny for every dollar of the state’s 6.25% sales tax. Its primary responsibility is to provide funding for new school construction and urgent repair projects across the Commonwealth’s 401 public school districts. Depending on the project, the MSBA reimburses cities, towns, or school districts for the construction costs of a project. The rate ranges from 78.5% to 90%, but is usually 80%. Large urban districts, with tens of thousands of students, face challenges in funding school facilities compared to wealthier suburban districts. **Worcester Public Schools currently serves 24,350 students and maintains several buildings constructed in the late 1800s and early 1900s.** As a city that relies heavily on state resources, Worcester’s partnership with the MSBA are crucial for developing safe and modern educational facilities.

### FROM CONCEPT TO CONSTRUCTION: NAVIGATING THE MSBA’S PROJECT PIPELINE

Before projects enter the MSBA pipeline, it’s essential to understand the initial step: Statements of Interest (SOIs). **SOIs are proposals submitted to the MSBA, which outline facility deficiencies that undermine safety or hinder educational delivery.**

Approved projects enter the **Eligibility Period**, starting with a 270-day period. Projects must meet MSBA requirements, including an Initial Compliance Certification, forming a School Building Committee, summarizing maintenance practices, certifying design enrollment, and executing the MSBA’s Feasibility Study

Agreement.

Next is the **Project Team** phase, when professional consultant services are procured. These teams guide projects through subsequent steps, including coordination with the district.

The **Feasibility Study** follows, in which the project team explores multiple project options required by the MSBA, including repair, an addition, renovation, and new construction. This step involves documenting the educational program of the school, evaluating existing conditions, and recommending solutions to the MSBA Board of Directors.

**Schematic Design** includes a detailed design program of the selected option, and establishing the scope, budget, and schedule of the project. The district and its team work closely during this phase to ensure alignment with project goals, integrating them throughout the balance of the project timeline.

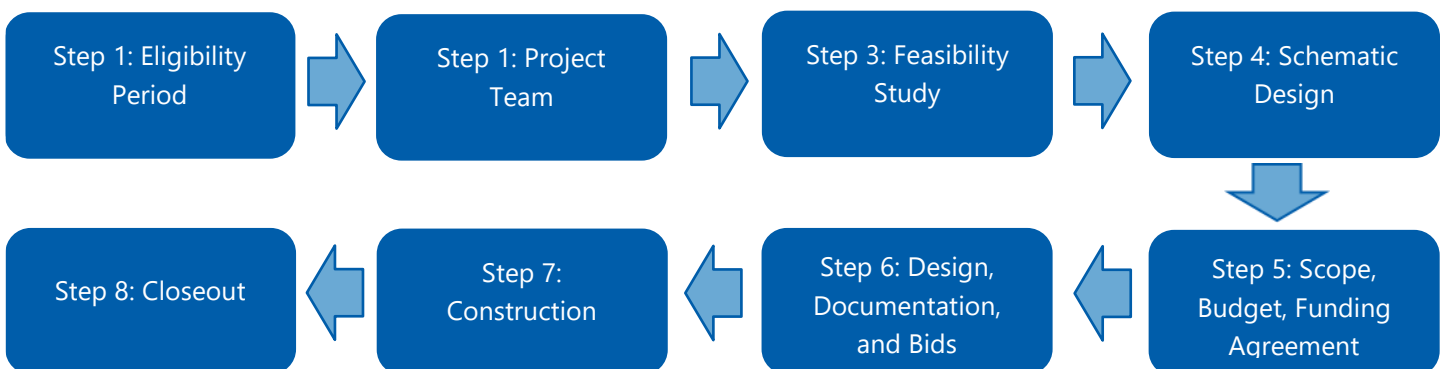
The **Project Scope, Budget, and Funding Agreement** phase documents project details for MSBA approval. The district secures community authorization and financial support before entering a Project Funding Agreement with the MSBA, ensuring commitment to the project.

**Design Development, Construction Documentation, and Bidding** includes planning and procurement activities. This involves finalizing the design, preparing construction documentation, and soliciting bids from construction companies. The goal is to ensure that the project stays within budget and meets quality standards.

**Construction** begins, monitored by the MSBA for adherence to timelines and budgets. Regular inspections and progress reports are conducted to address any issues promptly.

**Closeout** involves a final audit by the MSBA to determine grant amounts and mark project completion. This ensures

### Overview of the MSBA Project Pipeline



Source: [MSBA Modules Overview](#)





that all requirements have been met and the project has been successfully executed. This signals the end of the project.

The MSBA also includes a ninth step, called the **Post Occupancy Evaluation (POE)**, which assesses the performance and functionality of occupied MSBA-funded school buildings. This evaluation employs methods such as online surveys and site visits. Its aim is to improve school building design, construction and operation in the future.

A brief note on the formal processes of working with the MSBA: Massachusetts does not mandate local votes for school district bond authorizations. However, [G.L. c. 70B](#) and [963 CMR 2.10](#) guide the MSBA in establishing rules for local financial commitments for project authorizations. **Cities, towns, or districts must provide documentation of a motion, vote, order, or local ballot question authorizing funds for the Feasibility Study and the Project Scope and Budget stages.** This ensures that local communities have allocated the funds necessary to pay for the project. In Worcester, the City Manager recommends borrowing initiatives, such as MSBA projects, for approval by the City Council to obtain funds for construction projects. Upon fulfilling these requirements with the MSBA, projects are effectively greenlit to proceed.

**THE MSBA’S STATEWIDE INVOLVEMENT:**

The MSBA engages in statewide efforts to improve school building facilities. By cross-referencing publicly available data from the MSBA’s website, including their [List of Projects](#), [Board Meetings](#), and [Capital Planning Project Overview Reports](#), the history of the agency’s Statements of Interest (SOIs) and invitations reveals interesting trends. It is important for municipal leaders, policymakers, education advocates, and the general public to understand the scale of the agency’s endeavors.

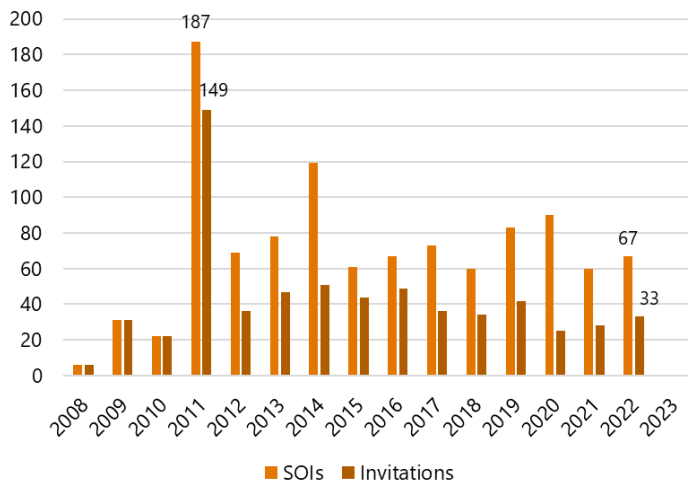
The MSBA has two main programs that this analysis will focus on. **The Core Program focuses on comprehensive renovations, additions, and new school construction projects.** These projects address outdated infrastructure such as plumbing, electrical, and mechanical systems, alleviating overcrowding concerns, or ensuring safety by rectifying structural deficiencies and fire code violations.

**The Accelerated Repair Program (ARP) targets urgent repairs in existing school facilities. These projects include relatively less expensive repairs such as roof replacements, HVAC system upgrades, boiler replacements, window repairs, and other essential maintenance** that is crucial for the safety and functionality of school buildings. It serves as the successor to the [Green Repair Program](#), a one-time, \$300 million pilot initiative offered in FY 2011. Continuing its legacy, the ARP emphasizes energy-efficiency, cost-effective repair projects to swiftly enhance the safety and functionality of public educational facilities.

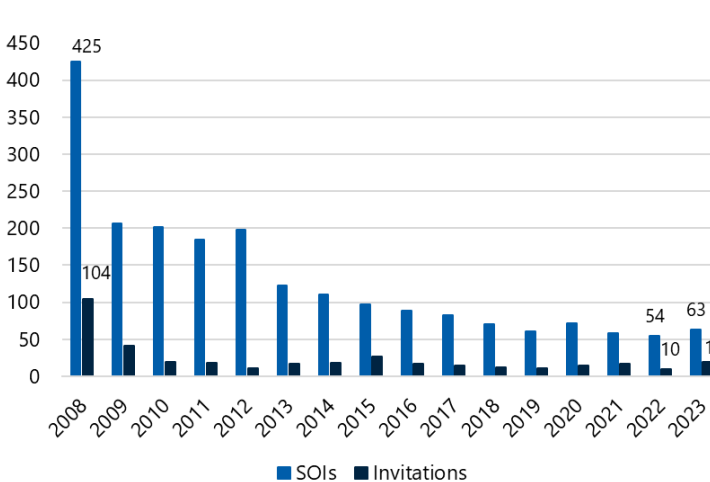
Charts 1 and 2 show the number of SOIs and invitations for both programs between 2008 and the year that the most recent data for each program was available. **On October 22, 2022, the MSBA Board of Directors announced a temporary pause to the Accelerated Repair Program for 2023, citing unexpected challenges in the market and supply chain disruptions,** leading to significant impacts on project bids. The decision aimed to bolster the MSBA’s Annual Project Approval Cap and mitigate the rises in funding limits for Core Program projects, thereby maintaining the number of program invitations extended.

Note that the ranges for the y-axes on charts 1 and 2 are different. The highest number of SOIs for the ARP is 187, but 425 for the Core Program. While the number of SOIs

**Chart 1: Statewide Accelerated Repair Projects (2008-2022)**



**Chart 2: Statewide Core Program Projects (2008-2023)**



Source: MSBA Capital Project Pipeline Overview Report, November 17, 2023



and invitations extended for the ARP fluctuate each year, the number of SOIs and invitations for the Core Program have steadily declined between 2008 and 2023.

The Core Program consistently receives more demand than the ARP. On average, the **Core Program receives 93 SOIs per year**, while the **Accelerated Repair Program receives 67**. However, the MSBA extends **17 core invitations and 45 accelerated repair invitations in a typical year**.

The invitation rate, an original data point created by The Bureau, represents the percentage of SOIs that are extended invitations by the MSBA each year. Chart 3 plots the invitation rate over time, including dotted lines to show the overall trend. This is crucial for understanding the agency’s ability to meet the Commonwealth’s demand for state-aided public school facilities upgrades. Data labels are provided for the first, middle, and most recent year that standardized data was available. **On average, the invitation rate stands at 56.6% for the ARP and 18.6% for the Core Program.**

From 2008 to 2022, the invitation rate for the ARP has fluctuated, with the overall trendline indicating a decline. Even when excluding the outlier years of 2008-2010 from

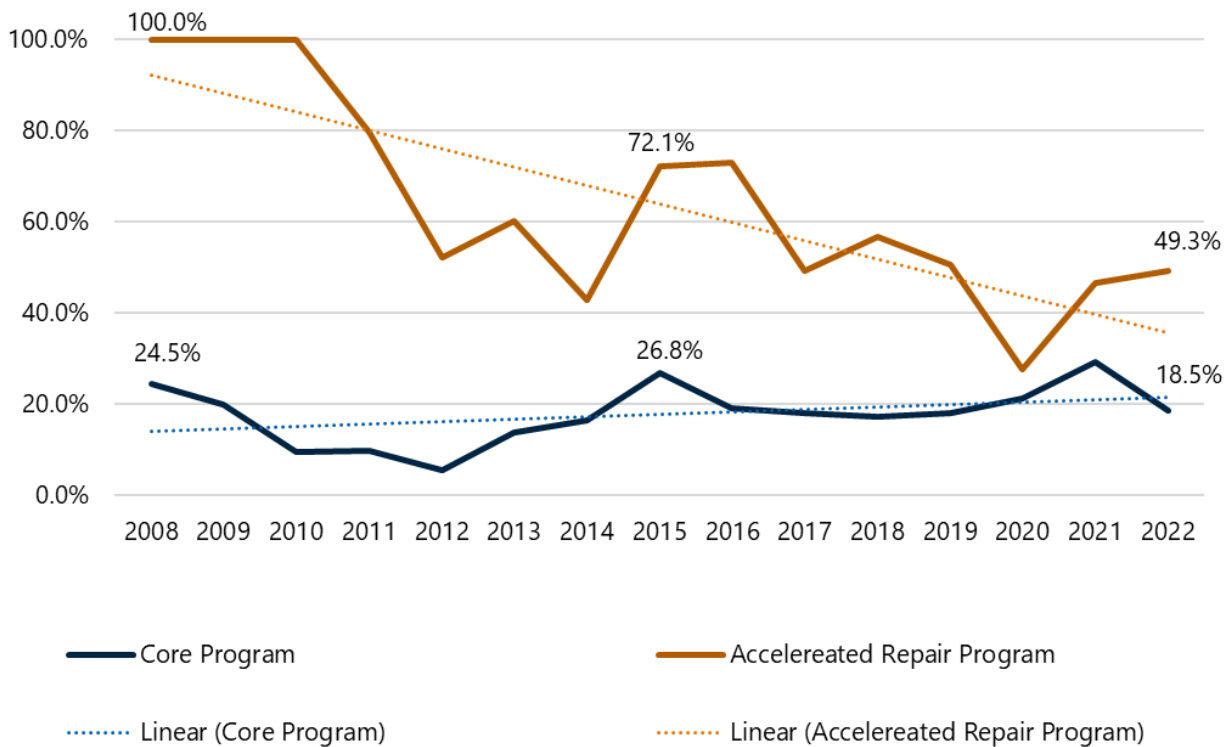
the dataset, the trend remains downward, though to a lesser extent. **In recent years, however, the MSBA has invited a greater percentage of ARPs, with the invitation rate reaching 49.3% in 2022, nearly returning to pre-pandemic levels.**

In contrast, the invitation rate for Core Program projects has been relatively stable over the same time period, fluctuating over longer periods than the ARP. The overall trendline suggests a modest increase in the invitation rate between 2008 and 2022. **In 2023, the invitation rate for the Core Program was 30.2%, a 11.7% spike from the prior year. This equates to 9 more projects in the Core Program.**

**Why does the Core Program receive more demand, yet the MSBA invites a greater number and percentage of ARP projects?**

This outcome likely stems from the differing financial scales of both programs. Core projects typically involve budgets in the hundreds of millions of dollars, whereas ARP projects generally range in the millions to low tens of millions of dollars. Therefore, the MSBA addresses a relatively smaller number of very costly core projects each year, while supporting a larger volume of urgent, less

**Chart 3: The MSBA’s Statewide Invitation Rates (2008-2022)**



Source: Capital Planning Project Overview, November 17, 2023



expensive repairs. This is not a reflection of the agency's priorities; rather, it reflects the agency's legislatively mandated responsibility to fund larger projects in the Core Program within its budget, while also addressing the immediate needs of districts. This strategy seeks to balance high and low-cost projects to meet the educational facility needs across the Commonwealth.

Now the focus shifts to the MSBA's history in Worcester, detailing the numerous projects that have enhanced the Worcester Public Schools system.

**A HISTORY OF COLLABORATION BETWEEN WORCESTER AND THE MSBA**

Between 2011 and 2023 the **MSBA has invited Worcester to engage in 5 core projects and 31 ARP projects.** Appendix 1 synthesizes detailed information on each project, including the year the SOI was submitted, the total budget and the MSBA's reimbursement.

According to the [MSBA Project List](#), Worcester has two active projects. **Firstly, the new Doherty High School is under construction.** This project was approved in 2017 and intended to cost \$293 million. However, the rising cost of materials has led to budget overruns. In 2022, to address a \$30 million overrun, The City Manager secured a \$23 million loan order with the City Council's approval.

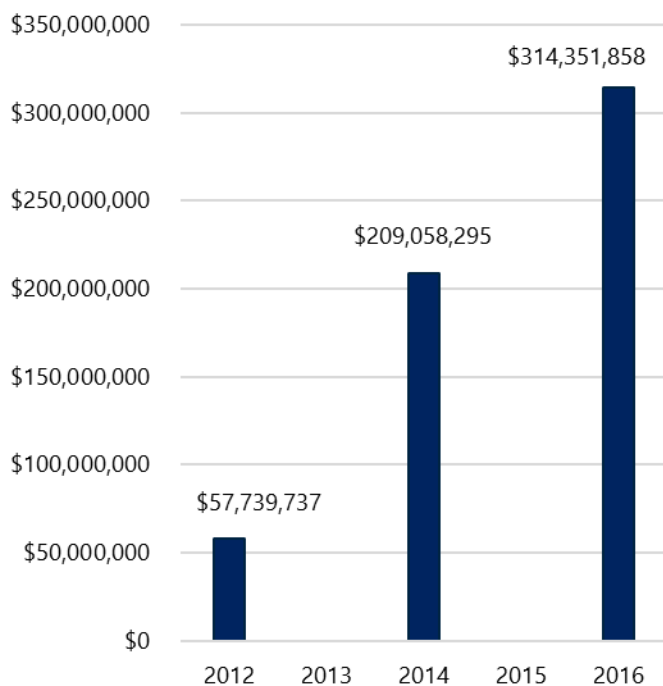
Additionally, to support local districts address these inflationary pressures, the MSBA's Board approved adjustments to the total facilities grant available for

projects approved prior to October 1, 2022. The specifics entail an increase to \$393 per square foot and \$39 per square foot for sitework, equating to a \$270 million supplemental grant across 30 projects, including Doherty High School. The funding for these adjustments stems from the Fair Share Amendment and changes to the state's FY 2024 Budget.

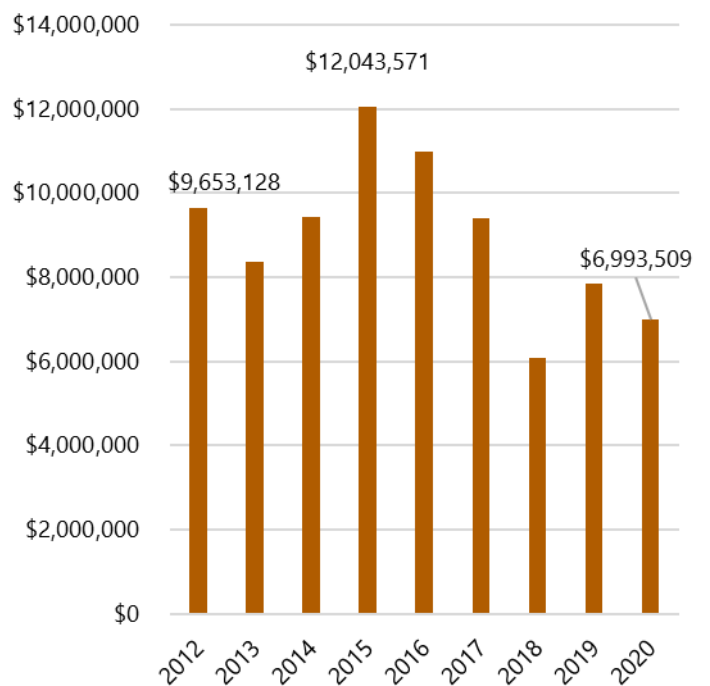
**The new total for Doherty High School, including overruns, is an estimated \$314 million. The MSBA Project List suggests that the agency will reimburse 49.5% of the total project costs.** So far, the MSBA has reimbursed the City \$80,700,786, and it is expected to pay another \$75,170,516 of remaining funds. The project is set to conclude in the summer, with student expected to attend in Fall of 2024.

**The second project is a roof replacement for Worcester Arts Magnet School, which was initially approved for a \$2 million loan in 2021.** On April 5, 2022, the City Council approved an addition \$5 million loan order because this cost of the project exceeded 30% of the assessed building value. This threshold triggered a zoning regulation in [521 CMR 3.3.2](#), which requires that the entire buildings be made compliant with the Americans with Disabilities Act. The MSBA does not reimburse municipalities for these costs, which tends to force cities and towns to pay much higher, unexpected project costs. **As of 2022, Worcester Arts Magnet School's roof replacement now costs \$7 million.**

**Chart 4: Worcester's Core Program Project Costs**



**Chart 5: Worcester's Accelerated Repair Program Project Costs**



Sources: MSBA Project List and Capital Planning Overview Report, November 17, 2023





**On December 13, 2023, the MSBA Board of Directors unanimously voted to approve Burncoat Senior High School into the Feasibility Study phase.** The decision comes after 13 rejected SOIs over the past 15 years, and marks the District’s fourth high school to be rebuilt since 2011. WPS is engaged in ongoing conversations with the MSBA to determine if Burncoat Middle School will be included in the project’s scope. These two schools share the same premises and are interconnected facilities, which makes including both a natural consideration.

First built in 1964, Burncoat High has suffered from inoperable components and deferred maintenance for years, posing safety risks and challenges for a productive learning environment. The school’s accreditation was put at risk due to these concerns. In December 2023, the school’s heat pump failed, causing a one-day closure. In September, a three-day heatwave caused a three-hour early dismissal. Burncoat’s acceptance into the MSBA pipeline is a long-awaited accomplishment that signals the end of the City and District’s efforts to rebuild each high school. The new North High concluded in 2011, and the new South High opened in 2021. Worcester Technical High School, constructed in 2006, further demonstrates the city’s collaboration with the state.

The lack of proper Heating, Ventilation, and Air Conditioning (HVAC) systems is not unique to Burncoat, however. This is a district-wide, and indeed, a nation-wide problem, and that disproportionately hurts urban districts with older school buildings. The issue was covered frequently in the news. On September 3, 2023, NBC Boston speculated that **90% of classrooms in the District, or more, lack air conditioning** (Botelho). On September 8, the Telegram & Gazette reported that **80% of the District’s school buildings do not have air conditioning** (Schwan). While the exact figures are unknown, the overall problem is clear: heat conditions pose a health and safety risks to students and staff across the District.

As climate change continues to worsen, making extreme heat waves more frequent, the District will be forced to address this concern sooner rather than later, in order to ensure the safety of students and staff. The Worcester Public Schools administration has expressed their deep concerns over the situation, and the resulting inequities in educational delivery.

**WORCESTER’S COMPETITIVE FOOTING WITH PEER CITIES IN MASSACHUSETTS**

The Bureau will shed light on Worcester’s success in securing ARP and Core Program projects compared to cities with similar school districts. The peer cities were carefully selected based on specific criteria: a FY 2020

school budget of at least \$200 million and a student population of more than 12,000. This list includes Boston, and seven Gateway Cities, including Worcester. The Gateway Cities that fall below this threshold include Fall River with 10,000 students, Quincy with 9,000 students, and Haverhill with 8,000 students.

The timeframe for analysis encompasses projects submitted to the MSBA from 2011 to 2022. 2011 marks the first year in which all selected cities submitted at least one project, while 2022 is the most recent year with up-to-date cost estimations, allowing for consistent comparison across all cities. This approach has obvious limitations, notably the exclusion of numerous projects undertaken by the MSBA (and its predecessor agency). However, the cutoff point simplifies the process of rectifying missing or outdated data on the MSBA Project List, particularly for projects inherited by the prior agency, for which there is limited online documentation. Additionally, this timeframe presents an opportunity for The Bureau to analyze the agency’s recent history of collaboration with the state’s eight largest public school districts.

**Between the 2011 and 2021 SOI Filing Period, Worcester accumulated a noteworthy total of 31 ARP projects**, solidifying its position as the highest recipient among selected Gateway Cities and only second to Boston, overall. It is important to acknowledge that Boston self-funded school projects for years without the MSBA’s support, and Springfield received grants for may urgent repair project prior to 2011. It is realistic that Boston Public Schools, with 45,000 students across more than 100 school buildings, leads the state in acquiring these projects.

**Over the same time period, Worcester secured the second-highest number of core projects, totaling 3.** Comparing the number of core projects across districts is practically meaningless for any individual year because there are so few awarded, statewide. Over longer periods

<b>Peer Cities</b>	<b>Accelerated Repairs</b>	<b>Core Projects</b>
Boston	38	2
<b>Worcester</b>	<b>31</b>	<b>3</b>
Springfield	28	5
Lowell	15	1
Brockton	13	1
New Bedford	11	1
Lynn	8	1
Lawrence	3	2



of time, however, comparing the number of core projects acquired is more appropriate.

It is also useful to compare the costs of projects in both programs. By cross-referencing the MSBA's List of Projects for each selected city with the latest data from the agency's Capital Project Overview Reports and Board of Directors meeting, the total costs of core and ARP projects can be compared. **However, simply comparing totals can be misleading without considering the number of projects each district accepts.** For instance, over this time period, Worcester took on three core projects with a combined cost of \$580 million, whereas Lowell's one project cost \$343 million. Thus, Chart 6 compares the average cost of core projects across peer cities. **On average, Worcester spends the third most, at roughly \$194 million per project.**

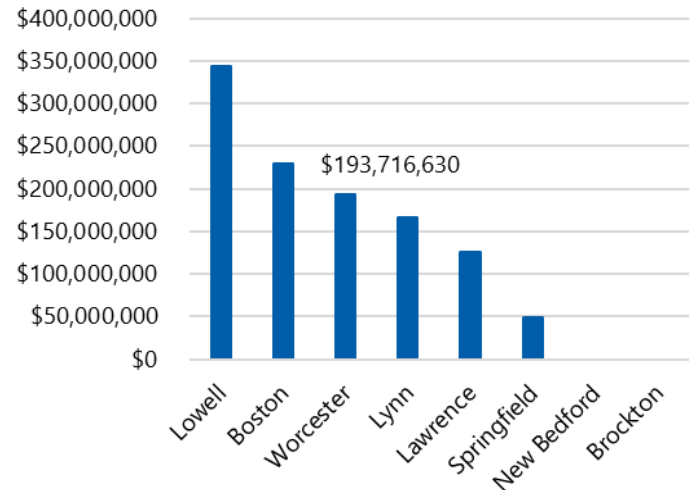
It's important to clarify that Worcester's apparent higher investment in core projects compared to other cities does not necessarily indicate an unnecessary overinvestment. Rather, it reflects differing project focuses and scopes. Worcester mainly concentrated on two high schools and an elementary school, while Boston included a high school and a K-12 facility. Although their projects seem similar, **Worcester was able to utilize more land for larger facilities, averaging about 93,000 square feet compared to Boston's 71,000.** This difference likely explains the variance in project costs. In contrast, Springfield's mix of elementary and middle schools typically have lower costs due to smaller enrollment, square footage, and material requirements.

When comparing the cost of ARP projects, most cities have acquired enough between 2011 and 2022, making it appropriate to compare total, as well as average costs. Also, the cost of these projects tends to fluctuate less considering the program's more limited scope. Chart 7 compares the total costs of ARP projects and the MSBA's reimbursement totals. **Worcester has the second highest total costs for ARPs among all selected cities, totaling \$88 million, with around \$50 million reimbursed by the MSBA. Additionally, it ranks first among Gateway Cities.**

As Chart 8 shows, **Worcester spends, on average, \$2.7 million on each ARP project. This ranks second-lowest among peer cities.** Springfield's projects cost the least, on average.

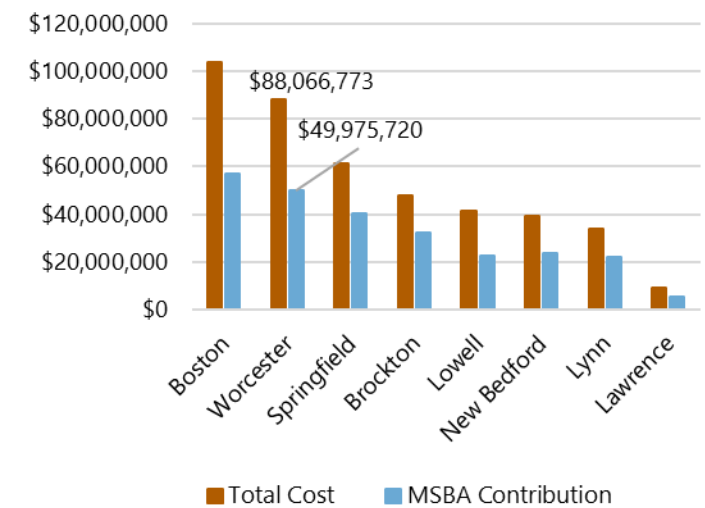
Overall, Worcester displays a relatively strong standing compared to peer cities, including Boston in acquiring both ARP and Core Program projects. A strong relationship between the MSBA and Worcester is vital for the city's educational growth.

**Chart 6: Average Costs of Core Projects in Peer Cities**

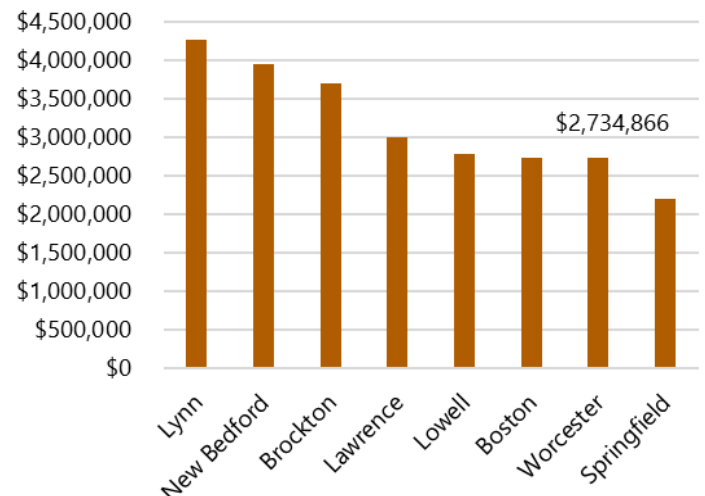


*Note: New Bedford's only core project has not secured a grant and Brockton received no core projects during this time*

**Chart 7: Total Costs of Accelerated Projects by Peer City**



**Chart 8: Average Cost of Accelerated Projects by Peer City**



Sources: MSBA: Project Lists, Capital Project Pipeline Overview Report (November 17, 2023), Board of Directors Meetings



### **BUILDING WPS’ FUTURE: MAXIMIZING MSBA PARTNERSHIPS FOR EDUCATIONAL GROWTH**

The MSBA continues to play a crucial role in enhancing school facilities in Worcester through the Core and Accelerated Repair Programs. Despite facing challenges with aging infrastructure and budget constraints, Worcester Public Schools have secured numerous projects, demonstrating effective collaboration with the MSBA. **With the acceptance of Burncoat High School into the MSBA pipeline, Worcester is positioned as one of the leaders among Gateway Cities in improving educational infrastructure.** Moving forward, city leaders can continue to leverage state funds by strategically aligning capital improvement plans with the MSBA’s priorities. By maximizing opportunities to fund school facilities, Worcester can continue to improve K-12 learning outcomes, preparing students for future success.

### **LOCAL SCHOOL FACILITIES SPENDING: A FOCUS ON MUNICIPAL INVESTMENTS**

In [Paying for A Public Education](#), the Bureau examined the WPS FY 2024 Budget in detail. This section will delve deeper into the facilities-related line items in the WPS FY 2024 budget to assess trends. It is also crucial to understand the [City’s 2024 Capital Budget](#), which invests in facilities and equipment upgrades across Worcester’s public buildings. A portion of that investment is dedicated toward WPS’ Capital Improvement Plan, which is outlined in the [WPS FY 2024 Budget](#). While ordinary maintenance is funded by the District’s budget, the City oversees and allocates school construction and renovation funds, as well as other initiatives. Understanding these various revenue streams, as well as updates to the City and District’s discretionary spending

outside of state and federal contributions, is pivotal for assessing what the city prioritizes with limited resources.

### **THE CITY’S CAPITAL IMPROVEMENT PLAN**

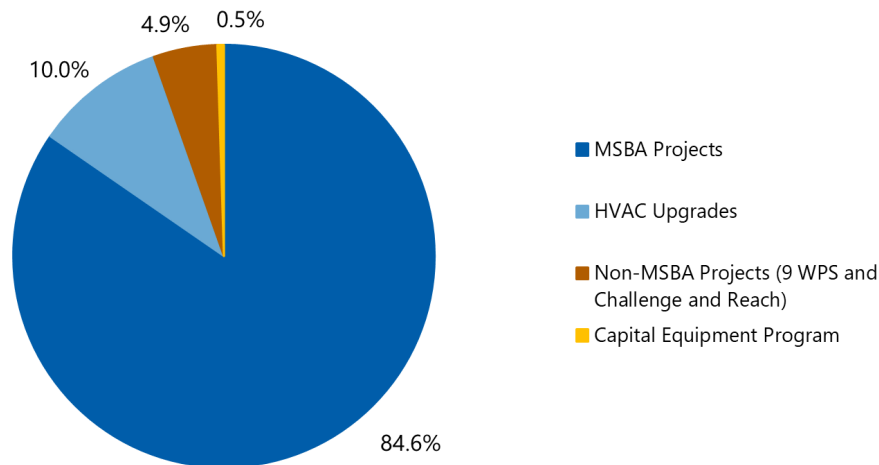
The Capital Improvement Plan (CIP) serves as the primary funding mechanism for enhancing public infrastructure within the City. It is primarily funded through funds borrowed from the open market. Over time, this debt is repaid through various sources, with the City’s tax levy being the largest contributor. Additionally, support for long-term debt service comes from enterprise funds, District Investment Funds (DIFs), and grants. **It is also crucial to understand that the annual borrowing budget reflects the projected amount to be borrowed within the fiscal year, rather than encompassing the total cost of a specific project outlined in the FY 2024 CIP.**

**The City of Worcester’s FY 2024 CIP will spend about \$100.5 million on schools.** This is comprised of the City’s \$53.9 million in borrowed funds, \$36.6 million from the MSBA, and \$10 million allocated by the City from American Rescue Plan Act of 2021 (ARPA).

**The vast majority of the City’s school-related borrowing in FY 2024 represents the City’s contribution to MSBA projects, which totals \$48.5 million.** This includes \$46.8 million for the new Doherty High School and \$1.7 million for Worcester Arts Magnet School’s roof replacement. Meanwhile, the MSBA is contributing \$35.3 million on Doherty and \$1.3 million on Worcester Arts Magnet, respectively. **Altogether, the City and MSBA are combining for \$85.1 million on MSBA projects this fiscal year.**

Outside of MSBA projects, the City is also borrowing an additional \$5.4 million. \$4 million of this represents the

**Chart 9: Breakdown of Approved Spending for WPS Facilities in the City’s FY 2024 CIP**



Source: *The City of Worcester’s FY 2024 Capital Improvement Plan*



City's annual allocation to WPS projects. **\$3.5 million of this amount is being spent on nine non-MSBA repair projects.** These projects can be found in the WPS FY 2024 Budget under the Capital Improvement Plan. **\$500,000 goes toward capital equipment purchases across the District.** These initiatives include \$200,000 for purchasing and replacing equipment and vehicles that support cleaning, maintenance, and other grounds work. \$175,000 is for technology infrastructure for students, such as Chromebooks, iPads, desktops, laptops and other 21st century technological necessities to support modern learning needs. \$125,000 is being spent on maintenance and equipment for the district's bus fleet for students and other vehicles. **The remaining \$1.4 million in borrowed funds will pay for the Challenge and Reach Academy's sprinkler system.** In sum, outside of funding MSBA projects each, the City is borrowing an additional \$5.4 million in FY 2024 to improve school facilities.

The City has also allocated COVID-related ARPA funds to non-MSBA facility improvement projects. This additional \$10 million is being used to upgrade HVAC systems across the District, according to the WPS FY 2024 Budget.

In sum, WPS benefits from \$85 million toward MSBA projects, more than half of which comes from the City's borrowed funds. Additionally, WPS has an additional \$15.4 million, combining the City's borrowed funds and the federal government's ARPA grant funds. As ARPA funds expire, Worcester will need to identify alternative revenue sources to continue to invest in its school facilities.

### **THE WPS FACILITIES-RELATED BUDGET ITEMS**

The WPS FY 2024 Budget includes line items that are valuable for evaluating the District's limited spending capacity on facilities-related investments. This section focuses on how these line items have changed over time, particularly since FY 2018, which was the fiscal year that the District conducted the Facilities Master Plan, a comprehensive building evaluation of the city's oldest schools. Changes and trends in facilities-related spending areas from that fiscal year to FY 2024 will shed light on the ability and willingness of WPS to direct attention to issues such as deferred maintenance, school safety, and capital equipment.

The Worcester Public School's budget is divided into 20 object account areas for salary and wage-earning employees, and 12 non-salary object account areas. Object accounts areas are like large buckets, containing smaller budget line items within them. For the purpose of examining the District's spending on facilities-related infrastructure, only two of these object account areas are relevant.

The first is **Facilities Ordinary Maintenance, or FOI.** FOI provides funding for expenses including trash removal,

repair of buildings, construction, and custodial supplies. Trash removal is not considered integral to the state of each building's infrastructure, so this analysis excludes that line item. The other FOI line items, such as facility maintenance, environmental management systems, and capital equipment, will remain.

The other object account area of interest is **Miscellaneous Education Ordinary Maintenance, or MEOM.** MEOM includes funds that provide indirect support to the instructional programs throughout the WPS.

All the line items in this account are irrelevant for this analysis, except for one: **School Safety Equipment.** In sum, this analysis looks at three line-items from FOI and one line-item from MEOM. The selected line items are defined below:

- ◆ **Facility Maintenance:** Funds for maintenance and repair of all district buildings, including exterior and grounds, and interior and classrooms. This includes but is not limited to roofs, masonry, heating systems, plumbing, painting, electrical, repair of elevators, fire extinguishers, sprinkler systems, emergency generators, fire alarm systems, security systems, intercoms, and clock and bell systems performed by outside contractors. This account also represents necessary supplies and leases associated with the maintenance and repair of all district buildings.
- ◆ **Environmental Management Systems:** Funds for consulting and evaluation services related to the District's Environmental Management System (EMS), as initiated through a consent agreement between the Worcester Public Schools, the Attorney General, and the State Department of Environmental Protection. This system requires operating procedures to manage environmental issues throughout the district that include, but are not limited to, asbestos, hazardous materials, hazardous waste, chemical safety, and incident response. The FY 2024 Budget includes additional funding for abatement projects and hazardous waste disposal.
- ◆ **Capital Equipment:** Funds to repair, maintain and upgrade district buildings. This line item is utilized for capital equipment costs greater than \$1,000 per unit.
- ◆ **School Safety Equipment:** Funds to purchase equipment including, radios, surveillance cameras, monitors, window and door locks, access controls, intercoms, and door alarms. Additional funds are supported through the FOI object area to provide for school safety repairs and equipment. The FY 2024 budget includes an increase to address anticipated recommendations of recent safety audit of all district





building locations. This line will also include professional development and staff training.

Chart 10 on the following page tracks each of these line items between WPS FY 2018 and FY 2024 budgets. This timeline was selected because in late 2017, WPS concluded its Facilities Master Plan. This report evaluated only the oldest 28 schools out of the 45 schools in the district. These projects were eligible for renovation, addition, or new construction projects with the MSBA.

Thus, Chart 10 shows if facilities-related spending, aside from the Capital Improvement Plan, has increased in the fiscal years following the release of the Master Plan, until FY 2024. It is important that the District makes smaller, short-term investments in ordinary maintenance, just as the City takes on larger, long-term, and expensive projects with the MSBA. This chart sheds light on some of Worcester’s efforts to address deferred maintenance and facilities issues independently.

There have also been several efforts by the City Manager, City Council, School Committee, and the Worcester Public Schools to enhance school facilities and pursue innovative funding opportunities to that end. For instance, on December 5, 2023, the City Council approved allocating the City’s new tax growth to address various needs. This allocation, guided by spending options provided by the City Manager, includes **\$2 million towards relieving tax burdens, \$1 million towards a new fire station, and another \$1 million towards meeting the capital maintenance requirements of school facilities. \$750,000 of the school facilities allocation is for the Doherty High School project.** While \$1 million represents a modest increase considering the City’s broad range of school facility needs, this initiative underscores the dedication of city leaders to devise innovative solutions to ensure students

have access to optimal learning environments.

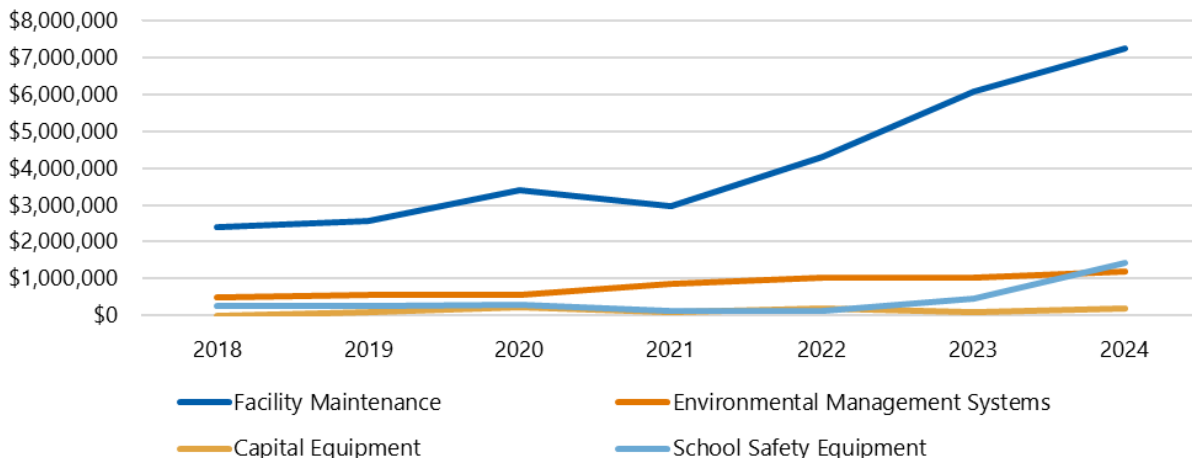
WPS also contracted Guidepost Solutions, a security and technology consultant firm, to conduct a safety audit for the District’s schools. On November 16, 2023, Guidepost presented some of their topline findings to the School Committee, as well as recommendations to improve school safety District-wide. In accordance with exemption (n) of the Massachusetts Public Records Law, due to the sensitive nature of these data regarding individual schools, further substantive details regarding the audit will not be provided to the public. The presentation can be found in the [School Committee’s November 16, 2023 Agenda and Minutes](#). Some their recommendations include: ensuring classroom doors and locking hardware function properly, establish key management and control, develop standards for security technology, add exterior lighting for schools with dark conditions, and considering perimeter protection measures and updating emergency management training.

**STUDENT ENROLLMENT PROJECTIONS**

Understanding the dynamics of population and student enrollment changes in The City of Worcester is crucial for effective school facilities planning. The Bureau’s report, [Reinventing Worcester](#), found that **the City’s population has surged by almost 45,000 residents between 1980 and 2020, a 27.6% increase.** Amidst overall population growth and several dilapidated buildings District-wide, school consolidation is on the horizon in Worcester. To inform public debate on this issue, this section analyzes WPS’ enrollment projections from the 2019-2020 academic year to 2026-2027, provided in the District’s FY 2024 Budget.

Examining enrollment projections by quadrant reveals varying degrees of change in student numbers across different regions of Worcester. Notably, the **South**

**Chart 10: Facilities-Related Line Items from the WPS Budgets (FY 2018 - 2024)**



Sources: WPS Budgets FY 2018 - FY 2024





**Quadrant is projected to experience the most substantial decline in student enrollment with a decrease of 3.4%**, followed by Doherty (-2.4%), Burncoat (-1.8%), and North (-1.4%). While declines in other quadrants are less pronounced, there is an expected decline across the district. This signals the importance of proactive measures to address potential challenges arising from diminishing student enrollment.

Analyzing enrollment projections by school type further elucidates shifts in student demographics within the Worcester Public Schools system. Elementary schools are projected to experience the most substantial decline, with a decrease of 5.9%. Conversely, middle schools are anticipated to see a notable increase in students, growing 13.6%. High schools demonstrate a marginal decline of 0.6%. **The greatest increases in student enrollment projections are for middle schoolers, which should lead to an increase in high schoolers in the next few years.** This evidence supports city leaders' decision to pursue improvements to Burncoat High School and Worcester East Middle School.

**It is essential to acknowledge the inherent limitations of enrollment projections**, as they may fluctuate due to various factors such as demographic shifts, economic conditions, and policy changes. While these projections offer valuable insights into future trends, they should be interpreted with caution and supplemented with additional data and contextual analysis.

## ANALYSIS OF THE WORCESTER PUBLIC SCHOOL'S 2017 FACILITIES MASTER PLAN

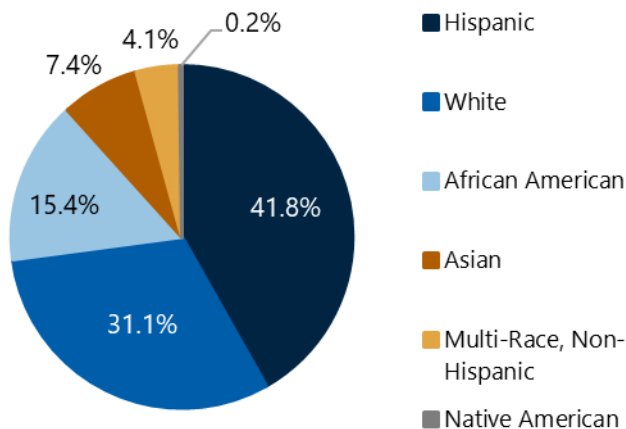
### BACKGROUND

The Worcester Public Schools unveiled its most recent Facilities Master Plan (FMP) in 2017. Discussions in preparation for the study were started several years earlier when the City approved funds to commission a comprehensive component inspection of 28 of the District's 45 schools. The District selected Symmes Maini & McKee Associates (SMMA), an architectural, engineering, and planning firm, to execute the study. This decision was a strategic investment to identify schools with the greatest level of need, devise a long-term vision to effectively prioritize school building upgrades, and to secure future funding from the Massachusetts School Building Authority (MSBA).

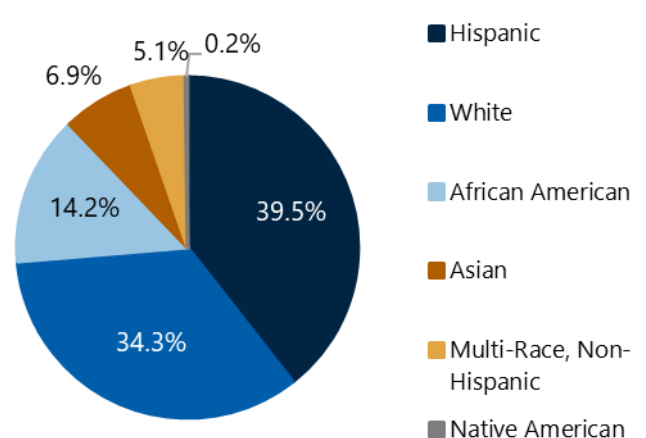
**SMMA conducted a comprehensive component inspection of 28 of the District's 45 schools (62% of school facilities). These schools were chosen because they are the 28 oldest schools in the District, which are also eligible for the MSBA's Core Program. The sample of schools included 24 elementary schools, 2 middle schools, and 2 high schools.**

In the 2016-2017 academic year, the District enrolled 25,479 students, of which 12,029 attended the 28 schools in the master plan. From the Bureau's own analysis of data compiled from the Massachusetts Department of Elementary and Secondary Education (DESE), the FMP includes 62% of the schools, but only 47.2% of the student body.

**Chart 11: District-Wide Race/Ethnicity Data (2016-2017)**



**Chart 12: Master Plan Schools by Race/Ethnicity (2016-2017)**



Sources: Massachusetts Department of Elementary and Secondary Education's School Profile Website (2016-2017 Academic Year)



According to charts 11 and 12 on the previous page, this sample of selection of schools over-represents several populations compared to the district-wide percentages. As shown in Chart 11, the FMP has a smaller percentage of students who are Hispanic (-2.3%), Black or African American (-1.2%), and Asian (-0.5%) compared to the District. Meanwhile, the sample over-represents White (+3.2%) and Multi-Race, Non-Hispanic (+1.0%) students. Native American students remained constant. While these changes may appear small, in a district of 25,479, each 1% change is about 255 students.

DESE also collects data on selected populations. These students of interest include **Economically Disadvantaged students, Students with Disabilities, and English Language Learners**. "Economically Disadvantaged" refers to students qualifying for state-administered aid programs like SNAP, TANF, DCF foster care, or MassHealth, indicating financial need. It is important to note that this term was used by the DESE from 2015 to 2021 but has since been replaced with a new measure: the number of students from low-income families. "English Language Learners" denotes the proportion of students whose primary language isn't English and require support in understanding classroom content. "Students with Disabilities" indicates the percentage of students with Individualized Education Programs (IEPs), highlighting those with specific educational requirements due to disabilities and learning challenges. In this report, the variable will be called "Students with IEPs" to more accurately reflect what the variable counts and does not count as a student with a disability, which can have many different meanings. These variables serve to understand the diverse needs of students and inform educational strategies to support

their learning journeys.

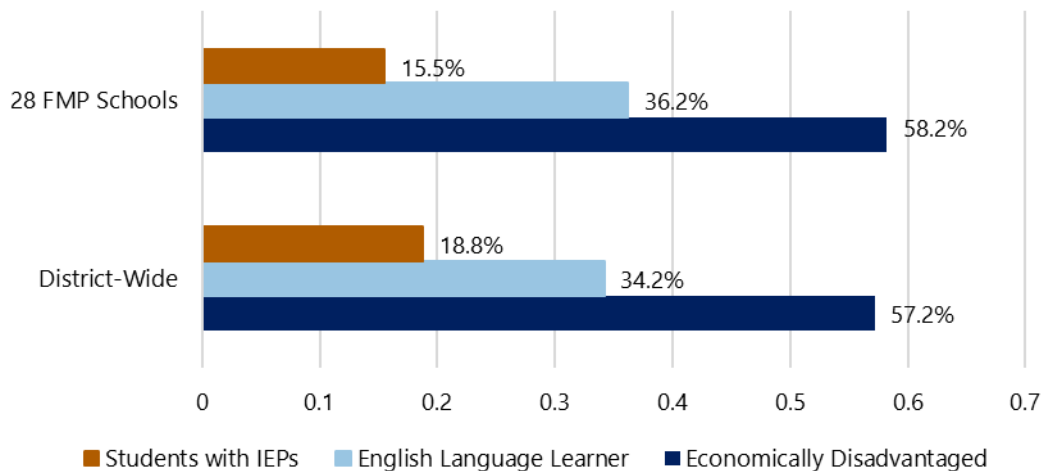
Chart 13 compares the percentage of students belonging to each of these categories compared to the district-wide numbers. This data is from the 2016-2017 academic year.

**SMMA'S APPROACH**

The master plan evaluated school facilities across four key areas: Learning Environments, Spaces, Building Evaluation, and Facility Assessment. SMMA's approach assessed buildings for their overall condition, as well as their conduciveness to an optimal student learning environment. The four categories used to assess each building include:

- ◆ **Learning Environments:** A qualitative assessment of factors influencing student performance, considering 17 types of components such as acoustics, daylighting, ventilation, and technological resources. Results are categorized based on the level of support provided for each educational facility component.
- ◆ **Spaces:** A qualitative analysis of educational space sizes compared to MSBA guidelines, aiming to meet Massachusetts' 21st century teaching and learning standards. Results are summarized in the Spaces section of the report.
- ◆ **Building Evaluation:** A qualitative review of major building components and systems, organized into 8 categories such as exterior elements, roof systems, and mechanical systems. This provides a general overview of each school's condition.
- ◆ **Facility Assessment:** A more detailed assessment of each facility's hundreds of infrastructural components, standardized into 13 categories such as

**Chart 13: Selected Population Comparison between District and 28 Schools in Master Plan**



Sources: Massachusetts Department of Elementary and Secondary Education's School Profile Website (2016-2017 Academic Year)



architectural, electrical, and environmental components. The components are ranked based on condition, tabulated, and color-coded for clarity.

**COST EVALUATIONS FOR EVERY SCHOOL:**

The study deployed a three-pronged cost estimation process for each school, provided A.M. Fogarty & Associates Inc., a construction company. The three cost estimations include: Repair Costs, Urgent Repair Costs, and Replacement Costs. **Repair Costs** reflects the total of all the items from each school’s facility assessment. This cost estimation uses historic unit rates for materials, labors, equipment, and asbestos abatement. **Urgent Repair Costs are a subset of Repair Costs, focusing only on components that pose health and safety risks to faculty and staff within each school.** The report recommends that these issues be addressed immediately. Lastly, **Replacement Costs reflects the total cost of completely replacing the existing school facility with a new building.** This estimation uses a fixed construction rate per gross square foot as of 2018, and excludes non-essential expenses such as demolition and relocation, and furniture. The repair costs for all schools totaled \$260 million, while the total of urgent repair costs neared \$70 million (27% of repairs).

The tables to the right show cost estimations for the ten costliest schools in SMMA’s report to repair, urgently repair, and replace altogether.

**SMMA’S RECOMMENDATIONS BY AGE OF BUILDING:**

SMMA concluded that all 28 buildings are out of conformance with current building and accessibility codes, and have been “grandfathered” to allow them to remain operational. They provided the following recommendations for each type of building, based on age:

1. **Late 1960s - 70s Buildings with Open Plans (4 Buildings):** Renovation was advised to ensure their long-term viability, with upgrades such as floor plan reconfigurations and system replacements.
2. **Steel-Framed Buildings from the 1950s and 1960s (8 Buildings):** Feasibility studies were recommended to assess their suitability for 21st century education.
3. **Pre-WWII Buildings (16 Buildings):** Replacement or consolidation were recommended due to universal outdatedness in terms of building codes and educational support. The master plan highly recommended that the District phase out these schools due to their age, overall condition, and most importantly, because of their combustible, wooden stairs. Upon revisiting each school’s facility assessment, it appears that in fact, **11 schools have combustible, wooden stairs, which violates state**

**Tables 2-4: Top 10 Costliest Schools to Repair and Replace from the 2017 Facilities Master Plan**

School Name	Repair Costs (in 2018 \$)
Burncoat High School	\$22,171,957
Worcester East Middle School	\$21,491,486
Burncoat Middle School	\$20,568,331
Goddard School of Art and Science	\$20,129,662
Belmont Street Community School	\$15,218,173
Vernon Hill School	\$15,207,399
Chandler Elementary Community School	\$12,943,275
Elm Park Community School	\$12,780,353
Union Hill School	\$8,321,870
Rice Square School	\$8,211,278

School Name	Urgent Repair Costs (in 2018 \$)
Worcester East Middle School	\$7,187,804
Vernon Hill School	\$5,225,321
Belmont Street Community School	\$4,796,653
Burncoat Middle School	\$4,490,929
Burncoat High School	\$3,392,418
Worcester Arts Magnet School	\$3,276,196
Elm Park Community School	\$3,246,262
Goddard School of Art and Science	\$3,041,324
May Street School	\$2,949,752
Chandler Elementary Community School	\$2,944,408

School Name	Replacement Costs (in 2018 \$)
Worcester East Middle School	\$67,595,520
Burncoat Middle School	\$64,073,760
Burncoat High School	\$62,073,760
Goddard School of Art and Science	\$52,187,820
Chandler Elementary Community School	\$44,370,000
Belmont Street Community School	\$40,449,780
Vernon Hill School	\$36,131,100
Elm Park Community School	\$28,993,185
Worcester Arts Magnet School	\$24,645,795
Flagg Street School	\$18,973,395

Sources: WPS 2017 Facilities Master Plan and School Study by SMMA



### fire safety codes.

- 4. SMMA recommends that small pre-WWII buildings be considered for consolidation**, as a more cost-effective, long-term investment strategy compared to rebuilding each of them one at a time. Our analysis finds that **replacing all 16 facilities would have cost \$337,172,300 in 2018**. These are conservative estimates, which do not include land acquisition, labor, or school relocation costs.

Refer to Appendix 2 to see the time period in which each school in the master plan was originally constructed.

### **A SECONDARY ANALYSIS OF THE FACILITIES MASTER PLAN**

Amid renewed policy discussions for an updated Facilities Master Plan, the Bureau identified an opportunity to generate original findings from the 2017 study. By extracting key building characteristics and repair costs data from the Master Plan, and combining it with student demographic data from each school during the same year of the site visits, our goal is to identify significant correlations between the selected variables and the cost of different types of repairs.

The Bureau created a quantitative dataset compiled from key building characteristics found in the Master Plan, along with accurate demographic data and selected population characteristics from the Massachusetts Department of Elementary and Secondary Education (DESE). While the previous Master Plan noted key demographic and building characteristics, it did not include further analysis on the relationship between these building characteristics or student demographic information and their correlation to greater repair costs. This opportunity allows for a deeper understanding of the demographic characteristics of Worcester's oldest school buildings, as of 2017. While the demographic data and available maintenance data are nearly seven years old, this analysis provides valuable insights to inform the District's strategy to enhance equity going forward, perhaps informing resource allocation and support for student learning initiatives.

### **VARIABLES OF INTEREST**

This analysis seeks to understand the relationship between several variables of interest and repair costs, to see if there are any relationships of significance. We will call these variables **predictor variables because we are exploring their relationships with the outcome variable**. These predictors are data from the Facilities Master Plan, including gross square footage of each school, the age of each school, and renovation history. Renovation history is a binary evaluation, measuring whether the school facility received a renovation or

addition since it was first built.

We also included school-level data from DESE, such as the student-to-teacher ratio, and the number of student populations belonging to each of the following racial and ethnic categories: Hispanic, White, Black/African American, Asian, Multi-Racial Non-Hispanic, or Native American. Lastly, we included the number of students who belonged to selected populations: Economically Disadvantaged, students with IEPs, and English Language Learners (ELs). A comprehensive list of definitions for student demographic variables can be viewed on our new interactive dashboard, [Understanding Your Neighborhood Schools](#) or DESE'S website. **Altogether, there are 13 predictor variables.**

This analysis explores which of the 13 predictor variables are associated with greater repair costs. **Thus, the three types of repair costs in our study are called outcome variables because we intend to understand this "outcome" (higher repair costs in some schools and not others), in greater detail.** The three outcome variables include:

- 1. Repair Costs:** The total expenses for repairs, determined using independent cost estimators' "Historic Unit Pricing" and practical experience. The unit cost comprises materials, labor, and equipment. Total repair costs are presented solely in construction costs and exclude furniture, fixtures, or other equipment not permanently connected to the building's structure or utilities.
- 2. Urgent Repair Costs:** The expenses associated with categories identified as inoperative in the Facility Condition Assessment. Immediate attention is required for these issues as they relate to the welfare and life safety of the facility's occupants.
- 3. Replacement Costs:** The expenses involved in replacing the facility with the same amount of occupied space as the current individual school utilizes. It assumes a 2018 construction cost of \$435.00 per gross square foot and a moderately amount of site work. It excludes demolition or relocation costs and does not encompass furniture, fixtures, or other equipment lacking a permanent connection to the building's structure or utilities.

### **CORRELATIVE FINDINGS**

Correlation tables present numerical values that indicate the degree of association between each predictor variable and each outcome variable. Essentially, these correlation coefficients gauge the strength of relationships using values ranging from 0 to 1. Interpreting the results is relatively straightforward: **the closer a coefficient is to '0', the weaker the**



**relationship, and the closer it is to '1', the stronger the relationship.** The key below illustrates the typical degrees of strength used to assess the relationship. Lastly, while the numerical value indicates the strength of the relationship, whether the correlation is positive or negative determines the direction. **A positive value suggests that as one variable increases, the other also tends to increase, indicating a positive correlation.**

**Conversely, a negative value implies that as one variable increases, the other tends to decrease, indicating a negative correlation.** Understanding whether a correlation is positive or negative is crucial for interpreting the relationship between variables accurately.

The key below provides a useful guide.

As the correlation table illustrates, **the size of the school building, measured by square footage, stands out as the most important factor correlating with repair costs, overall.** However, other predictor variables such as the age, student-to-teacher ratio, and renovation status of each building, are not correlated with any type of repair cost. This is clear from the values in the table,

Key for Correlation Coefficients	Strength of Relationship
1.0 to 0.7	Strong correlation
0.7 to 0.4	Moderate correlation
0.4 to 0.2	Weak correlation
0.2 to 0	Little to no correlation

which range from 0 to 0.2.

There are interesting trends regarding the demographic composition of each school. **First, as the number of Hispanic, Black or African American, Economically Disadvantaged, or students on IEPs increases, so does the cost of repairs.** As Table 5 illustrates, all of these variables are highly positively correlated with at least one type of repair cost, and if not, they are moderately correlated.

Next, across the board, there are a few variables that are moderately positively correlated with greater costs. These variables are the number of Asian, Multi-Race Non-Hispanic, and English Language Learners. These variables are positively correlated with costs, but to a smaller degree than the first set of variables.

**Lastly, the number of White and Native American students are very weakly correlated with all three types of costs, but White students are moderate correlated with Repair Costs.** It should be noted, again, that White students constituted 34.3% of the student population of this 28-school sample, while Native Americans made up 0.2%, on average. This yields an interesting finding for further examination and public debate. It is not very surprising that Native American students, as the smallest counted DESE category in the District, are not correlated with greater costs. However, **White students, who are the second largest racial or**

Predictor Variable	Repair Costs	Urgent Repair Costs	Replacement Costs
Square Footage	0.902	0.708	0.909
Age	0.177	-0.052	-0.253
Renovation or Addition	0.372	-0.086	-0.342
Student-Teacher Ratio	-0.218	-0.030	-0.189
Economically Disadvantaged	0.804	0.677	0.766
Students on IEPs	0.829	0.569	0.798
English Language Learners	0.625	0.502	0.594
Hispanic	0.710	0.556	0.685
White	0.157	0.160	0.463
African American	0.764	0.746	0.755
Asian	0.457	0.420	0.463
Multi Racial Non-Hispanic	0.538	0.616	0.560
Native American	0.292	0.086	0.187

Sources: Original Analysis by The Research Bureau. Data from WPS 2017 Facilities Master Plan and School Study by SMMA





**ethnic group in the District, are also very weakly correlated with costs on average, while non-White racial groups are strongly correlated.** This poses an interesting question for city leaders to answer: **Why would the number of White students be weakly correlated with greater costs, while the correlation of Hispanic and African American students is highly correlated?** Considering that this sample of 28 schools over-counts White students and undercounts both other groups compared to the District-wide 2017 data, the strength of these relationships warrant further investigation.

**The exploratory findings reveal a notable trend across the 28 sampled schools: as the number of Economically Disadvantaged students, those on IEPs, or individuals identifying as Hispanic or Black increases, so too do overall repair costs.** It is crucial to emphasize that our unit of analysis is each school building rather than the student body. The repair costs delineated in the Facilities Master Plan range from millions to tens of millions of dollars, a sum not reasonably attributable to the student body.

**Furthermore, it is imperative to refrain from implying a causal relationship between specific demographic groups and heightened repair costs.** Such an interpretation risks perpetuating harmful stereotypes, unfairly associating higher repair expenses with historically underserved and vulnerable populations.

These findings prompt further investigation, particularly to ascertain whether schools with significantly higher non-White student populations compared to the District's average are enrolled in schools in greater disrepair. While the 2017 data is now outdated, it underscores the necessity for the City and District to plan school facility projects through data-driven practices that inform equitable resource allocation in the future.

**Future analysis should draw upon up-to-date enrollment data, facilities assessments, and cost projections, as well as various other variables beyond the scope of this report to better understand whether increased levels of facilities need are prevalent in schools serving more non-White students.** Such an approach would empower the City and the District to strategize for equitable resource allocation for school facilities.

## CONCLUSION

While the City and Worcester Public School have made notable strides in improving school buildings over the past decade, it's clear that they require additional support from external funding sources such as the state and

federal government. Urban school districts like Worcester's have tens of thousands more students than suburban ones, which means they have many more schools to invest in. Compounding this issue, Worcester Public Schools have several out-of-code school buildings first built in the 1800s. With a litany of deferred maintenance issues, and constrained budgetary resources to fix them, the City and District cannot face these challenges alone.

The Massachusetts School Building Authority (MSBA) has been instrumental in assisting Worcester's initiative to rebuild all high schools and address various urgent repair needs. Worcester has effectively managed its projects, ensuring competitive acquisition and cost maximization compared to peer cities. Despite budget constraints, the City and District have allocated resources for capital improvement projects, school safety, and maintenance through innovative initiatives.

Worcester has shown its commitment to enhancing school facilities on a few fronts. In late 2023, the City allocated \$1 million in local surplus tax revenues for school facilities maintenance. While this investment is extremely small, given the District's needs, it signals that municipal policymakers are actively seeking innovative solutions to improve school facilities with the resources available to them. Additionally, the District added a section dedicated to school facilities to its new five-year Strategic Plan. One specific commitment in the facilities section is the development of a new Facilities Master Plan by the 2027-2028 school year. This study will likely involve identifying the District's most urgent school building needs and specific buildings in need of urgent repairs or reconstruction.

Improving school facilities is a crucial initiative to enhance student learning outcomes. As the City and District continue to collaborate and explore innovative revenue sources, it is crucial to assess historic and on-going investments. By identifying areas for improvement, prioritizing support for the neediest schools, and striving for equitable growth across the District, Worcester can significantly enhance student learning outcomes and foster positive educational progress.

The Bureau's following recommendations aim to guide the City and District toward accomplishing these objectives.

### RECOMMENDATION 1: DEVELOP A DATA-DRIVEN PRIORITY LIST OF THE DISTRICT'S NEEDIEST SCHOOLS

When the District undertakes a new Facilities Master Plan, it is imperative that the study builds upon the previous plan's data-driven evaluation of the District's oldest



school buildings. While the previous report makes recommendations for buildings based on the era during which they were constructed, it is imperative that the District receive more specific, actionable recommendations. The report should include specific school projects in a hierarchical priority list, identifying urgent repair and reconstruction projects, justified using specific evaluation metrics. Subsequently, the District should develop a short and long-term plan to address identified issues, building upon the WPS FY 2024's Budget section on the Capital Improvement Plan, which outlines future facilities projects. These project priorities should be accompanied by detailed justifications and timelines for each project. Both the Facilities Master Plan and the District's project plans should be made publicly available, providing students, parents, education experts, community members, and the general public the opportunity to provide input on the District's facilities maintenance agenda.

#### **RECOMMENDATION 2: ENSURE A DATA-DRIVEN, TRANSPARENT, AND EQUITABLE SELECTION PROCESS FOR SCHOOL REPAIR PROJECTS**

The process of selecting schools for urgent repair projects and reconstruction must be transparent. It is essential that selecting schools for construction is a data-driven process, utilizing comprehensive metrics such as detailed building evaluations, cost projections, estimated debt, and population projections. The City and the District should actively seek multi-stakeholder input from all members of the community, with a particular focus on historically underserved populations.

#### **RECOMMENDATION 3: EXAMINE CORRELATIVE FINDINGS BETWEEN THE NUMBER OF STUDENTS FROM HISTORICALLY UNDERSERVED BACKGROUNDS AND HIGHER REPAIR COSTS**

The Bureau's findings stem from the 28 oldest schools among the District's 45, relying on outdated cost estimations and demographic data. This underscores the need for further analysis. Extracting additional insights would necessitate a larger sample of schools and more variables to comprehensively understand the factors linked to higher repair costs.

This deeper examination is pivotal for recognizing and addressing any potential inequitable outcomes in educational delivery. It is essential to understand the degree to which historically underserved or vulnerable populations are disproportionately situated in worse learning facilities. Such understanding is crucial for devising effective strategies to mitigate disparities and ensure that all students have access to quality educational environments.

#### **RECOMMENDATION 4: CONSOLIDATE PRE-WWII SCHOOLS**

Given the significant costs involved with rebuilding the District's oldest schools, it is imperative to develop a specific plan to consolidate schools effectively. This plan should prioritize schools with the highest need for infrastructural improvement, taking into account for factors such as the proximity of each of these schools, population projections, and lot sizes. Additionally, it should identify optimal lots for land acquisition, as needed. As the District embarks on the final chapter of rebuilding all high schools, it is crucial to lay out a plan for addressing the previous Master Plan's most concrete recommendation: closing schools that no longer meet modern safety or educational needs. This initiative will usher Worcester Public Schools into a new era.

#### **RECOMMENDATION 5: ADVOCATE FOR FURTHER STATE INVESTMENT IN SCHOOL FACILITIES**

Building on successful partnerships with the MSBA, city leaders, state legislators, and community stakeholders should advocate for increased state investment into school facilities. The state should explore innovative solutions to generate funds for core and accelerated projects, mirroring the creativity of municipal policymakers, who leverage tax surpluses and other financial strategies to address these needs amidst budget constraints.

City leaders and community members should also consider policy solutions such as differentiated funding formulas or special programs within the MSBA for urban districts. This would address issues of urban density and the greater need for state support compared to wealthier suburban districts.

Finally, while the Massachusetts Legislature has addressed rising construction costs due to inflation with ad hoc supplemental grants, the Commonwealth should reconsider the MSBA's reimbursement criteria. Including land acquisition or unanticipated ADA costs would significantly help urban school districts, which rely on these funds to improve their public school facilities.



**APPENDIX 1:**

Worcester's Complete List of MSBA Projects (2011-2023)					
School	SOI Year	Total Project Budget	Project Type	Project Phase	Total MSBA Contribution
North High School	Inherited	\$72,800,000	Core Program	Final Audit Approved	\$45,911,881
Chandler Magnet School	2012	\$4,426,598	Accelerated Repair	Final Audit Approved	\$2,846,485
Dr. James Caradonio New Citizen Center		\$1,330,553	Accelerated Repair	Final Audit Approved	\$959,755
Jacob Hiatt Magnet School		\$451,022	Accelerated Repair	Final Audit Approved	\$308,480
Lake View School		\$1,435,094	Accelerated Repair	Final Audit Approved	\$792,262
May Street School		\$2,009,861	Accelerated Repair	Final Audit Approved	\$1,412,032
Nelson Place School		\$57,739,737	Core Program	Final Audit Approved	\$32,518,288
Columbus Park Preparatory Academy		2013	\$2,467,367	Accelerated Repair	Final Audit Approved
Tatnuck Magnet School	\$2,038,196		Accelerated Repair	Final Audit Approved	\$1,313,932
Worcester Arts Magnet School	\$1,801,521		Accelerated Repair	Final Audit Approved	\$1,130,828
Worcester East Middle School	\$2,865,498		Accelerated Repair	Final Audit Approved	\$1,300,776
Clark Street Developmental Learning School	2014	\$2,505,511	Accelerated Repair	Final Audit Approved	\$1,398,028
Goddard School of Art and Science and Technology		\$5,494,557	Accelerated Repair	Final Audit Approved	\$2,982,499
South High School		\$209,058,295	Core Program	Closeout	\$114,856,067
Union Hill School		\$2,520,957	Accelerated Repair	Final Audit Approved	\$1,503,075
West Tatnuck School		\$2,395,045	Accelerated Repair	Final Audit Approved	\$1,137,231
Flagg Street School	2015	\$4,336,844	Accelerated Repair	Final Audit Approved	\$2,218,449
Francis J. McGrath School		\$1,812,614	Accelerated Repair	Final Audit Approved	\$969,302
Grafton Street School		\$4,569,125	Accelerated Repair	Final Audit Approved	\$2,830,314
Jacob Hiatt Magnet School		\$2,334,988	Accelerated Repair	Final Audit Approved	\$1,291,350
Belmont Street Community School	2016	\$4,109,178	Accelerated Repair	Final Audit Approved	\$3,094,365
Chandler Elementary School		\$1,492,592	Accelerated Repair	Final Audit Approved	\$1,026,791
Doherty High School		\$314,351,858	Core Program	Construction	\$127,118,217
The Gerald Creamer Center		\$3,071,825	Accelerated Repair	Final Audit Approved	\$2,135,694
Wawecus Road School		\$2,271,503	Accelerated Repair	Final Audit Approved	\$1,622,722
Elm Park Community School	2017	\$3,179,270	Accelerated Repair	Final Audit Approved	\$2,086,908
Lincoln Street School		\$3,155,906	Accelerated Repair	Final Audit Approved	\$2,008,355
Thorndyke Road School		\$3,059,252	Accelerated Repair	Final Audit Approved	\$1,710,516
Challenge and Reach Academy	2018	\$6,075,849	Accelerated Repair	Closeout	\$2,605,301
Burncoat Street Preparatory School	2019	\$1,017,713	Accelerated Repair	Closeout	\$749,595
Lincoln Street School		\$1,346,274	Accelerated Repair	Closeout	\$717,006
Tatnuck Magnet School		\$2,025,697	Accelerated Repair	Closeout	\$966,315
Vernon Hill School		\$2,504,165	Accelerated Repair	Closeout	\$1,646,695
Worcester East Middle School		\$2,968,689	Accelerated Repair	Closeout	\$1,683,315
Worcester Arts Magnet School	2020	\$6,993,509	Accelerated Repair	Construction	\$2,052,451
Burncoat High School	2023	TBD	Core Program	Feasibility Study	TBD

Source: WPS 2017 Facilities Master Plan and School Study by SMMA



**APPENDIX 2:**

28 Schools in the WPS Facilities Master Plan by Age	
School	Year
Chandler Elementary School	1977
Francis J. McGrath School	1977
Belmont Street Community School	1971
Elm Park Community School	1971
Burncoat High School	1964
Wawecus Road School	1963
West Tatnuck School	1961
Worcester Arts Magnet School	1961
Chandler Magnet School	1953
Clark Street Developmental Learning School	1953
Flagg Street School	1953
Burncoat Middle School	1952
Heard Street Discovery Academy	1932
Vernon Hill School	1931
Lincoln Street School	1929
May Street School	1927
Thorndyke Road School	1927
Worcester East Middle School	1924
Columbus Park Preparatory Academy	1922
Lake View School	1922
Tatnuck Magnet School	1922
Union Hill School	1922
Burncoat Street Preparatory	1916
Rice Square School	1914
Goddard School of Science and Technology	1900
Midland Street School	1896
University Park Campus School	1885
Grafton School of Art and Science	1879

Source: MSBA Project List for Worcester and Board of Director Meeting, December 13, 2023



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