GOVERNMENT OF THE DISTRICT OF COLUMBIA
OFFICE OF THE CHIEF FINANCIAL OFFICER

Glen Lee
Chief Financial Officer

October 31, 2022

The Honorable Muriel Bowser
Mayor of the District of Columbia
1350 Pennsylvania Avenue, N.W., Suite 300
Washington, DC 20004

The Honorable Phil Mendelson
Chairman of the District of Columbia
1350 Pennsylvania Avenue, N.W., Suite 504
Washington, DC 20004

Re: District of Columbia 2022 Long-Range Capital Financial Plan Report

Dear Mayor Bowser and Chairman Mendelson:

Enclosed for your review is a briefing summary and the full 2022 District of Columbia Long-Range Capital Financial Plan Report (the "Report") prepared by the Office of the Chief Financial Officer (OCFO). The Report is also available on the OCFO website (www.cfo.dc.gov).

If you have any questions, please feel free to contact me at (202) 727-2476.

Sincerely,

Glen Lee

Enclosure

cc: All Members of the Council of the District of Columbia
Kevin Donahue, City Administrator
Jennifer Reed, Director, Office of Budget and Performance Management,
Office of the City Administrator
Jennifer Budoff, Budget Director, Council of the District of Columbia

DISTRICT OF COLUMBIA

Long-Range Capital Financial Plan **Report**

PRODUCED BY THE OFFICE OF THE CHIEF FINANCIAL OFFICER

ISSUED OCTOBER 2022

GOVERNMENT OF THE
DISTRICT OF COLUMBIA

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PART I: Overview

Key Highlights

The Office of the Chief Financial Officer's 2022 Long-Range Capital Financial Plan Report assesses the condition of the District of Columbia's (the "District") current assets, future capital needs, and funding availability. The plan then optimizes resources to address all identified capital needs in the shortest possible time.

The District's asset management system, the Capital Asset Replacement Scheduling System (CARSS), contains a detailed inventory of all District-owned assets, including land, buildings, roads and streets, vehicles, and equipment. This system provides the basis for developing the District's capital improvements plan (CIP) as part of the annual budget process and determines the cost of deferred maintenance for current assets.

Key highlights of this year's report include:

- $14.47 billion of total capital needs identified; approximately $10.93 billion of those needs are funded in the FY 2023 - 2028 CIP.
- $3.54 billion of unfunded capital needs remain during the 6-year CIP period, down from $4.54 billion last year, of which approximately $1.45 billion is deferred maintenance.
- Reasons for the decrease in unmet capital needs include the District's strong economic recovery, as well as the receipt of significant federal funds, which allowed for an increase in the size of the capital budget.
- Analysis shows that unmet capital needs can be funded as early as FY 2032, if no additional capital projects are added before addressing currently identified unmet needs. This can be accomplished if the District commits roughly 16% of its general fund budget to capital projects (12% to support debt service on borrowings and an average of approximately 4% on pay-as-you-go cash funding). However, if additional capital projects are added before addressing current unmet needs, the timeline to catch up with unmet needs could be extended significantly.
- The District has a comparatively lower cost of borrowing compared to its peers due to strong bond ratings: Aaa/AA+/AA+ by Moody's, S&P and Fitch, respectively. However, rising interest rates, due to macroeconomic factors, could impact future borrowing capacity.
- Challenges to executing this plan include an uncertain economic outlook in the short- to medium-term, persistently high inflation, increased borrowing costs due to rising interest rates, supply chain disruptions, labor market shortages, geopolitical risks, amongst others.
- The nation's capital is in an enviable position compared to its peers to navigate these challenges and address its infrastructure needs due to prudent financial management policies *(including very strong reserves and fully funded pension and OPEB liabilities)*, a state-of-the-art asset management system, and a resilient local economy.

Executive Summary

Introduction

The District faces significant challenges in maintaining its critical infrastructure like most other state and local governments throughout the country. Maintaining existing, and building new, infrastructure is crucial to the quality of life and economic prosperity of District residents. The District plans to fund approximately $10.93 billion of its highest-priority capital projects over the FY 2023 - 2028 capital planning period, with approximately $6.18 billion funded by selling municipal bonds (debt financing). However, the overall need for new facilities or asset maintenance in the District far exceeds this funding level.

The District has limits on its borrowing capacity and must strike an appropriate balance between funding its on-going operations and investing in new capital assets.

Total Capital Funding Needs

This Long-Range Capital Financial Plan report shows that the District can address all deferred maintenance and unmet capital needs as early as 2032. To achieve this ambitious goal, the District must commit to borrowing up to its statutory maximum level of debt service, which is a maximum of 12% of general fund expenditures and to increase pay-as-you-go (or cash) funding for capital to an amount averaging slightly more than 4% of general fund expenditures. Additionally, the plan commits to prioritizing funding of existing unmet capital needs over any additional new capital projects.

CARSS

The District is unique in that it functions as a city, state, county, and school district and has the responsibility to fund infrastructure for all these functions. A team of subject matter experts throughout the District developed a comprehensive asset management planning system to better understand the costs to maintain its assets in a state of good repair. The Capital Asset Replacement Scheduling System (CARSS) is an asset management planning solution that delivers a comprehensive view of the District's capital asset health and provides information on each project or asset. CARSS, coupled with the District's long-range financial forecasting model, was designed to answer 4 fundamental questions:

1. *What assets does the District own?*
2. *What is the condition of those assets?*
3. *How should the District prioritize its capital needs?*
4. *How much funding is available to address those needs?*

CARSS is now generally recognized as the most comprehensive and detailed capital asset management system of any city or state government in the country.

Total Capital Funding Gap

The District developed a long-range financial forecasting model. This model can determine the optimal capital funding mix, within certain financial constraints, including debt capacity, pay-as-you-go (paygo) or cash funding, as well as federal or other grant funding. The model determines the amount of available funding for the 6-year Capital Improvements Plan (CIP) and helps to determine which capital projects the District cannot afford during that timeframe. In addition to analyzing available traditional methods of funding, capital projects were also analyzed to determine where the private sector may assist in addressing future infrastructure challenges through non-traditional funding, such as public-private partnerships.

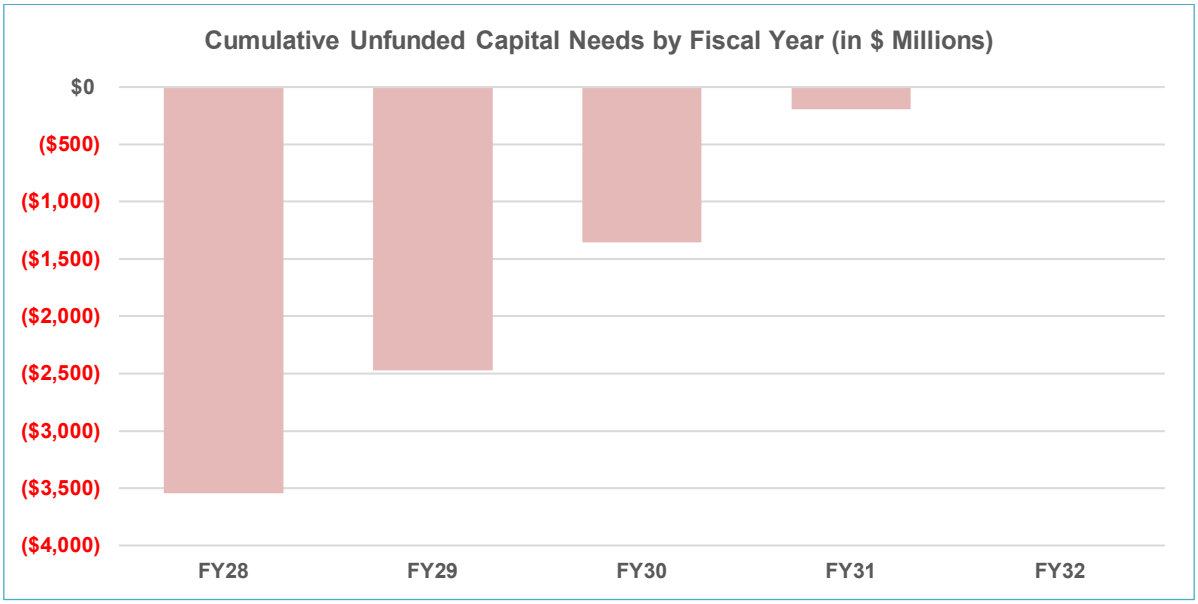
The District can fund roughly $10.93 billion of its highest-priority capital needs in its FY 2023 - 2028 CIP. However, the CARSS analysis identified approximately $3.54 billion of additional unmet capital needs during that same period, which is approximately $1 billion lower than was reported in the 2021 report. The $3.54 billion equates to approximately $591 million per year on average, or roughly 5.5% of the District's FY 2023 Local Fund revenues.

The District has made significant progress in addressing its unmet capital needs and deferred maintenance for several reasons, key amongst them was the District's rapid recovery from the economic contraction caused by the Covid-19 pandemic. Additionally, the District received a significant amount of federal funding, a large portion of which will be used to fund capital projects.

Long-Term Funding Solutions

In Fiscal Year 2017, the District Council adopted legislation to increase the amount of paygo provided to support capital program needs as part of the FY 2018 Budget Support Act. Under this law, the amount of additional paygo funding for capital increases annually from a base year in 2020, until it eventually reaches a level equal to annual depreciation as reported in the District's Annual Comprehensive Financial Report. Over the 15-year period studied in this report, paygo transfers for capital, including those amounts dedicated to WMATA, would average approximately $560 million annually.

The combination of a resilient economy and relatively low costs of borrowing, due to strong credit ratings, will allow for additional debt issuances, while staying below the statutory debt limit. Given the substantially higher projected paygo funding and the full utilization of its borrowing capacity, coupled with significant federal funds, the District could fund all existing unmet capital needs and address all its deferred maintenance as early as 2032.



Challenges

The District faces several challenges in funding its unmet capital needs within the timeline outlined in this plan. Several of these challenges are outside of the District's control, including the prospects of an economic recession, persistent high inflation, rising interest rates due to tightening monetary policy by the Federal Reserve, supply chain disruptions, labor shortages, as well as geopolitical crises and the lingering after-effects of the Covid-19 pandemic. These same macroeconomic challenges create incentives to provide additional programs and services to impacted residents. As budgets become more constrained due to slower growth in revenues, the District will have to carefully balance its commitment to annually increasing paygo funding levels with operating needs.

Conclusion

Although the District faces significant challenges, as does every state and local government in the country, in addressing its capital infrastructure needs, it is in an enviable position compared to most of its peers. This report outlines a plan, that if executed, would allow the District to meet all its unmet capital needs and deferred maintenance within a decade. Simply stated, if the District commits approximately16% of its general fund revenues to its capital needs (12% for debt service and approximately 4% for paygo), and the remaining 84% to operations and programs, it can achieve the status of having the best maintained infrastructure of any city or state in America.

PART II: Long Range Capital Financial Plan Report

Introduction

As part of the Fiscal Year 2015 Budget Support Act, the Council of the District of Columbia included a requirement for the Office of the Chief Financial Officer (OCFO) to develop a replacement schedule for capital assets and report on its status in October of each year. This report meets this requirement by reporting on the development of a Long-Range Capital Financial Plan for the District of Columbia ("District") that includes capital asset replacement needs. This report also satisfies an initiative included in the OCFO's strategic plan which called for the development of a long-range capital financing plan for the District. Therefore, the legislative requirement introduced by the Council coincided with, and is complementary to, the necessary work in support of the OCFO's strategic initiative that had already begun. In addition, this report serves as an update on the progress of the Capital Asset Replacement Scheduling System (CARSS), which includes an asset registry of all District-owned assets and detailed information on the condition of those assets.

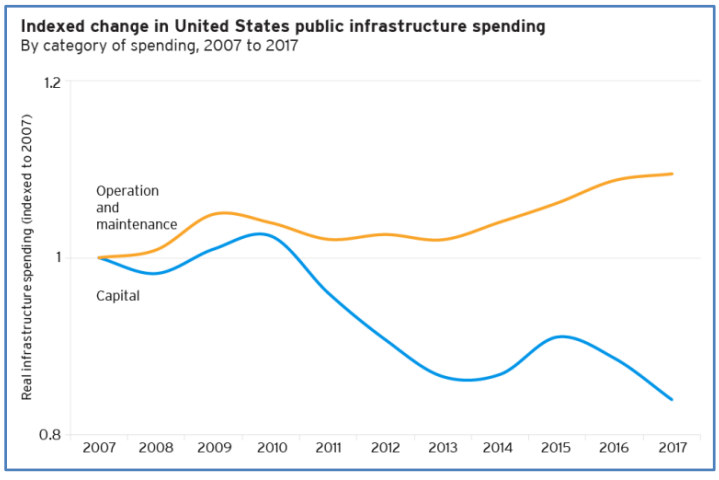
Purpose of the Report

This report is intended to assist the Mayor, Council, other policymakers, and the public in understanding the size and scope of the District's capital infrastructure funding gap during the current Capital Improvement Plan (CIP) period and beyond, as well as to provide a funding solution through the development of a long-range capital financial plan. The development of CARSS allows the District to have a truly data-driven and transparent CIP process that informs policymakers of the true costs of maintaining the District's current assets and the costs of deferring maintenance, and thus, supports better decision making. The Long-Range Capital Financial Plan provides a roadmap to address all identified capital needs that the District cannot afford during the CIP period within a reasonable timeframe.

This update to the Long-Range Capital Financial Plan report indicates that if the District commits to borrowing up to its statutory maximum level of 12% of general fund expenses, as well as commits to increase pay-as-you-go (or cash) funding for capital to a level averaging slightly more than 4% of general fund expenses, then it can fund all identified deferred maintenance and currently identified, new capital needs as early as 2032.

Background

Figure 1



A growing population, rising commercial demand and inadequate funding levels over the past several decades has led to the general deterioration and poor quality of public infrastructure in America. A significant part of the problem is driven by the complex and diverse nature of ownership of these assets, with responsibility for operations, maintenance and capital expenditures shared across state and local governments, the federal government, and in some cases, the private sector. As shown in the figure to the left, operation and maintenance

infrastructure spending saw an increase from 2007 to 2017 while capital infrastructure spending sharply declined (Source: The Brookings Institution).

The United States differs from most other industrialized countries in the extent to which it relies on local and state spending to meet its infrastructure needs. While most European countries fund the bulk of their infrastructure development at the national level, only roughly 23% of U.S. public infrastructure funding comes from the federal government. State and local governments own 90% of non-defense public infrastructure assets and account for approximately 77% of infrastructure spending according to The Brookings Institution. While state and local government coffers are largely full by most measures, that has not always been the case. When budgets are tighter, state, and local governments often face a choice between cutting back on programs for constituents or capital spending, and all too often it's the capital spending, especially the deferred maintenance that takes the hit. Like other jurisdictions, the District has deferred some necessary investment in capital infrastructure in favor of other competing priorities when faced with tight budgets. The District, however, has generally done a better job than its peers in addressing its critical infrastructure needs. In June 2021, the ASCE released an infrastructure report card focusing solely on the infrastructure of the District. The District's infrastructure received a grade of "C", an improvement over its previous grade of "C-" reported in ASCE's 2016 report card. The District's grade is also slightly better than the nation's overall 2021 infrastructure grade of "C-", however, it is still far from adequate and well below its own expectations.

While the federal government has a critical role to play in maintaining the nation's infrastructure, increased federal spending alone will not be sufficient to address these critical infrastructure needs. In fact, total public spending on infrastructure as a share of GDP peaked in the late 1950s during the initial stages of construction of the Interstate Highway System. Since the mid-1980s, however, total public spending as a share of GDP has remained relatively flat or even declined. The Bipartisan Infrastructure Law, also known as the 'Infrastructure Investment and Jobs Act' (IIJA), which was signed into law 2021 can go some way in addressing the nation's infrastructure needs. However, the largest portion of the funding and maintenance responsibility for improving the nation's aging and inadequate infrastructure will still fall to state and local governments.

CARSS: The District's Approach to Asset Management

In the attempt to develop a better understanding of the costs of maintaining the District's critical capital infrastructure, a comprehensive asset management planning system had to be developed for all the District's assets. This was accomplished through the development of the Capital Asset Replacement Scheduling System, or CARSS. In developing CARSS, the District applied many of the key concepts and fundamentals of ISO 55000, which is the international standard for asset management, as well as concepts outlined in a 2015 report from the Institute of Asset Management (IAM) titled, Asset Management – an Anatomy (version 3). While the District is not seeking, at this time, to have CARSS certified as ISO 55000 compliant, the various personnel involved with CARSS, including the CARSS project manager, have been formally trained, tested, and certified as ISO 55000 professionals. The team involved with managing the CARSS program continues to use the ISO 55000 and IAM concepts and principles as guidelines as it further refines, and continues to improve, the management of the District's assets.

In determining how to go about structuring its asset management system and understand how to identify, and ultimately fund, its infrastructure funding gap, the District set out to answer four fundamental questions:

1. *What assets does the District own?*
2. *What is the condition of those assets?*
3. *How should the District prioritize its capital needs?*
4. *How much funding is available to address those needs?*

CARSS addresses the first three questions and identifies the capital funding gap during the six-year CIP period. A separate long-range financial modeling tool is used to address the fourth question and identify a solution to fund the identified gap over the shortest amount of time possible.

Step 1: What Assets Does the District Own?

The first, and possibly most critical, step the District took in beginning this process was to establish a centralized database, or asset registry, of all District-owned assets. Given the extremely large number of assets the District owns, inventorying them all at once would have been impossible. Therefore, a decision was made to proceed with a more methodical approach, and to first develop a proof-of-concept model involving a few discreet asset types to test the validity of building a centralized, enterprise-wide asset database. After the successful completion of the proof of concept, the District began building out a comprehensive asset registry by adding the assets of all District agencies, as well as those of related component units that manage their assets separately. This process took several years, but as of the publication of this report, the District has 100% of its assets inventoried in CARSS. In fact, enhancements have been made to the asset registry in CARSS since the 2018 report, whereby existing assets have been "broken down" into more granular component units and sub-systems which can now be tracked separately, thereby substantially increasing the overall asset count in CARSS. These enhancements will be discussed in greater detail later in this report, as well as in *Appendix A* of the report.

Step 2: What are the Conditions of the District's Assets?

The next phase in developing a comprehensive asset management system was a thorough understanding of the condition of all the District's assets. Initially, certain assets, such as school facilities recently built, certain road segments and fleet assets, had current condition and maintenance data available. However, many of the District's assets did not have that detailed level of condition assessment data. Therefore, the OCFO has been working with the District's Department of General Services (DGS) and other relevant agencies to complete detailed facility condition assessments on all municipal buildings, as well as other assets. These condition assessments were expected to be completed in fiscal year 2020, however delays caused by the Covid-19 pandemic, and other factors, have delayed their completion. DGS is currently working on a revised timeline to complete these assessments as soon as possible. In the intervening time, certain assumptions were made on the condition of assets based on industry standards on the useful life of assets, as well as any relevant maintenance data that existed. The combination of a detailed asset inventory and condition assessments of assets has allowed the District to have a much more precise idea of the costs to maintain or replace its critical capital infrastructure. For more detailed information about the development of the asset registry and condition assessments, please see the discussion on the Approach to Developing CARSS in *Appendix A* of this report.

Step 3: Prioritization of Capital Needs

The OCFO worked closely with the Executive Office of the Mayor (EOM) to build a methodology to score, rank and prioritize all capital projects, to build a more data-driven approach to asset maintenance. Capital projects were classified into one of four asset types: 1) horizontal infrastructure, 2) vertical infrastructure, 3) fleet, and 4) information technology and equipment. Projects were then further grouped as either capital maintenance projects (deferred maintenance) or new capital projects. A scoring methodology was then established within CARSS based on several different elements and criteria that coincided with policy priorities of the EOM. Those scoring criteria were then weighted to ensure that all capital projects could be fairly and objectively compared, scored, and ranked across all different asset types. Using these scoring criteria, the District's Capital Budget Team (CBT) and relevant subject matter experts spent several weeks individually scoring each capital project. The scores were reviewed several times to assess consistency and underlying logic and to ensure the process was done as objectively as possible. The final criteria and scores were then applied to the CARSS model, which in turn created a project ranking. This ranking largely determined the capital projects that were included in

the six-year CIP. For more information on the classification and scoring of capital projects please see *Appendix B*, and for more discussion of the prioritization of capital projects, please see *Appendix C* of this report.

Step 4: Funding Solution

Finally, the OCFO created a separate long-term capital financial plan model that incorporated the District's outstanding debt, along with anticipated future borrowings, all while remaining compliant with the District's federal and local statutory debt limitations. The model further incorporated certain levels of paygo funding based on legislation enacted as part of the FY 2018 Budget Support Act, as well as all other potential sources of funding including grants and other federal funding. This model determined the amount of available funding during the current CIP period that was available to address the capital funding priorities identified in CARSS. In addition, the model identified available funding outside of the current CIP to address unmet capital needs in the shortest possible time outside of the current CIP. More information is provided on the development of the Long-Range Capital Financial Plan model later in this report, as well as in *Appendix D* of this report.

Capital Funding Gap During the CIP Period

The CARSS model determined that the total capital infrastructure needs of the District, as identified in the FY 2023-2028 CIP budget formulation, is approximately $14.47 billion. The District has identified approximately $10.93 billion of funding, a mix of debt, paygo capital, federal loans and grants, and other funds, over the next 6 years, in its FY 2023-2028 capital budget for the highest-priority capital projects. This results in a remaining total capital infrastructure funding shortfall of approximately $3.54 billion over the 6-year CIP period. This amount includes both unfunded new capital projects needed to support the population of the District, as well as unfunded capital maintenance projects for existing assets.

The chart below shows the annual estimated funding needed, beyond what the District can afford during the current six-year CIP, broken into the 2 categories of capital projects: capital maintenance projects (deferred maintenance) and new capital projects. The 6-year funding gap for capital maintenance projects is nearly $1.45 billion, or roughly $242 million annually. The 6-year funding gap for new capital projects is approximately $2.10 billion, or approximately $349 million annually. Combined, the annual funding gap is approximately $591 million, which is equivalent to roughly 5.5% of total FY 2023 local funds revenues.

Table 1

Total Unfunded Capital Needs During the 6-Year CIP Period

(in $ Millions)

Fiscal Year	FY23	FY24	FY25	FY26	FY27	FY28	6-Year Total
Unfunded Capital Maintenance Projects	$169.2	$270.9	$265.1	$233.8	$261.8	$248.6	**$1,449.4**
Unfunded New Capital Projects	$298.2	$290.9	$389.7	$429.3	$381.9	$306.1	**$2,096.1**
Total Unfunded Capital Needs	**$467.3**	**$561.8**	**$654.8**	**$663.1**	**$643.7**	**$554.7**	**$3,545.4**

As shown in the following chart, the total capital funding gap represents projects across key sectors of the District's capital infrastructure program. These amounts represent actual capital projects that cannot be delivered during the current six-year CIP with current funding levels and sources. For example, the roughly $2.4 billion in unfunded new facilities projects includes two very significant capital projects for the District: a replacement of the Henry J. Daly building, which houses the headquarters of the Metropolitan Police Department, and a replacement for the District's correctional facility. Even though the

scope of the correctional facility project has been significantly downsized, the estimated additional funding needed, above what is already in the capital budget for those two large projects, is likely to exceed $850 million.

Table 2

Annual Capital Funding Gap by Asset Type

(in $ millions)

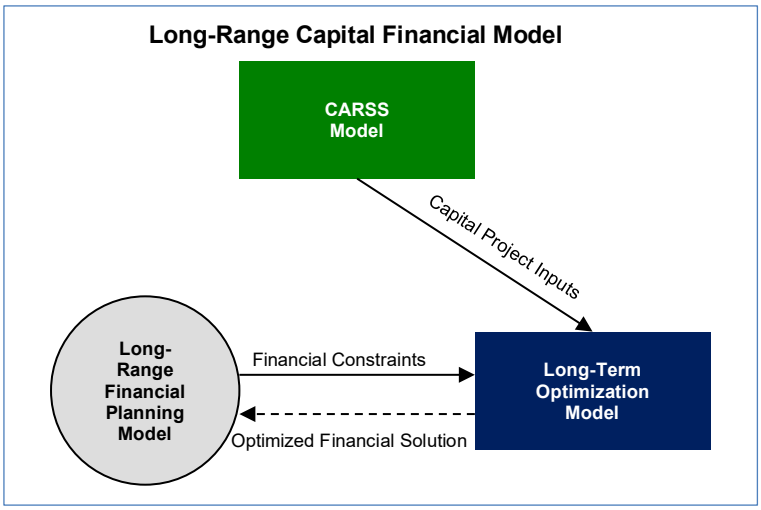
Fiscal Year	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	Total
IT Projects & Systems							
Capital Maintenance Projects	9.8	15.5	14.0	7.3	7.1	8.3	**62.0**
New Capital Projects	26.4	29.6	14.5	6.9	16.1	6.7	**100.4**
Total	**36.2**	**45.2**	**28.5**	**14.2**	**23.2**	**15.0**	**162.4**
Equipment & Regulatory							
Capital Maintenance Projects	6.5	11.6	14.5	14.9	16.5	15.8	**79.8**
New Capital Projects	2.5	3.0	10.5	5.5	4.3	1.8	**27.5**
Total	**9.0**	**14.6**	**25.0**	**20.4**	**20.7**	**17.5**	**107.3**
Fleet							
Capital Maintenance Projects	0.3	41.6	42.8	31.9	34.1	35.2	**185.8**
New Capital Projects	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Total	**0.3**	**41.6**	**42.8**	**31.9**	**34.1**	**35.2**	**185.8**
Horizontal Infrastructure							
Capital Maintenance Projects	64.1	99.1	80.2	101.5	109.4	98.8	**553.0**
New Capital Projects	37.1	12.1	33.3	12.4	12.2	12.3	**119.5**
Total	**101.3**	**111.2**	**113.4**	**114.0**	**121.6**	**111.0**	**672.5**
Facilities							
Capital Maintenance Projects	88.5	103.1	113.7	78.2	94.7	90.6	**568.7**
New Capital Projects	232.1	246.2	331.4	404.4	349.3	285.3	**1848.7**
Total	**320.5**	**349.3**	**445.1**	**482.6**	**444.0**	**375.9**	**2,417.4**
Grand Total	**467.3**	**561.8**	**654.8**	**663.1**	**643.7**	**554.7**	**3,545.4**

It is important to note that the Long-Range Capital Financial Plan analysis incorporates inflation assumptions in line with market expectations, especially in the short- and medium-terms. The costs of deferred capital projects beyond the 6-year CIP period continue to grow at 3% annually until those projects are funded. In addition, CARSS incorporates cost curves for various assets in the database to measure the cost of repair or replacement more accurately as these assets deteriorate. For example, if potholes are not filled on a particular street segment in a timely manner, the asset deterioration curve for street and roads may cause CARSS to accelerate the timing of a more expensive repair event, such as a complete street scraping. Similarly, if vehicles are not replaced pursuant to the schedule established in CARSS based on the various metrics used to determine the useful life of those assets, CARSS also inflates the purchase price of those vehicles to reflect the likely higher cost of purchasing those assets later than what is recommended in the model. Finally, operating costs are also incorporated into CARSS as part of the overall outlook of asset health, so if capital maintenance or asset replacement, is delayed beyond what is prescribed in CARSS, then annual operating and maintenance costs for that asset are escalated the following year and subsequent years until the repair or replacement is completed.

Developing Long-Term Funding Solutions

To properly maintain the value and functionality of existing capital assets, and to minimize life-cycle costs, the establishment of a time frame for 'catching up' on deferred maintenance is a best practice of any long-range capital financial plan. To address this complex financing challenge over the shortest time period, while remaining within the various constraints imposed by the District's borrowing limits, a financial planning model was developed. This model assists the District in identifying financial strategies to fund the identified capital needs gap in the earliest year possible given various constraints.

Figure 2



The long-range capital financial model is a combination of 3 discreet models that work together to identify the optimal financial result. The long-range capital financial model is comprised of CARSS, a Long-Range Financial Planning model, and a Long-Term Optimization model. A diagram of how the long-range capital financial model works is shown on the right. A more detailed description of the model, and its various components and assumptions can be found in *Appendix D*.

CARSS was used to prioritize, score, and rank all the District's various capital projects. Then, under certain capital budget constraints and with a specific priority ranking assigned to each project, CARSS determines which projects can be funded in the CIP each year, and which projects will not receive funding (due to their lower priority ranking). The unfunded capital projects are then imported into the Long-Term Optimization model, along with certain debt and resource assumptions from the Long-Range Financial Planning model, to solve for the optimal solution to finance the unfunded capital gap as soon as possible. The financing information from the Long-Term Optimization model is then exported back into the Long-Range Financial Planning model in order to present a complete long-term capital financing plan for the District over the 15-year forecast period.

The model also allows the District to optimize and project the maximum amount of debt that can be issued in each fiscal year (to stay under the 12% debt service cap), while simultaneously determining the earliest possible fully funded year of all unfunded capital projects. The District will also be able to quantify the amount of paygo, federal funding, or other revenues needed to address the entire backlog of unfunded capital needs over various time periods depending upon various constraints, most notably on the amount of paygo dedicated to capital.

A detailed description of the methodology used to classify and score the various capital projects, along with the scoring criteria, can be found in *Appendix B*. In addition, a detailed description of how projects were prioritized in CARSS can be found in *Appendix C*.

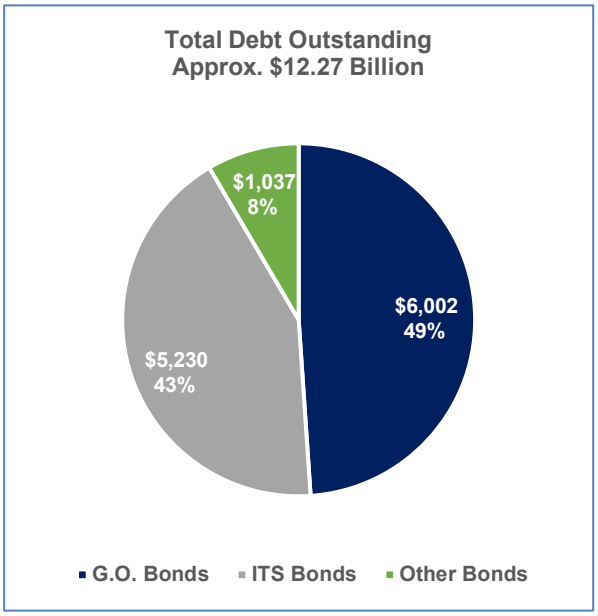
Funding Sources

Although the District relies on a variety of sources to finance its capital infrastructure program, including paygo financing, federal grants, local highway trust fund monies, local transportation funds, Grant Anticipation Revenue Vehicles (GARVEE bonds) from the Federal Highway Administration, sale of assets and other typical municipal sources of revenue, like most other state and local governments throughout the nation, the District has traditionally relied on debt financing as the primary source of funding for capital infrastructure investments.

Outstanding Debt

The District has utilized debt financing, primarily General Obligation (G.O.) bonds and Income Tax Secured Revenue (ITS) bonds, as the primary sources of funds for capital infrastructure investments. As of September 30, 2022, the District has approximately $12.27 billion of total outstanding debt, of which roughly $11.23 billion (or approximately 92%) are either G.O. bonds or ITS bonds.

Figure 3



While G.O. and ITS bonds will remain a key source of funds for infrastructure investments into the future, the key challenges for the District will be to ensure that the total debt burden remains at a sustainable level and does not overburden the city's budget. The District's debt must be structured in such a way as to maintain our strong credit ratings, thereby keeping the overall cost of borrowing as low as possible. Although the District's revenues have rebounded from the Covid-19 pandemic, revenue growth is projected to slow substantially as a result of the larger macroeconomic environment. At the same time, the District anticipates increasing its outstanding debt by nearly 50%, or approximately $6.18 billion in additional G.O. or ITS bonds over the next 6 years, to support its capital improvements plan. Along with slower projected revenue growth, rising interest rates due to tightening monetary policy by the Federal Reserve as they aim to bring down inflation, will make adding this amount of additional indebtedness in a responsible manner all the more challenging.

Debt Capacity Limitations

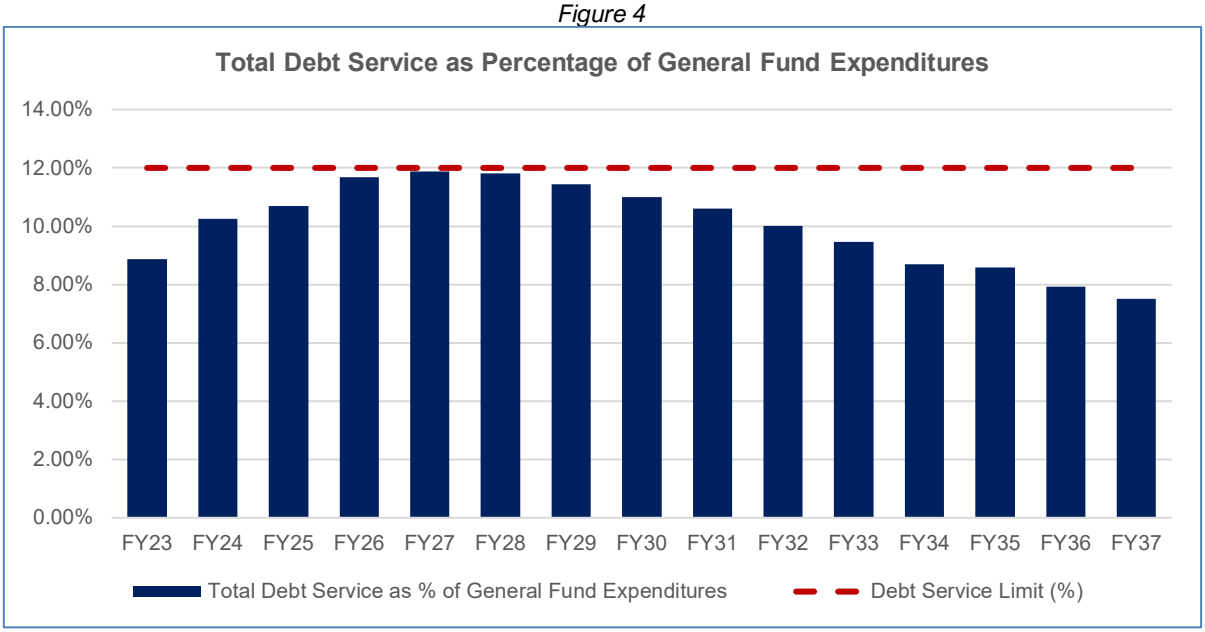
The District must operate within both federal and local statutory debt limits. Under the federal Home Rule Act, annual debt service on the District's General Obligation bonds must be no more than 17% of General Fund revenues. In 2009, the Council passed local legislation to further restrict the amount of debt outstanding. The local Debt Ceiling Act limits the annual debt service on all tax and fee supported debt to no more than 12% of the District's General Fund expenditures. This locally imposed limit is the true constraint under which the District's borrowing must operate. Compared to other state and local governments, the District has a relatively high debt per capita ratio. Staying below the 12% debt limit allows the District to maintain its very strong credit ratings on its General Obligation bonds (Aaa/AA+/AA+ from Moody's Investors Service, Standard and Poor's and Fitch Ratings, respectively), as well as on its Income Tax Secured Revenue bonds (AAA/Aa1/AA+ from S&P, Moody's, and Fitch, respectively). **The District's credit is now one of the highest-rated among state or local governments in the country.**

The OCFO measures the projected annual debt service as a percentage of anticipated general fund expenditures during the current CIP period, in compliance with the 12% locally mandated debt limit. The following graph illustrates the District's projected annual debt service percentages given the amount of debt projected to be issued to support the FY 2023-2028 CIP. It is important to note that the

chart does not reflect the impact of future debt refinancings or restructurings, which is likely to lower the debt service reflected in the graph below and increase future borrowing capacity for the District.

While the 12% statutory debt limit is on the higher end as compared to other state and local governments across the country, it reflects our unique requirement to fund state, county, city, and school district infrastructure needs. This debt limit has been extensively discussed with the credit rating agencies, and coupled with our strong reserve policies, provides the maximum borrowing capacity to fund infrastructure at the lowest possible cost.

Figure 4



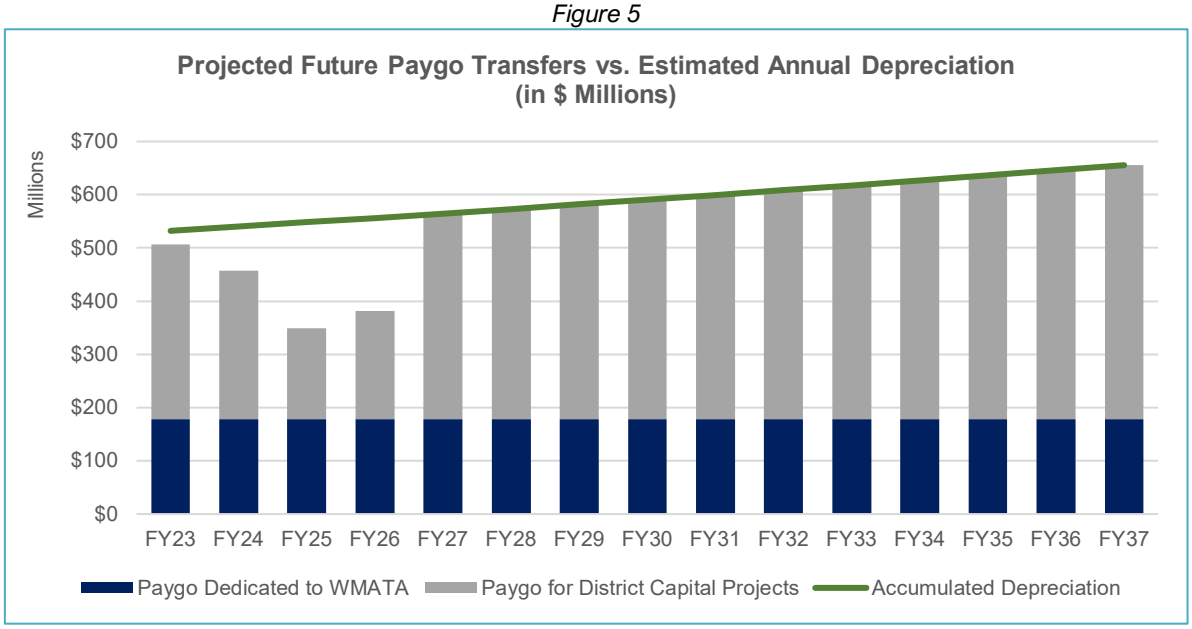
Paygo Funding Mechanism Through Legislative Action

The other key source of funding for the District's CIP is paygo funding, which is a transfer of cash from the operating to the capital budget. Given the statutory limits on the amount of debt that can be issued, these cash transfers from the General Fund to the CIP program are the most flexible source of funding for addressing the identified, unfunded capital needs.

The Budget Support Act of FY 2018 included a provision for the use of paygo as part of the Capital Infrastructure Preservation and Improvement Fund. The provision specifies that for FY 2020, the financial plan shall include a minimum local funds total transfer of paygo to the CIP of $58,950,000, plus any associated special purpose revenues dedicated to capital. Then, beginning in FY 2021, and for each subsequent fiscal year thereafter, the financial plan shall include a minimum local fund transfer for paygo of the $58,950,000 (and any special purpose revenues dedicated to capital) plus twenty five percent (25%) of the increase in local fund revenues over the FY 2020 base year. The amount of local fund revenues transferred to the CIP is capped, to not exceed annual depreciation as reported in the District's most recent Annual Comprehensive Financial Report. As an example of how significantly paygo funding for capital has grown, the adopted FY 2023 budget includes total paygo funding for capital, including amounts dedicated to WMATA, of roughly $507 million in FY 2023 alone, which is almost $109 million more than is legislatively required. Additionally, over the 6-year CIP period projected paygo transfers to the capital budget total $2.83 billion. The total aggregate amount of paygo funding over the entire 6-year CIP period exceeds the legislative minimum by roughly $163 million. In addition, the District is expected to receive funding from the Infrastructure Investment and Jobs Act (IIJA) that was enacted into law in 2021 in excess of $3 billion through FY 2026. That substantial amount of additional federal funding for infrastructure could be used to supplement local funds to further address the District's unmet capital needs.

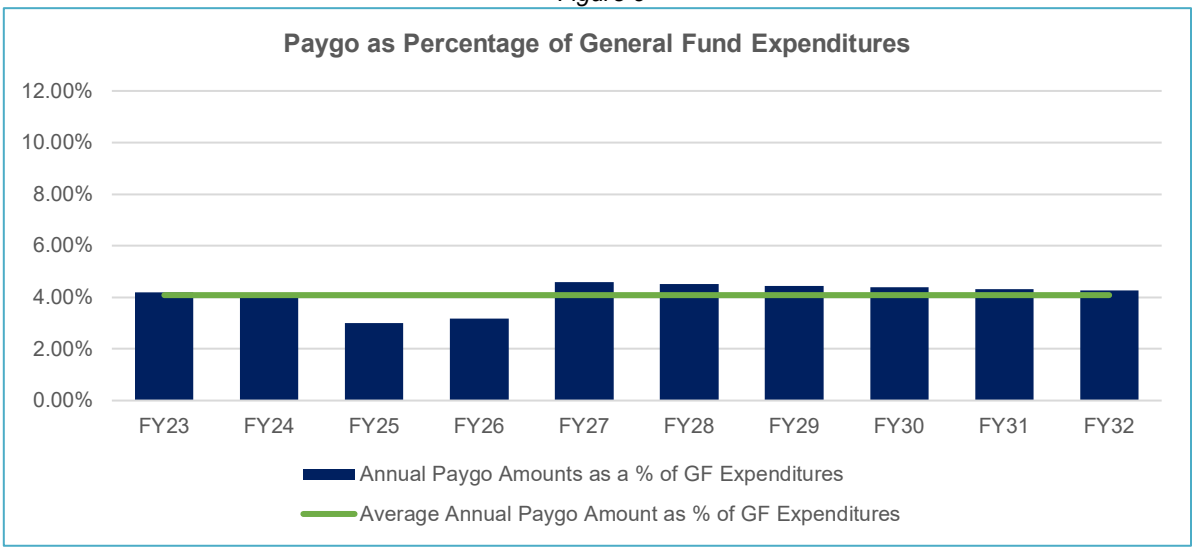
As shown in the following graph, under the approved legislation, future local funds transfers to the CIP for paygo, both the amounts dedicated to WMATA and the amounts for the District's capital projects, would be roughly equivalent to total annual depreciation by 2027, at which point the calculation to determine future local funds transfers would be capped at the amount of annual depreciation.

Figure 5



While the estimated increases in paygo from local funds represent significant portions of the projected local funds revenue growth of the District, and a substantial increase in funding for the capital program over prior year's amounts, it represents a relatively small part of the local funds portion of the District's general fund budget. As seen in the following graph, the annual amount of local funds transfers of paygo for capital averages slightly more than 4% of the local funds portion of total general fund expenditures between fiscal year 2023 and fiscal year 2032, which is the earliest time by which all unmet capital needs could be funded.

Figure 6



Allocating this level of additional paygo funding is not without challenges, as the growth of local revenues is projected to slow substantially due to an expected weakening of the District and national economies, since capital projects compete with programmatic priorities such as affordable housing, homeless services, and the general growth and expansion of services for residents, for funding. However, properly maintained equipment and facilities will, over the long-term, result in lower life-cycle costs and increased resources for other District programs. Additionally, federal funding from the IIJA should help to offset a slowing of local revenue growth and to address the District's unfunded capital needs. The District expects to receive approximately $700 million per year through FY2026 from the Infrastructure Investment and Job Act. The additional funds will help to maintain and expand the existing asset base and cope with the increasing strains on the District's infrastructure.

Also, District legislation requires that once the 60-day operating reserve level is reached for the federally and locally mandated cash reserves, 50% of all surpluses in a given fiscal year go to paygo funding. This additional funding will further assist the District in achieving paygo levels that support ongoing capital asset maintenance needs. The addition of these new revenues should allow the District to meet its increased commitment to funding capital, while also supporting reasonable growth in operating programs.

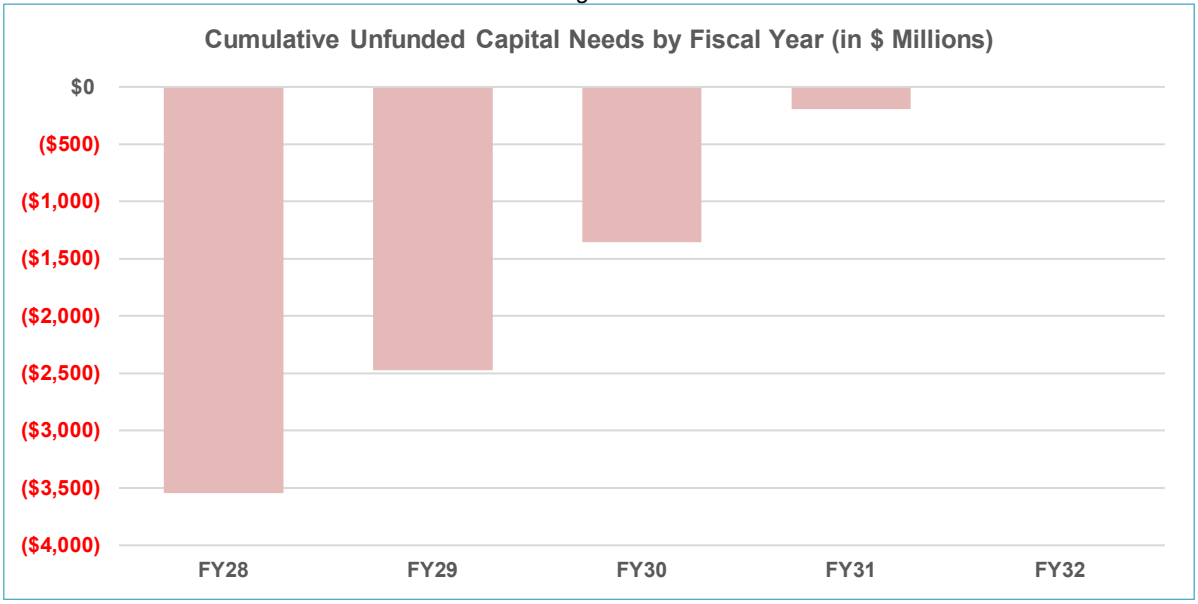
Funding Solution for the District's Unmet Capital Needs

The District's long-range financial planning model incorporated both the projected amounts of additional paygo funding, as discussed earlier, and maximized the amount of borrowing for capital, all while staying below the District's statutory debt limits.

Given these projected amounts of paygo funding for capital, and maximizing the District's bonding capacity, the long-range capital financial model estimates that the District will be able to "catch up" and fund all existing unfunded capital projects identified in CARSS as early as FY 2032. This would allow all District assets in the general fund to reach a state of good repair, while also addressing new unfunded capital projects. In other words, the $3.54 billion of capital needs not funded in the 6-year CIP could be funded as early as 2032 with paygo levels increasing on average to slightly more than 4% of the general fund budget and borrowing up to the 12% statutory debt capacity limit if no additional capital projects are added before addressing currently identified unmet needs. Funding of the gap could be further accelerated through additional resources, such as increased federal funding or greater use of non-traditional funding structures, such as public-private partnerships.

The following graph illustrates the unfunded capital needs, meaning those capital needs not funded as part of the FY 2023-2028 CIP, identified in this 2022 report. Those unmet capital needs, which grow to slightly more than $3.54 billion through FY 2028, begin to be paid down starting in FY 2029, assuming no new additional capital projects are added to the CIP before addressing these identified unmet needs. The analysis that supports unmet needs being funded as early as 2032 relies on two important assumptions: 1) unmet capital needs identified in this report are prioritized in the years beyond the current CIP period over the addition of new capital projects, and 2) that all the bonding capacity available outside of the current CIP is targeted at funding these unmet capital needs. Over the last several years, the District's capital budgets have been split roughly 60% to address existing capital needs, or deferred maintenance, and 40% to new capital projects to support growth. If the District were to maintain such a split in its future capital budgets outside of the current CIP it would extend the time frame to "catch up" with all the identified unmet capital needs by several years. In addition, if revenues were to fall, or grow at an even slower pace than currently anticipated, the time that it would take to fund all the District's unmet capital needs would likely be extended by several years as well.

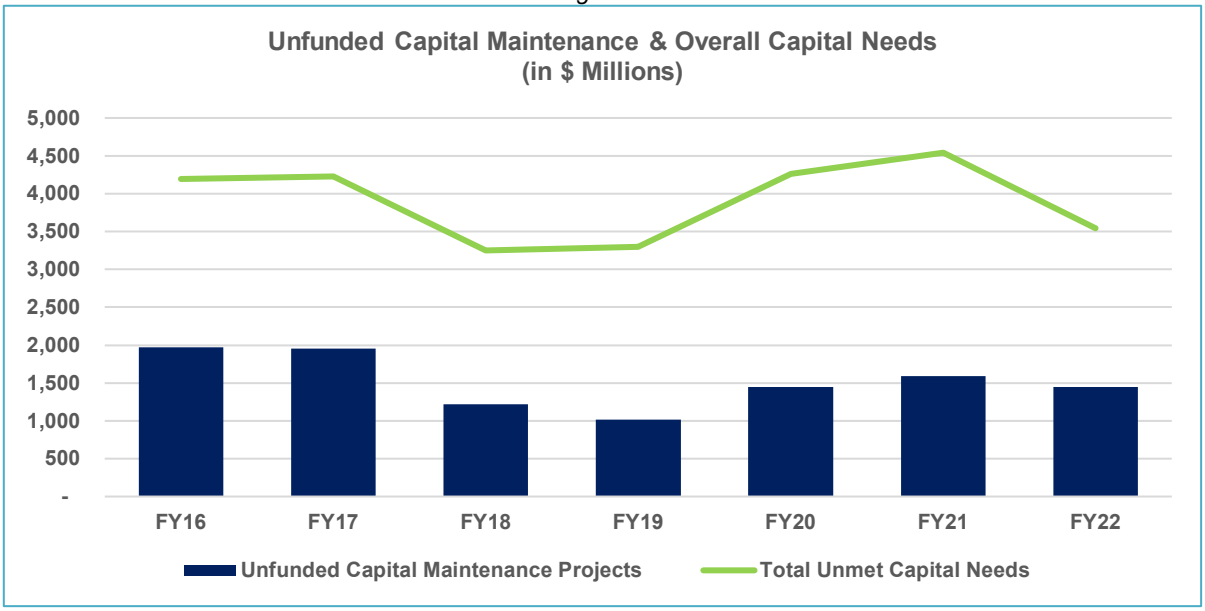
Figure 7



Progress in Addressing Unfunded Capital Needs

Since the first Long-Range Capital Financial Plan report was produced in 2016, the amount of identified unfunded capital needs steadily decreased until the onset of the recession in 2020 brought about by the coronavirus pandemic. The District's capital budgets have become increasingly focused on addressing those unmet capital needs, especially deferred maintenance of existing assets, as can be seen in the following graph. This year's report identified total unmet capital funding needs of approximately $3.54 billion, which is lower than the $4.54 billion identified in last year's report. The District can address these unfunded needs in a reasonable amount of time due in large part to the strength and resilience of the District's economy, lower borrowing costs due to strong credit ratings and a focus on refinancing existing debt, whenever possible, and utilizing the debt service savings for additional borrowing capacity to support the capital budget. These factors should still allow the District to address its unmet capital needs in roughly a decade. The focus on returning its critical infrastructure to a state of good repair, along with largely rebounded revenues, has resulted in the District's 6-year CIP budget growing from approximately $6.3 billion in 2016 to roughly $10.66 billion in 2023.

Figure 8



As seen in the chart above, unfunded capital maintenance needs, which serve as a proxy for deferred maintenance, had decreased since the first long-range capital financial plan report in 2016. In the 2016 report, unfunded capital maintenance needs were nearly $2 billion, or nearly half of total unmet capital needs. However, there was a much greater emphasis on addressing those unmet capital maintenance needs beginning with the 2018 CIP, and those amounts declined significantly to just slightly more than $1 billion in 2019. These amounts then began to rise in 2020 and 2021 because of capital maintenance project delays caused by the coronavirus pandemic. Capital funding increased in 2022 which brought down the level of both unfunded capital maintenance needs and total unmet needs from levels seen during the period of the Covid-19 pandemic. This demonstrates the District's commitment to focus on both deferred maintenance and new capital projects.

Challenges to Achieving Timeline of Meeting Unfunded Capital Needs

While the analysis described in this report indicates that the District could fund all its unmet capital needs as early as 2032, it is important to note that there several challenges, from larger macroeconomic conditions to assumptions on growth of local revenues, that will impact the viability of that timeline. The OCFO released its most recent quarterly revenue estimate on September 30, 2022, which stated that the District's economy, as measured by gross domestic product, has recovered from the Covid-19 pandemic, however, the outlook for FY 2023 remains cautious.

The District's economic outlook has weakened in line with the national and global economy due to inflation pressures, monetary policy tightening and geopolitical risk. Growth in real gross domestic product in the District is expected to slow to 0.4 percent in FY 2023, down from 1.7 percent in FY 2022. Employment in the District is not expected to reach 2019 levels during the financial plan period (through FY 2026) due to slower growth in hospitality sectors and weak federal, professional, and technical job growth. Over the last quarter, tourism has been a bright spot for the District, as hotel occupancy has increased and restaurant taxable sales are reaching pre-pandemic levels, even without commuters fully returning. However, high prices and global instability continue to suppress international tourism and may dampen domestic travel as well. Finally, the District's population, which declined in FY 2021, is not expected to recover to the 2020 level until 2027. Population decline and expansion of remote work could have economic repercussions for the District. Permanent population loss could mean a change in the demographic profile of the city, the effects of which are not yet clear. Similarly, increasing adoption of remote work will likely change the profile of the District, as it means fewer commuters, and

employers adjusting their office space use and demand. This trend may already be taking hold with federal government leasing as some agencies have reduced their footprints.

Finally, a weakening of the District's economy, and the resulting slowing of revenue growth, will increase the inherent competition between programmatic and capital spending. Future decisions regarding these allocations could have a material impact on the District being able to meet the timeline outlined in this report to fund all its deferred maintenance and unmet capital needs.

Non-Traditional Funding Approaches (Public-Private Partnerships or P3s)

The District has begun to explore alternative funding methods, where appropriate, such as public-private partnerships (P3s). P3s potentially unlock additional private sources of funding that could supplement the District's more traditional tools for funding infrastructure. While P3s have their own benefits and drawbacks, the fact that the District has a detailed asset registry and a thorough knowledge of all its assets, makes it possible to better assess which assets might be good candidates for utilizing a P3 structure. In attempting to assess which capital projects might be funded using P3s, the OCFO has held extensive discussions with the Mayor's Office of Public Private Partnerships (OP3), as well as with the Office of the Deputy Mayor for Planning and Economic Development (DMPED), over the past several years to better identify projects, that although rated high in importance, are unlikely to receive the full amount of funding needed to bring them to fruition in the normal CIP process.

An example of such a project is the District's streetlighting modernization project. Earlier this year the District closed on its first-ever P3 for the DC Smart Street Lighting Project, which is the largest urban P3 street lighting project in the nation. The project will convert the District's network of more than 75,000 street and alley lights into energy-efficient LED bulbs and also upgrade and expand its Wi-Fi infrastructure and network. The Wi-Fi component of the project will add 239 wireless access points across the District, expanding broadband availability into areas of need within the District. The project is expected to reduce energy usage of the District's streetlighting system by 50%, as well as eliminate 38,000 tons of greenhouse gas emissions, while also supporting the District's Vision Zero campaign by minimizing outages and thereby increasing pedestrian and cyclist safety.

District of Columbia Housing Authority (DCHA)

In 2019, the executive team from the District of Columbia Housing Authority (DCHA) requested financial assistance from the District government for funding their substantial long-term capital needs to bring their housing stock back to a state of good repair. OCFO staff agreed to embark on a long-term analysis of DCHA's long-term capital needs and utilizing CARSS to help quantify their long-term funding gap. OCFO worked with DCHA staff to onboard an external consultant to conduct detailed Physical Needs Assessments that would be compatible with CARSS on each of the properties for which funding had not yet been identified. This subset of thirty-five properties, and all the pertinent asset data, is now included in the CARSS registry. OCFO staff further helped DCHA staff identify the properties in that portfolio with the most critical needs, which totaled seventeen specific properties, so that this information could be used to further refine their capital budget requests to the District.

OCFO staff also worked with the external consultant to create a sophisticated financial model to offer a third-party "verification" of the funding gap DCHA identified, including detailed analyses of each of the seventeen properties covered by its capital budget request. OCFO utilized CARSS and the separate financial modeling tool developed with our external consultant to provide a more detailed estimate on the overall cost to bring DCHA's entire portfolio of properties back to a state of good repair.

Summary and Conclusions

The District continues to have a sizeable amount of unmet capital needs, including deferred maintenance, that it cannot afford to fund in its 6-year CIP. The District, like every other state and local government in the nation, continues to face challenges in navigating these uncertain times driven by tightening monetary policy, supply chain disruptions, labor shortages, and other challenges, which could negatively impact the continued growth in District revenues.

The District's approach to proper asset management included the development of CARSS, which has resulted in all District-owned assets being inventoried, assessed (or in the process of being assessed), and all capital projects being ranked and prioritized in constructing its FY 2023-2028 CIP. The CARSS analysis highlighted a total capital funding need of approximately $14.47 billion during the 6-year CIP period. However, as is detailed in this report, not all capital projects or recommended maintenance needs can be funded in the District's 6-year capital planning period. The District's highest priority capital needs are funded in the FY 2023-2028 CIP at a cost of roughly $10.93 billion, however approximately $3.54 billion in capital needs require funding outside of the current CIP period. Approximately $1.45 billion of that unfunded amount, or around 40%, are related to maintenance of existing assets.

Though there is still work to be done, it is important to note that the District has made great progress in addressing its deferred maintenance needs. Through an increased focus on funding maintenance of existing assets, such as roads and sidewalks in the capital budgets, the amount of identified deferred maintenance has been reduced by roughly 26% from the amount identified in the initial Long-Range Capital Financial Plan report in 2016.

Despite e challenges, this report outlines that if the District commits to borrowing up to its statutory maximum level of 12% of general fund expenditures, as well as commits to increase pay-as-you-go (or cash) funding for capital to an amount averaging roughly 4% of the general fund budget, it can fund all deferred maintenance and new capital needs by as early as 2032. In other words, if 16% of the District's budget is committed to capital, with the remaining 84% spent on operations and programs, the District can have amongst the best funded and maintained infrastructure of any state or local government in the nation.

The credit rating agencies have taken note of the District's aggressive approach to identifying and addressing its deferred maintenance and critical infrastructure needs and cited it as one of the key factors in the ratings upgrades earned by the District in 2018. Any significant delays, or deviations, from the District's prescribed plan to address these critical infrastructure needs could potentially jeopardize the District's status as one of the highest-rated large cities in the nation. While the District has addressed its commitment to Metro through the establishment of new dedicated taxes for that purpose, aggressive outreach for non-traditional funding and project delivery approaches, such as public-private partnerships and asset recycling initiatives, should be prudently pursued to potentially provide additional sources of funding for other critical capital projects that might be outside the scope of available funding in the District's CIP.

PART III: Appendices

Appendix A

Approach to Developing the Capital Asset Replacement Scheduling System (CARSS) & Highlights of the FY 2023-2028 Analysis

Approach to Developing CARSS

In the attempt to develop a better understanding of the costs for the District of Columbia of maintaining its critical capital infrastructure, it was determined that there was a need to develop a comprehensive asset management plan for all the District's assets. The approach that was developed to address this need led to the creation of the District's Capital Asset Replacement Scheduling System, or CARSS. CARSS is a comprehensive asset management planning tool that was created by the District in conjunction with our software solutions partners at PowerPlan. In 2021, the District partnered with Arcadis Gen as the District's new software solutions provider for CARSS. The buildout of the new software system supported by Arcadis Gen is expected to be completed during the 1st quarter of FY 2023.

In developing CARSS, the District applied many of the key concepts and fundamentals of ISO 55000, which is the recognized international standard covering asset management, as well as concepts expressed in a 2015 report from the Institute of Asset Management (IAM) titled, Asset Management – an Anatomy *(version 3)*. While the District is not seeking, at this time, to have CARSS certified as ISO 55000 compliant, the Office of the Chief Financial Officer (OCFO) has had five managers – including our CARSS Project Manager – formally trained, tested, and certified as ISO 55000 professionals. The OCFO applied the concepts and fundamentals of ISO 55000 in our asset management approach initially, and we continue to use it for guiding principles as we refine and continue to improve our management of assets.

In developing CARSS, a critical first step was to create a centralized database, or data warehouse, of all District-owned assets and their respective condition, so that a calculation of the costs to maintain or replace those assets can be performed. This data warehouse provides a detailed inventory of all District-owned assets on an enterprise-wide basis. The District must have an inventory of these assets, and an understanding of the maintenance and replacement costs, at not just an agency level, but also at an enterprise-wide level, to have a full understanding of the scope of the challenge in financing the District's capital infrastructure needs. It is also worth noting that maintaining an asset inventory and conducting condition assessments are best practices in asset management promulgated by the Government Finance Officers Association. *A system for assessing assets is prerequisite to appropriately planning and budgeting for capital maintenance and replacement needs, in turn ensuring that assets are in conditions necessary to provide expected service levels.*[1]

Given the inherent complexities of this task, the process of developing CARSS, while being led by the OCFO, has been a collaboration between this office and the Executive Office of the Mayor. One of the first steps that occurred in this process was the creation of a steering committee to manage the development and implementation of CARSS. The steering committee was comprised of various members from critical agencies with expertise in capital planning, information technology and finance.

Recap of the District's Implementation of CARSS

Proof of Concept:

Development of the CARSS model initially began in June of 2015 with a Proof of Concept (POC) using three different asset types: fleet, facilities, and horizontal infrastructure. During the POC, information from three agencies that owned some of these three asset types were loaded into static

[1] Government Finance Officers Association, *Best Practice: Asset Maintenance and Replacement*, approved by the GFOA Executive Board, March 2010, and updated October 2017.

Retrieved from: https://www.gfoa.org/materials/capital-asset-management.

Microsoft Excel files. These agencies were the Office of State Superintendent of Education (OSSE) for the special education school bus fleet; District of Columbia Public Schools (DCPS) for school facilities and their construction; and the District Department of Transportation (DDOT) for their data on streets representing horizontal infrastructure assets. The POC was successfully completed in October of 2015, having confirmed that it was possible to create an asset replacement model across multiple asset types that would successfully predict asset investment needs, and develop annual budgets for an extended period of time. A status report on the successful completion of the POC was submitted to the Mayor and Council in October 2015, per a legislative requirement.

Development of a comprehensive "top down" 15-year capital financial plan:

Development of a robust asset replacement model entails calculating the needs from the "bottom up", individual asset by asset. This solution is neither quick nor easy to implement, therefore as an interim step, the process began with a focus on a capital projects' needs basis. Agencies provided their complete set of capital needs, project-by-project, for FY 2018 through FY 2023 as part of budget formulation in November 2016.

For the CARSS project data, the Capital Budget Team (CBT) carefully reviewed the submissions from agencies, along with those projects receiving budget in FY 2017, and created a file set of 508 current and proposed capital projects. These capital projects were carefully categorized into one of four different asset types: horizontal infrastructure, facilities (vertical infrastructure), fleet, and information technology and equipment.

Below is a breakdown of the various asset classes and some of the project classifications that were used in this phase of the CARSS project, along with some of the various types of attributes that are captured about each.

Figure 1

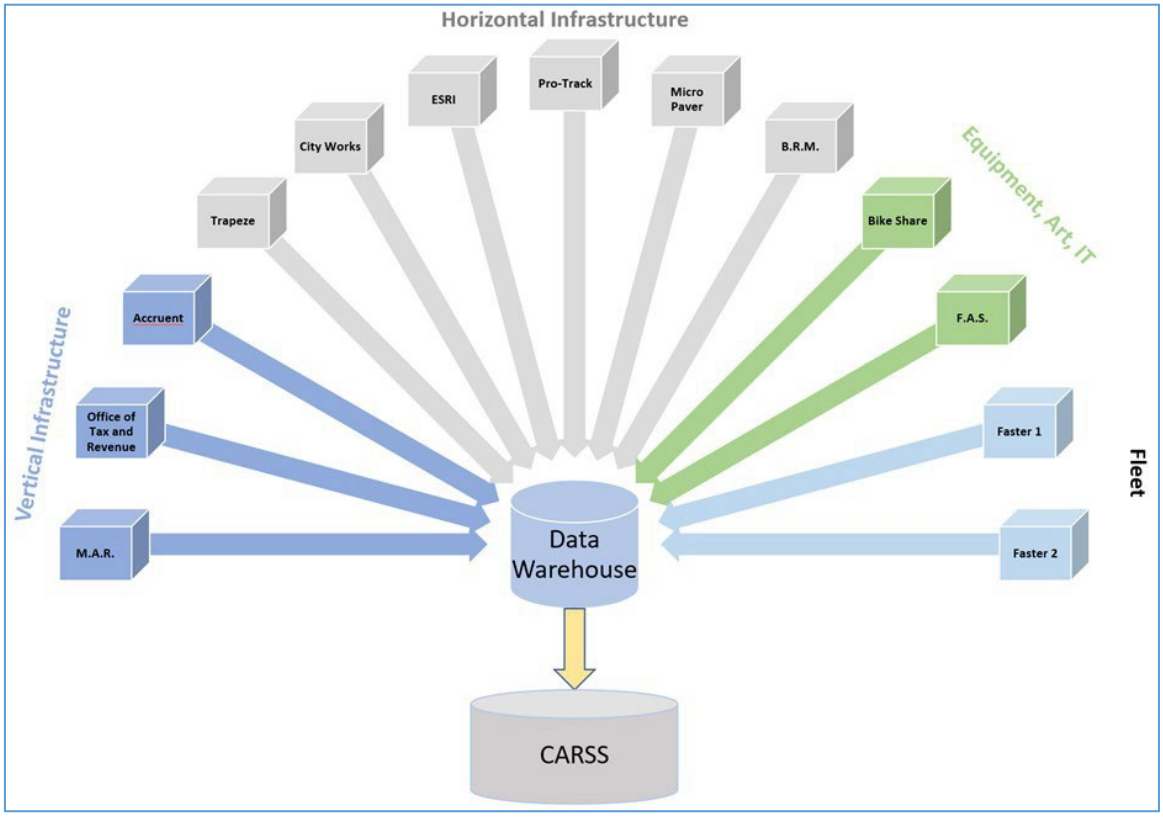
Asset Class	Asset Type	Asset Attributes
Horizontal Infrastructure	• Streets • Sidewalks • Alleys • Bridges	Length, Width, Age, Useful Life, Remaining Life, Current Condition, Name, Brick, Cement, Gravel, Asphalt.
Vertical Infrastructure	• General Support Facilities • School Facilities • Parks, Playgrounds, Athletic Fields • Public Libraries	Amenities, Substructure, Shell, Interior, Services, Equipment, Construction, SSL, Appraised Value, Assessed Value, Ward, ANC, Uniformat, Address, Lot Square Footage.
Fleet	• School Buses • Fire & EMS vehicles • Police Vehicles • Passenger Vehicles	VIN, License Plate, Make, Model, Year, Agency Owner, Useful Life, Current Age, Remaining Life, Maintenance Cost, Repair Cost, Warranty Cost, Milage, Engine Hours, Agency Owner.
Information Technology	• Computer Hardware • Software Purchase • IT Development • Communication Equipment	Communication Equipment, Audio Visual Equipment, date purchased, Purchase amount, replacement cost, location, agency owner.
Equipment and Art	• Bike Share • Equipment • Art • Furniture	Address, Count, Recreational Equipment, Laboratory Equipment, Fire Fighting Equipment, Communication Equipment, Machinery and Tools.

CARSS Full Implementation

Development of a Detailed "Bottom-up" Approach to Building the Capital Budget

While the top-down, capital projects-based approach was initially used, the development of a much more granular, asset-by-asset level needs assessment using data from the already existing data-bases across all District agencies has been completed. Thirteen different databases from various agencies that manage the District's assets feed information into a central data warehouse that is managed by the Office of the Chief Technology Officer. These data sources include the District's fixed asset system, the Master Address Repository and ESRI for GIS mapping, Office of Tax and Revenue for assessed value information, MicroPAVER for pavement management information, the Faster 1 and Faster 2 databases that house the District's fleet assets, as well as external data sources such as Accruent that house facilities condition assessment data, amongst others. This information is refreshed on a weekly basis, and the data needed for asset planning and management are pulled into CARSS for further analysis, as is illustrated below.

Figure 2



The bottom-up approach has been used for all horizontal infrastructure and facilities, including building system components in the FY 2023-FY 2028 CIP.

There are three distinct advantages of developing a "bottom-up" budget driven by individual assets in CARSS:

1. An alignment is created between asset and resource decisions to better meet strategic objectives

2. It removes subjectivity, and improves transparency, by using evidence and a common framework for prioritization

3. It enables the District to optimize constrained resources/budget with clear visibility into the impact of tradeoffs.

For the FY 2023-2028 capital budget formulation process period covered by this report, detailed, granular-level data was compiled for all District-owned assets in CARSS. This has given the District the ability to build its capital budget using a "bottom up" approach for all its assets, with the exception of equipment or fleet, which are not typically replaced at a component level. This approach synthesized the much greater level of detailed data now available on each of the District's assets into capital projects that correspond directly to the calculated need as determined in CARSS. This approach was used for all ongoing capital maintenance projects, as well as for all new capital projects for horizontal and vertical infrastructure. This approach was based on a scoring and ranking process for each new capital project to provide a reasonable estimate of all new capital project's needs. These estimates for new capital projects, as well as the detailed data for ongoing capital maintenance of existing assets represent all known capital needs of each agency. Those capital projects were then compared to the projects that actually received funding as part of the FY 2023-2028 CIP. The unfunded projects represent the extent of the District's capital infrastructure funding gap, as seen in the table below.

Figure 3: Infrastructure Funding Gap

Total Unfunded Capital Needs During the 6-Year CIP Period

(In $ millions)

Capital Project Type	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	6 year Total
Unfunded Capital Maintenance Projects	$169.2	$270.9	$265.1	$233.8	$261.8	$248.6	$1,449.4
Unfunded New Capital Projects	$298.2	$290.9	$389.7	$429.3	$381.9	$306.1	$2,096.1
Total Unfunded Capital Needs	**$467.3**	**$561.8**	**$654.8**	**$663.1**	**$643.7**	**$554.7**	**$3,545.4**

This more granular approach to asset data is only possible because of the comprehensive asset inventory that the District has built over the last several years. The table below *(Figure 4)* reflects all the District's assets, by category (horizontal infrastructure, facilities, etc.,) that are captured in CARSS and their value as reflected in the 2020 Comprehensive Annual Financial Report.

Figure 4: Asset Inventory

Assets and Their Value in CARSS

	Number of Assets *	Percentage of Total Asset Classification	FY 2021 CAFR Book Value of Asset Type ($000) *	% of Assets Captured
Horizontal Infrastructure				
Ramps	564	100%	3,871,501	100.0%
Service Roads	124	100%		
Streets (blockkey)	36,262	100%		
Sidewalks (blockkey)	47,184	100%		
Trails	90	100%		
Alleys (blockkey)	9,578	100%		
Bridges	371	100%	237,537	100.0%
Bikeshare Terminals/Racks	290	100%	13,755	100.0%
Street Car Rail (Track Segments)	41	100%	219,908	100.0%
Total	**94,504**	**100.0%**	**$ 4,342,701**	**100.0%**
Facilities				
Buildings	642	100%	8,041,903	100.0%
Building Components	187,584	100%		
Amenities (Pools, courts, Playgrounds etc)	568	100%		
Total	**188,794**	**100.0%**	**$ 8,480,882**	**100.0%**
Equipment and IT				
Fleet	5,734	100%	449,744	100.0%
Boats/Ships	27	100%		
Aircraft	2	100%		
Circulator Buses	72	100%		
Street Cars	6	100%		
Street Car System Equipment	143	100%		
Equipment (>$5K)	10,785	100%		
IT and Furniture	11,872	100%		
Total	**28,641**	**100.0%**	**$ 449,744**	**100.0%**
Land				
Land (count by parcel)	**4,214**	**100%**	**$ 1,028,470**	**100.0%**
Grand Total **	**316,153**	**100.00%**	**$ 14,301,797**	**100.00%**

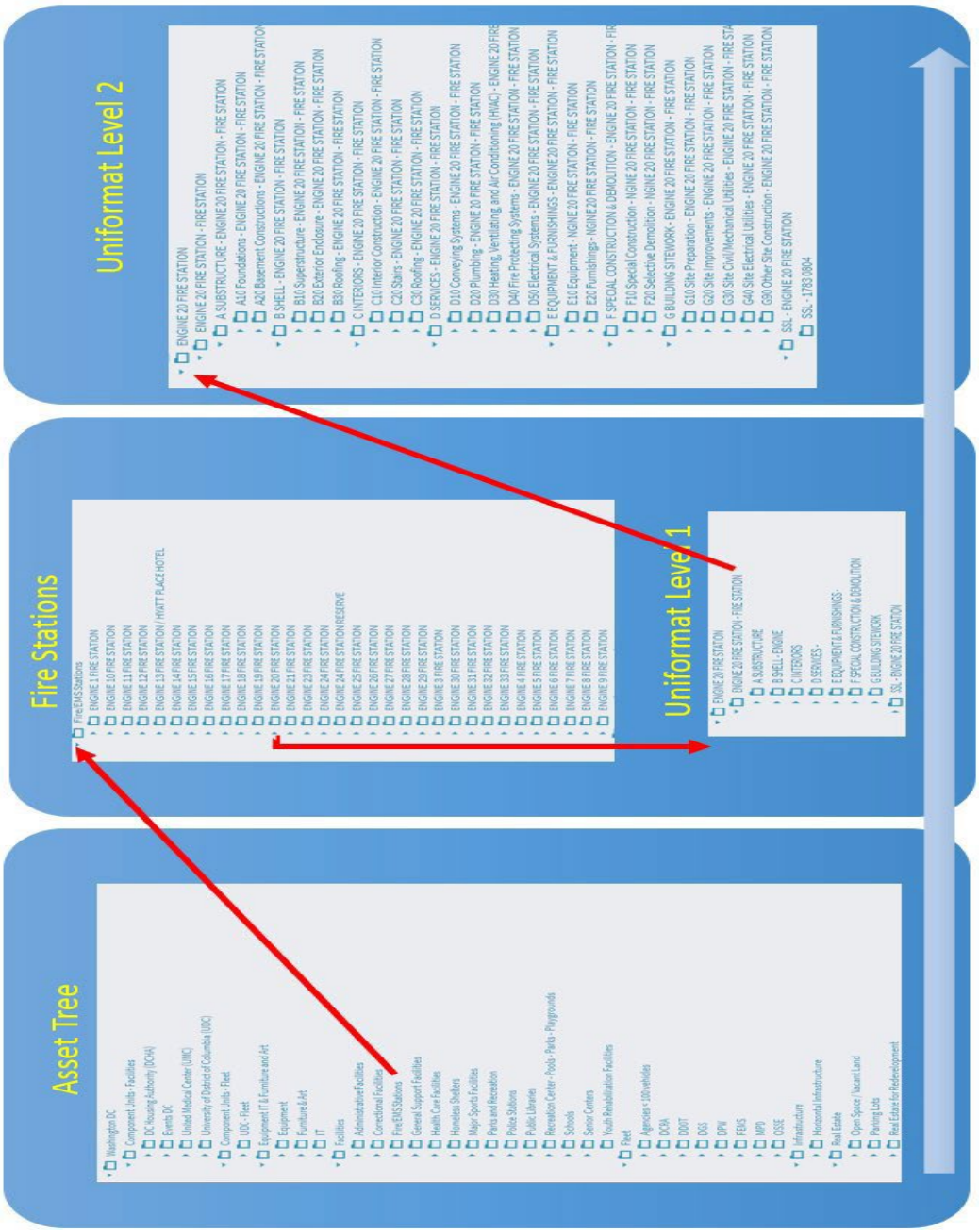
** Does not include construction in progress*

*** Does not include assets from the District's component units - UDC, DCHA, UMC, and Events DC*

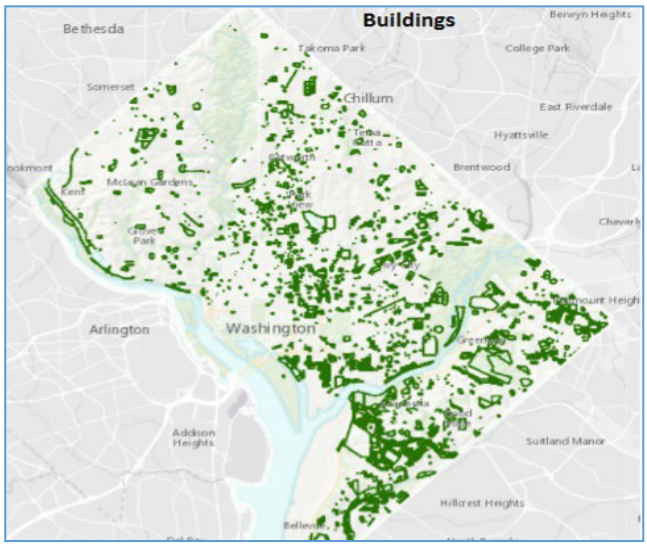
*** Streets & Sidewalks - Moved from street segments to a blockkey system

The “bottom up” approach enables the District to have data around each asset along with its current condition and cost for repair or replacement. The screen shot below *(Figure 5)* shows a portion of the asset tree structure used in CARSS to organize the asset-level data - using a fire station as an example of the level of asset detail that is currently available in the system. The data breakdown is based on industry standards, called the uniformat, and the District facilities are structured to the level 2 standards, which provides data around individual building system components.

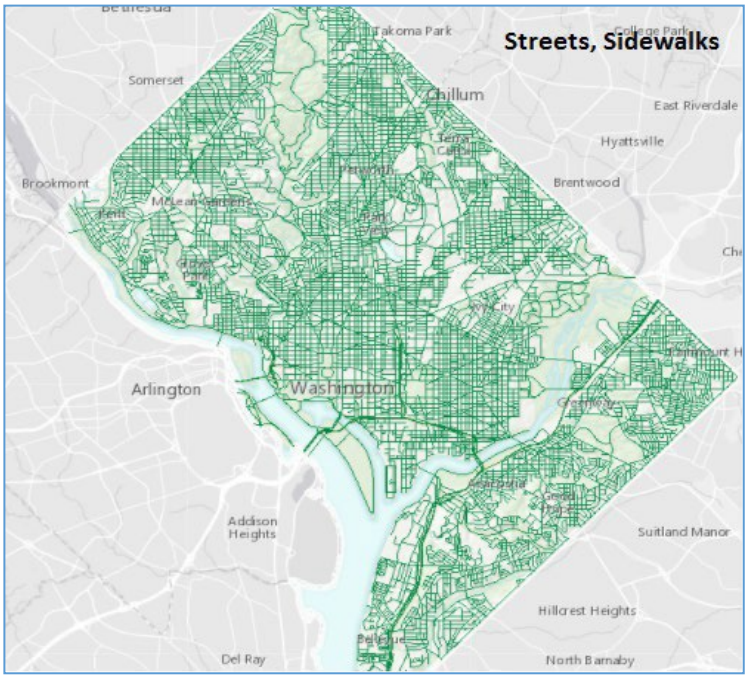
Figure 5: Asset Tree



GIS Capability



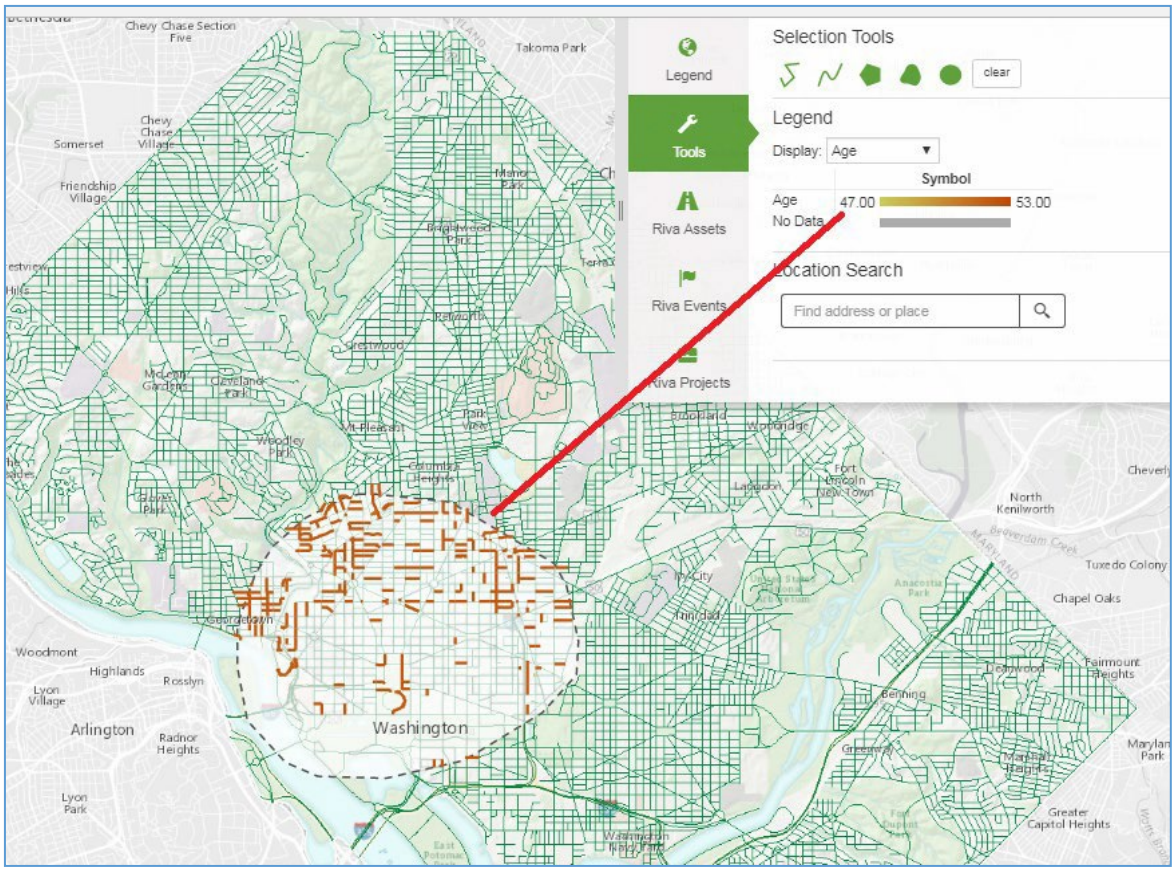
Information on the more than 640 municipally owned buildings within the District has been captured in CARSS and displayed in the related GIS system (see image, left). However, while data might have existed on the type, location and assessed value of a particular building, information on the current condition of the building, and its sub-systems, might have been missing or not up to date. DGS and its contractor have been performing facility condition assessments (FCAs) on all District- owned buildings with the goal of assessing each of them at least once every three years. The information from the FCAs is uploaded into the CARSS database, allowing for more accurate calculations of costs for repair and maintenance of facilities and their sub-components, such as roofs, HVAC, etc., thereby facilitating a more data-driven approach to building the capital budget for DGS. The additional building components/systems can be seen in CARSS and the current inventory now approaches 190,000 asset data points.



The District now has the ability to map all streets, service roads, sidewalks and alleys utilizing data in CARSS and GIS. In an example of this new ability, the image to the left illustrates all streets and sidewalks in the District.

More impressively is the ability of a user to now “drill down” on any portion of the map to look at a particular street and sidewalk segments. More specifically, as seen in the graphic below, there is now the ability to focus on just those segments that are in poor condition to help better prioritize those assets most in need of capital maintenance.

Local Streets GIS 'Drill Down'



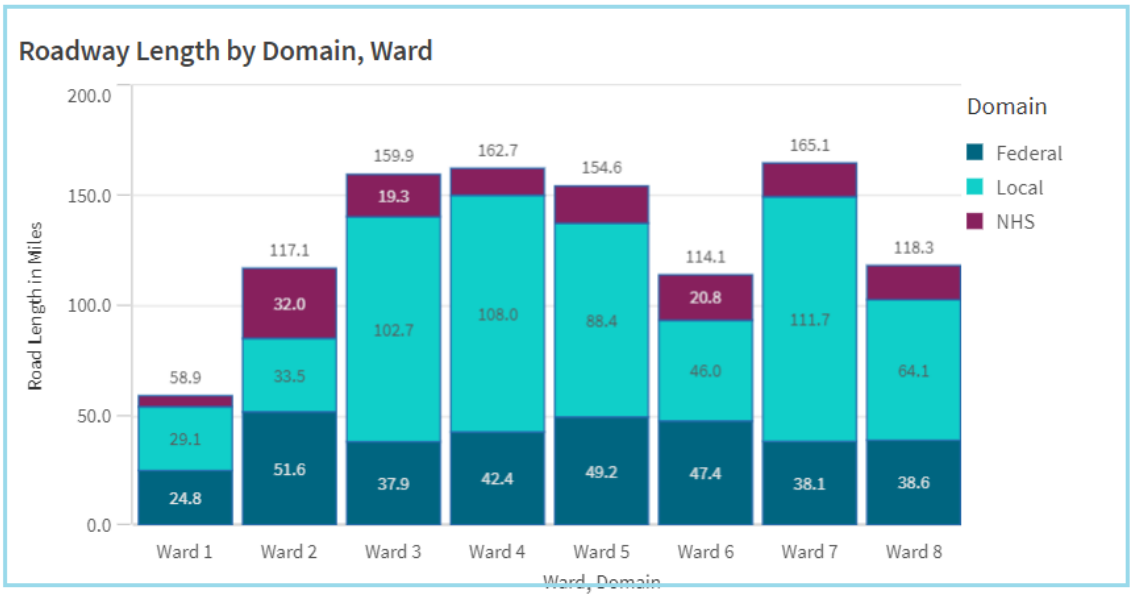
Enhanced Analytical Capabilities

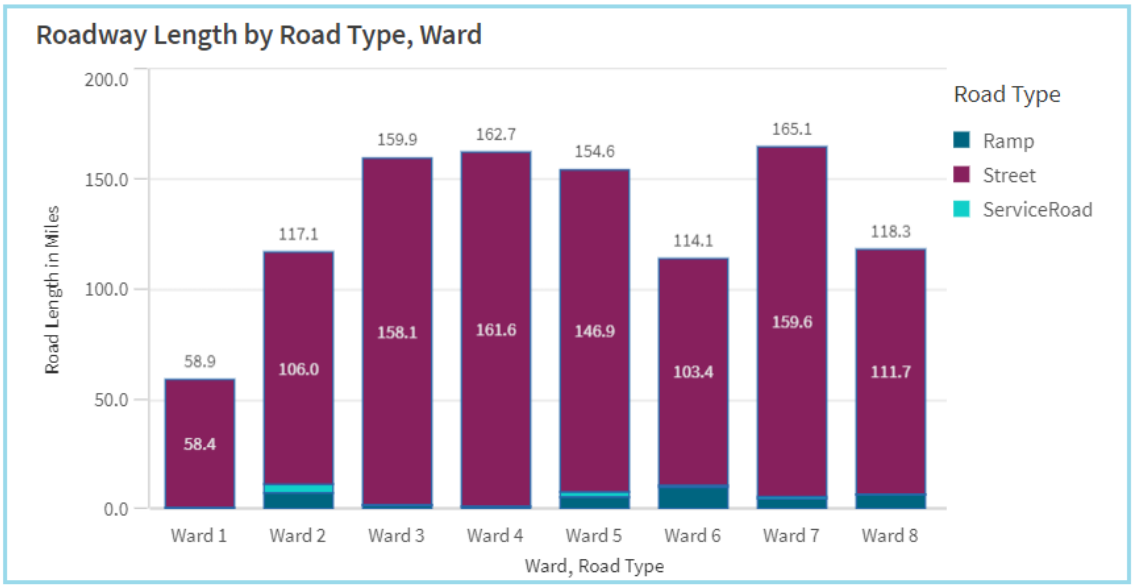
CARSS data has been enhanced to allow more user-friendly analysis and the capability to "drill down" on any asset type to get specific information on individual assets.

Local Roads Condition - Drill Down

For asset types where high-quality data already existed, such as streets and sidewalks with DDOT, the CARSS database, working with existing DDOT databases, provides a powerful tool to forecast capital needs more accurately for horizontal infrastructure. *Figure 6* below reflects the current total miles of all local streets and roads in the District, by ward.

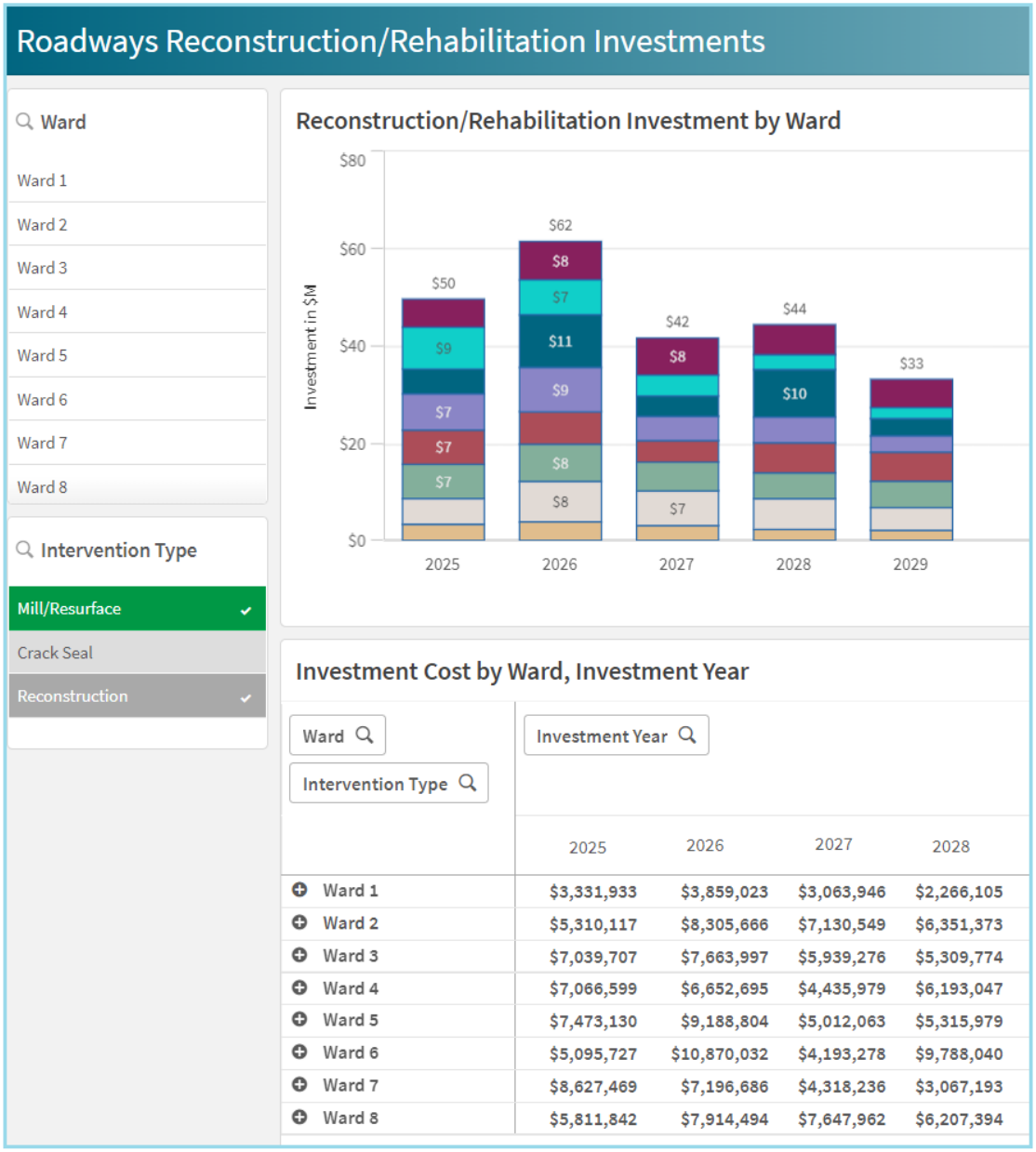
Figure 6: Local Roads – Mileage per Ward





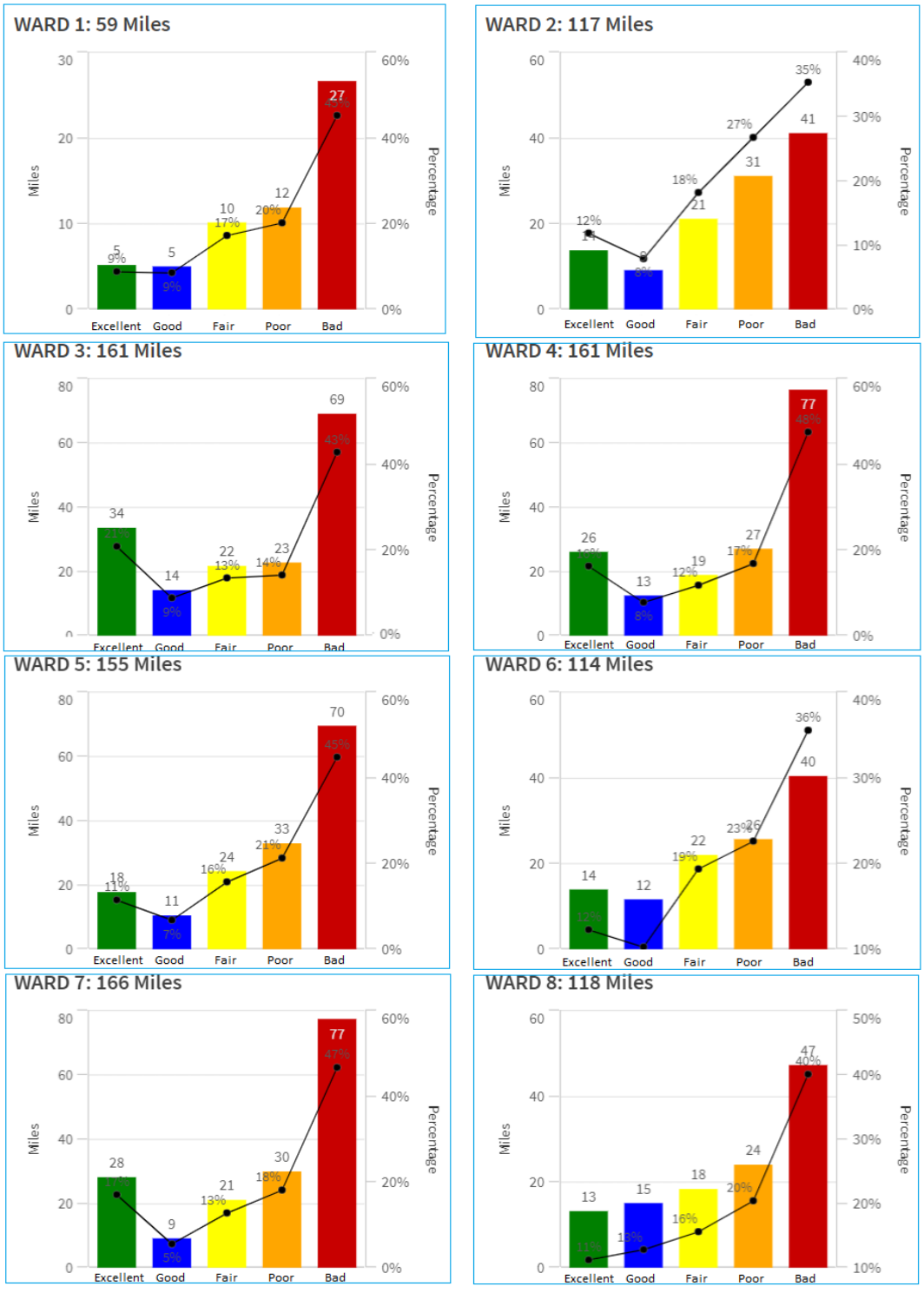
To further highlight the CARSS data and the value of enhanced analytics, *Figure 7* provides summary level details on the condition of various road types. This kind of data is critical in determining the costs and needed budget for maintaining roads across the District.

Figure 7: Road Surface Details & Replacement Costs



Further analysis can be done looking at the various road conditions by ward in *Figure 8* below. The data is presented to show the miles of roads – by condition – for each of the 8 wards. This serves as a guideline to determine what roads need the most attention and the number of miles – and thus cost – to perform the needed work. Combining this data with surface types enable DDOT to provide very good estimates on the needed budget and the number of roads that can be improved, by ward .

Figure 8: Local Roads Condition - by Ward



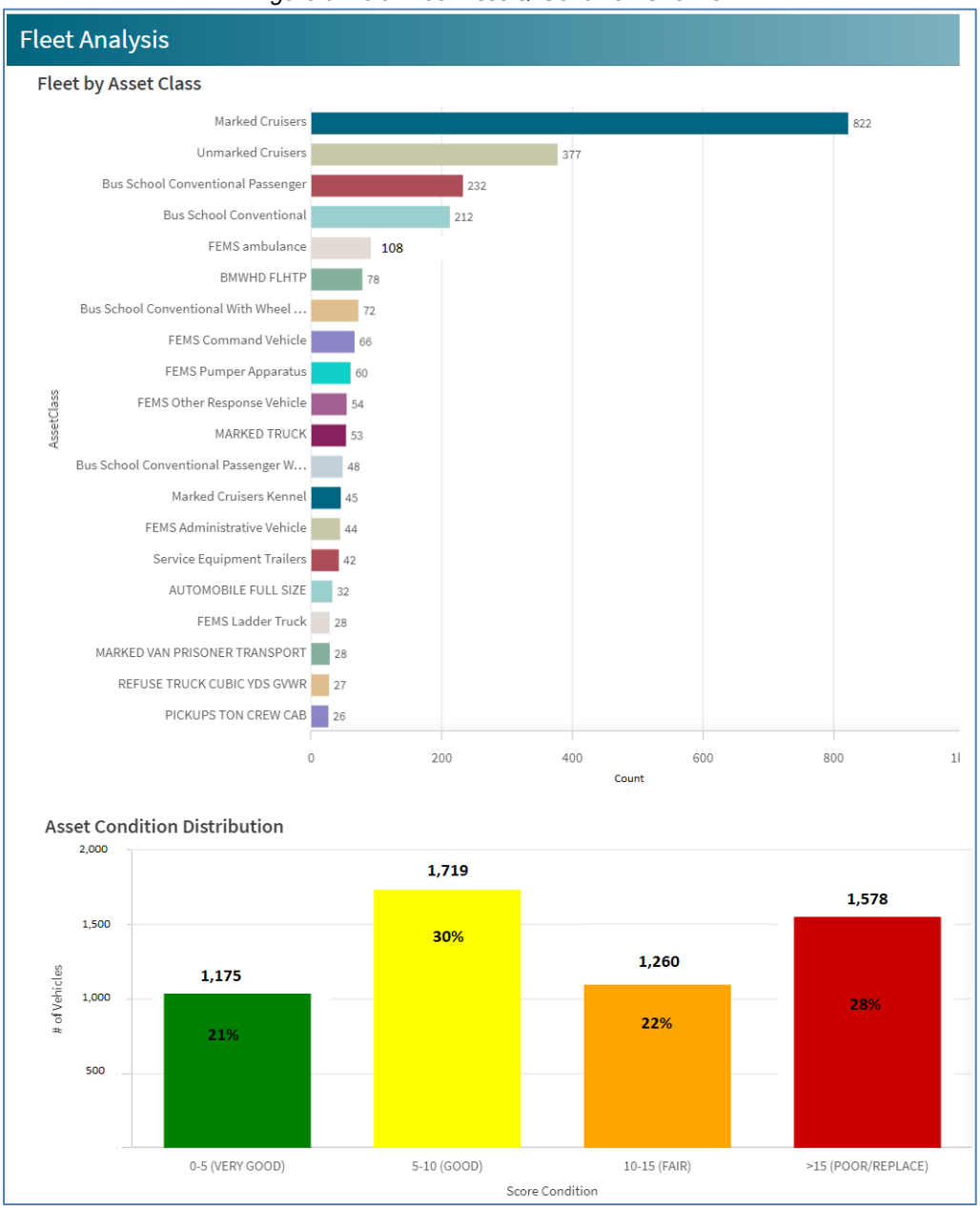
Drilling down further into the data will enable the user to ultimately see the specific information around any given block of roadway in the District. Individual asset information on roadway blocks is presented with a level of detail similar to the individual asset data for vehicles shown in *Figure 9* on page A-12.

Fleet "Drill Down"

When viewing all 5,734 fleet assets through CARSS and our enhanced analytics tools, it becomes quickly apparent that the District's rolling stock, or fleet, is procured and owned across multiple agencies; of which the key agencies are MPD, DPW, OSSE, FEMS and DDOT. The chart below *(Figure 9)* shows the current vehicle count for each of the major fleet owning agencies.

By drilling further into the data and using the tools available in CARSS, a user can graphically display not only the number of vehicles, but also the condition of the District's entire fleet of vehicles across all the owner agencies.

Figure 9: Total Fleet Assets/ Condition Overview

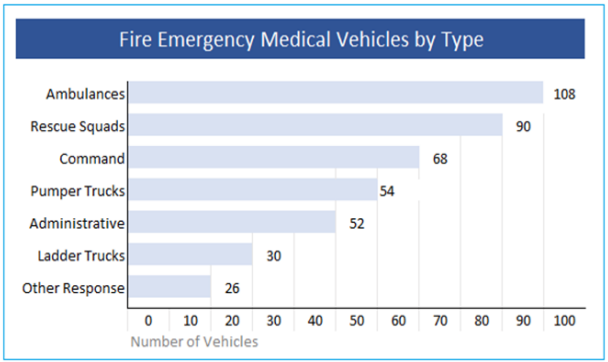


As the chart above shows 1,578 vehicles, or approximately 28% of the District's total fleet of vehicles, are currently in the '*Poor/Replace*' category, as determined by the assessment of a combined set of factors including age, vehicle mileage, maintenance costs, and engine hours.

Drilling down another level, the ability exists to focus on just the fleet data of a particular agency. As an example, the data shown below focuses on Fire and Emergency Management Services (FEMS) vehicles.

In *Figure 10*, the user can see data within FEMS at an even more granular level, by vehicle type, such as ambulances, command vehicles, ladder trucks, pumper trucks, etc. The data reflect not only the number of vehicles of each type, but also the average vehicle age by type, the overall maintenance costs by type of vehicle, as well as the total mileage by type of vehicle.

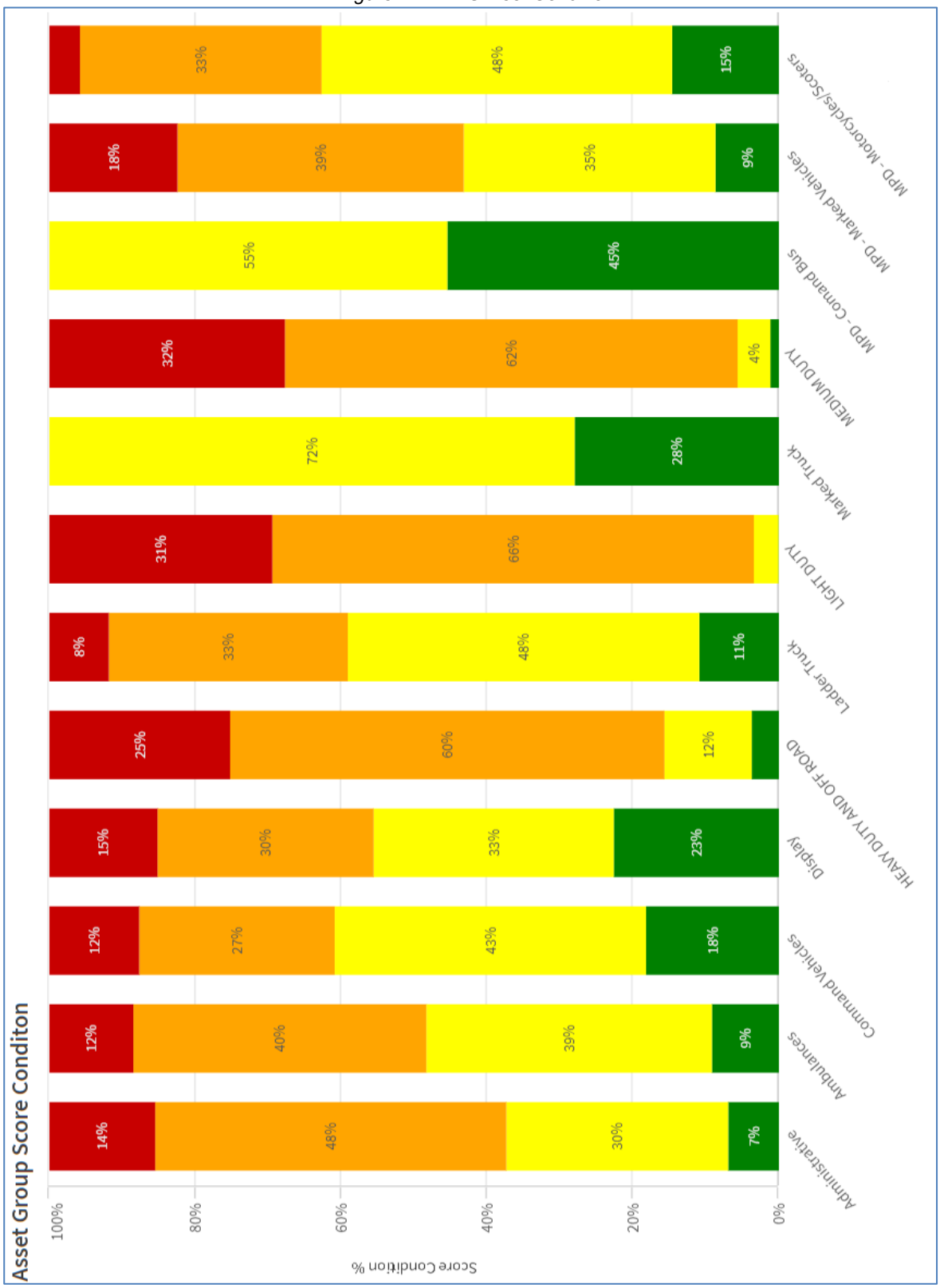
Figure 10: FEMS Fleet Data



Asset Type	Vehicle Count	Average Age	Maintenance Cost	Average Milage
Administrative	52	11.69	843,340	32,871
Ambulances	108	5.72	6,939,841	62,647
Command	68	5.74	1,175,870	28,827
Ladder Trucks	30	10.23	6,144,285	14,608
Other Response	26	20.57	573,719	5,941
Pumper Trucks	54	8.33	6,593,227	25,824
Rescue Squads	90	13.81	3,656,775	22,132
	428	10.87	25,927,057	192,849

As an example of the level of granularity that has been achieved, the District now has the ability to track the condition of the entire FEMS fleet by type of vehicle, as well as that of other fleet owning agencies, in a manner that is more easily understood by all stakeholders involved in the process of formulating the District's capital budget. The chart below *(Figure 11)* is the type of report that would be given to management at each of the agencies that own fleet assets, as well as to staff of the EOM, during the capital budget formulation process. This information allows the capital budget to focus more precisely on those assets that are most in need of replacement, and thereby directly addressing the District's most critical deferred capital maintenance needs.

Figure 11: FEMS Fleet Condition



The enhanced analytics tools allow users to drill down even further to review data around a specific vehicle type, such as pumper trucks (pictured to the right). From the graphic above, the data shows that there are 73 pumper trucks with an average age of approximately 10.9 years and maintenance costs approaching $10.6 million, the highest of all the vehicle types. The data further shows that there are 25 pumper trucks that are ranked in the poor/replace category based on various criteria that are measured, such as vehicle age, mileage, engine hours, etc.

This represents roughly 34% of the pumper truck fleet that needs to be replaced during the current CIP period. This more data-driven approach to analyzing which vehicles need to be replaced and when is used by FEMS in proposing their capital needs as part of the Mayor's overall proposed CIP.

The chart below *(Figure 12)* is a representation of additional detail obtained by looking specifically at the pumper trucks fleet. Data in the table is at an individual vehicle level and reflects additional data regarding make, model and age of the vehicle, the total maintenance costs to date, and total mileage (when last serviced) as an example of the level of detail available for each vehicle.

Figure 12: Pumper Trucks Data

ACQUIREDATE	CLASSDESC	MAKE	MODEL	YEAR	USEFULLIFE	Total Mainteanace
17-Jul-08	FEMS - Pumper Apparatus	SEAGRAVE	PUMPER	2008	120	498,389
14-Jun-11	FEMS - Pumper Apparatus	PIERCE	ARROW X	2011	120	411,150
1-Jan-05	FEMS - Pumper Apparatus	SEAGRAVE	TB40DA	2005	120	367,048
10-Oct-08	FEMS - Pumper Apparatus	SEAGRAVE	PUMPER	2008	120	351,911
1-Jan-05	FEMS - Pumper Apparatus	SEAGRAVE	TB40DA	2006	120	324,293
1-Jan-05	FEMS - Pumper Apparatus	SEAGRAVE	TB40DA	2005	120	322,256
1-Jan-05	FEMS - Pumper Apparatus	SEAGRAVE	TB40DA	2006	120	307,248
1-Jan-05	FEMS - Pumper Apparatus	SEAGRAVE	TB40DA	2006	120	298,542
1-Jan-05	FEMS - Pumper Apparatus	SEAGRAVE	TB40DA	2006	120	284,067
31-Oct-02	FEMS - Pumper Apparatus	SEAGRAVE	TB40DD	2003	120	281,370
1-Jan-05	FEMS - Pumper Apparatus	SEAGRAVE	TB40DA	2005	120	280,425
1-Jan-05	FEMS - Pumper Apparatus	SEAGRAVE	TB40DA	2005	120	280,256
1-Jan-06	FEMS - Pumper Apparatus	SEAGRAVE	TB40DA	2006	120	245,782
31-Oct-02	FEMS - Pumper Apparatus	PIERCE	DASH	2003	120	243,304
1-Jan-05	FEMS - Pumper Apparatus	SEAGRAVE	TB40DA	2006	120	239,446
31-Oct-02	FEMS - Pumper Apparatus	SEAGRAVE	TB40DD	2003	120	232,206
1-Jan-05	FEMS - Pumper Apparatus	SEAGRAVE	TB40DA	2006	120	230,413
31-Oct-02	FEMS - Pumper Apparatus	PIERCE	DASH	2003	120	230,360
1-Jan-05	FEMS - Pumper Apparatus	SEAGRAVE	TB40DA	2005	120	230,315
1-Jan-05	FEMS - Pumper Apparatus	SEAGRAVE	TB40DA	2006	120	228,690
14-Jun-11	FEMS - Pumper Apparatus	PIERCE	ARROW X	2011	120	225,519

Finally, our enhanced analytics tools allow users to drill down all the way into detailed data on a specific asset, by taking the user directly into the CARSS application, where the actual asset data is stored. The screen shot below *(Figure 13)* shows only a small sample of the data on this particular pumper truck that a user could access, including custom calculations on the estimated cost of replacement for this vehicle, when the replacement should occur and how much additional maintenance costs are needed to maintain the vehicle if replacement of the vehicle is delayed past the date recommended by CARSS.

Figure 13: Individual Asset Data

130 - 2000 SEAGRAVE TB40DD	Asset		
Name	130 - 2000 SEAGRAVE TB40DD	Rollup To	Pumpers
Asset Type	Pumpers	Active Date	00:00.0
Title	130 - 2000 SEAGRAVE TB40DD	Retirement Date	
Status	Active	Riva Asset Code	87953
Asset Details			
VIN	1F9EU28T4YCST2098	License Plate	GT4762
Make	SEAGRAVE	Model	TB40DD
Year	2,000	Organization	FIRE & EMERGENCY MEDICAL SERVICES (FEMS)
Class	7PFF	Class Description	FIRE UNIT, PUMPER
Lifecycle			
Useful Life	10	Current Age	17
Life Consumed (%)	170	Remaining Life	-7
Current Condition			
Inspection			
Inspection Date	10/16/2017	Rehabilitation Count (Initial)	0
Last Rehabilitation Date		Life Expectancy Hours	10,000
Life Expectancy Miles	150,000	Actual Reading Hours	0
Actual Reading Miles	97,478	Condition Factor	0
Inspected Condition Predictive Score	14.8		
Costing			
Replacement Cost ($)	788,648	Rehabilitation Cost ($)	
Inspection Cost ($)		Maintenance Cost	7,421
Repair Cost	144,202	Total Maintenance Costs	151,623
CapitilizedCost	309,177		

Measure Values

	2018	2019	2020	2021	2022	2023	SUMMARY
Age	0	1	2	3	4	5	
AdjustedAge	0	1	2	3	4	5	
Rehabilitation Count	0	0	0	0	0	0	
LIFECYCLE	2018	2019	2020	2021	2022	2023	SUMMARY
Condition	100	99.942	99.533	98.407	96.154	92.252	
Replacement Value	835,966.88	886,124.89	939,292.38	995,649.92	1,055,388.92	1,118,712.26	202,339,102.87
Cycle Count	1	2	3	4	5	6	
COSTING	2018	2019	2020	2021	2022	2023	SUMMARY
CAPEX	835,966.88	0	0	0	0	0	19,147,537.35
OPEX	0	0	0	0	0	0	0
Cost	835,966.88	0	0	0	0	0	19,147,537.35
Asset Value	835,966.88	835,480.188	832,059.679	822,653.836	803,816.29	771,196.931	
CONDITION SCORE PREDICTIVE	2018	2019	2020	2021	2022	2023	SUMMARY
Engine Hours Reading	0	0	0	0	0	0	
Engine Mileage Reading	0	12,378.159	24,756.317	37,134.476	49,512.635	61,890.794	
Predictive Condition Score	0	0.913	1.825	2.738	3.65	4.563	

Enhancements to CARSS

Substantial progress has been made in further enhancing and refining CARSS over the last several years, both in the number of assets included in the system, as well as in the quality of data on the individual assets inventoried. As was noted in last year's report, the District has already captured 100% of all District-owned assets in CARSS, as opposed to only 14% of assets that were inventoried in the system when the first report was released in 2016. At that time, it was understood that a greater level of detail on many of the assets would be obtained as condition assessments were performed. As more data points become available for many of the assets, and these components and sub-systems are captured and tracked in CARSS, the total number of assets in the system continues to increase. For example, the 2019 report showed a total asset count in CARSS of roughly 100,000 assets. As CARSS has been further refined over the past several years, and the quality of data has improved due to ongoing condition assessments, the asset count has now risen to over 316,000 assets. The asset count remained relatively flat as compared to the 2021 report due to the delay in obtaining enhanced facility condition assessments, however that is expected to change as condition assessments are received from the vendor hired by DGS to perform this work.

This more precise method of looking at these assets has not only increased the number of data points, but also the quality of the information overall. The ability to now isolate and inventory assets at a more granular level further increases the level of sophistication and utility of CARSS, allowing for more precise tracking of assets and planning in the capital budgeting process. The District now has the most comprehensive inventory of assets it has ever possessed, and certainly the most comprehensive asset registry of any state or local government in the nation. This will allow policymakers and the OCFO to perform much more detailed, and data-driven, capital asset planning for all future capital budgets.

In addition to those assets directly owned by the District, certain information of the assets of component units, such as the University of the District of Columbia and the Washington Convention and Sports Authority, have also been added to CARSS. In addition, the OCFO completed earlier this year a large-scale project to add the assets of the District of Columbia Housing Authority (DCHA), which is a separate legal entity, to CARSS as well. This project is discussed in more detail later in this appendix. While the assets of these component units are separately maintained and funded by those entities, and not from the District's general fund, their addition will allow for a more complete picture of the overall health of all of the District's assets.

Development of New Software Platform to Support CARSS

The District's desire to continuously upgrade and evolve many of the capabilities of CARSS, along with a change in the market focus of the original software vendor, PowerPlan, led the District to search for a new software partner to support CARSS. After an extensive search and procurement process the District selected Arcadis Gen to be its new software partner in developing a further enhanced version of CARSS. The asset management platform of Arcadis Gen will allow the District to build in powerful new features into this new version of CARSS that did not exist in the previous version of the system. It will allow for greater use of the system by end-users in the various asset-owning and managing agencies, thereby facilitating even greater user acceptance of the tool. The greatly enhanced data visualization and reporting capabilities alone will prove to be invaluable to not only the core CARSS team, but to all the agencies throughout the District that manage capital assets, as well as to budget staff of the EOM and the District Council.

Expanded Use of CARSS with the District's Office of Planning

In fall of 2020, the OCFO began working with the Office of Planning on an ambitious project to enhance inter-agency coordination of long-range infrastructure and facilities planning. This project, known as the Civic Infrastructure and Facilities Initiative (CIFI) is a multi-year effort to achieve a more coordinated, anticipatory, and data-driven approach for near- and long-range infrastructure and facilities planning in the District. CIFI serves as an opportunity to coordinate facilities and infrastructure planning across agencies, using a common set of assumptions about land use, growth forecasts, demographic shifts, and the needs and experiences of residents at various scales, including at a citywide, planning area and neighborhood level. CARSS, with its comprehensive asset database, along with its ability to forecast costs to maintain existing assets and construct new infrastructure, will be a critical tool in the CIFI project.

As an example, a key goal of the CIFI project is to support agency initiatives by looking for site locations and investment opportunities in specific areas and enhance adjacent projects. The CARSS process helps this initiative by providing data driven reports on the scoring and mapping of capital projects. CARSS produces project scoring reports based upon various elements to determine a ranking of capital projects from highest to lowest. Those projects not ranked highly enough are unlikely to make the CIP and are listed as unfunded capital needs. The CIFI team takes that list of unfunded capital projects to look for development and investment opportunities by bundling unfunded projects together. The CIFI team looks for potential synergies with certain unfunded capital projects that might serve multiple agencies, such as bundling certain unfunded agency-specific projects into one larger redevelopment project that could support multiple agency initiatives. These types of opportunities might be reevaluated as higher priorities in the capital budget, or potentially as opportunities for alternative funding mechanisms, such as P3s.

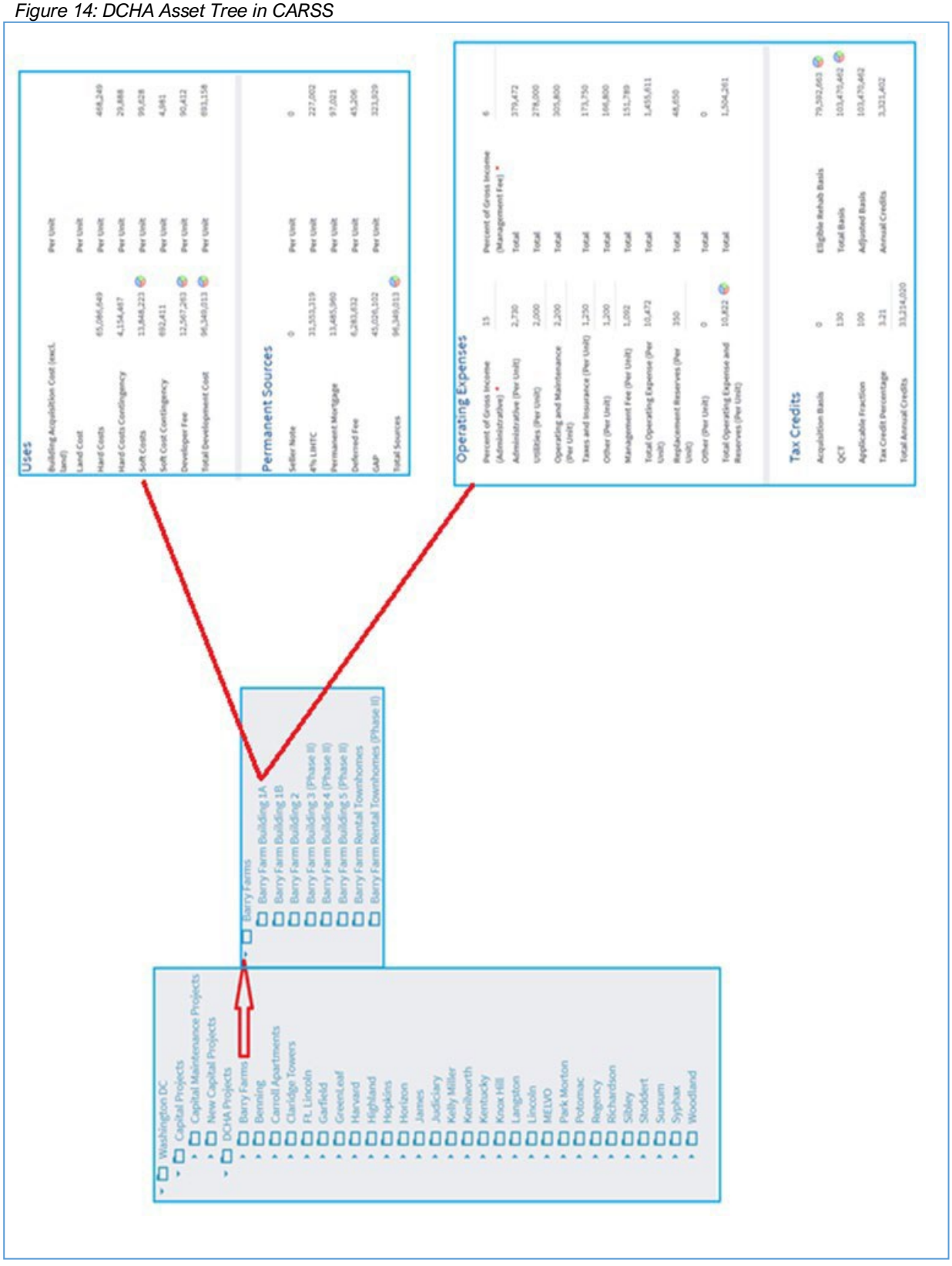
Expanded Use of CARSS with the District of Columbia Housing Authority (DCHA)

In 2020, the OCFO began a collaborative project with DCHA, which is a separate legal entity from the District, to embark on a large-scale effort to catalog and add all DCHA's housing stock assets to CARSS. The purpose of this project was to help DCHA better understand the true size and amount of its deferred maintenance and unmet capital needs. By utilizing CARSS, which is widely accepted throughout the District, DCHA will have now have a more authoritative basis for determining its true funding needs then previously existed. This will allow them to begin working on a long-range financial plan to return their housing stock to a state of good repair. The OCFO has built a separate asset tree within CARSS to house DCHA assets, not only at the level of public housing sites, but also for each building and individual housing units on that site, as well as all public areas, central HVAC plants, roofs, etc. The chart below *(Figure 14)* shows a representation of the DCHA asset tree as it currently exists in CARSS for the 35 public housing complexes evaluated as part of the physical needs assessment that DCHA's consultant completed, as required by the U.S. Department of Housing and Urban Development.

The chart below illustrates the housing complexes that are currently in CARSS. It shows the ability to drill down into each individual building that makes up that housing complex, as well as each individual unit within those buildings. Various types of units from studios/efficiencies and 1-bedroom up to 5-bedroom units, each of which are tracked separately. CARSS can also track the annual income and operating costs for each unit, and thereby calculate the funding gaps for each unit and building in each housing complex. Furthermore, CARSS has the ability to drill down into the various sub-systems of individual buildings, such as roofs, windows, doors, HVAC, common areas, etc., that allows for more precise tracking of critical assets and more data-driven capital planning.

CARSS can assist DCHA in developing and refining their long-term capital needs analysis to bring their housing stock back to a state of good repair by building on data obtained from physical needs assessments and energy audits conducted by the Authority's consultant on each of its properties.

Figure 14: DCHA Asset Tree in CARSS



Appendix B

Methodology for Classifying and Scoring Capital Projects

Methodology for Classifying and Scoring Capital Projects

Project Classification

After all agencies of the District of Columbia formally submitted their capital projects, and the Capital Budget Team (CBT) reviewed and made adjustments to them, the total number of capital projects with requested budget needs stood at 327. This set of projects went through several progressive actions to better refine and assess the total capital needs of the District.

After defining the categories and classifications of all projects within the four asset types; Horizontal infrastructure, Vertical infrastructure/buildings, Fleet, and Information Technology and Equipment, all capital project requests were then re-examined placing them into one of two groups based on their need for capital investment. The first group of projects consists of what are called "new capital projects." This group is characterized by the fact that the project is essentially a one- time investment that either expands or establishes a new service for District constituents. For example, projects to build a new swimming pool, completely modernize a school, or to invest in an extension to the streetcar line are examples of projects in this grouping. These projects receive budget a single time, perhaps over multiple years during construction, and are then placed into service without a specific continuing capital investment need.

The second group of projects are called "capital maintenance projects," and are comprised of those projects where a continued capital investment must be made in the asset. These projects can generally be thought of as the necessary investment in capital maintenance of existing assets that are already owned by the District. It is important to note that these are qualified capital expenditures, not the routine operating and maintenance costs, of capital assets. Capital projects such as public safety vehicles, sidewalks, information technology upgrades, and roof or HVAC capital repairs to buildings are examples of these types of projects. These projects require periodic investments of capital in order to maintain them in a good working condition, or otherwise replace the assets at the end of their useful lives (i.e., vehicles). Without these periodic capital investments, the assets will deteriorate, costing significantly more in annual maintenance costs, and will eventually fail completely requiring a much larger capital investment to replace the asset.

There are numerous examples in our region of this kind of asset failure due to lack of adequate investment in capital maintenance over the years. High profile examples of this inadequate capital maintenance can be found at the federal level with the Arlington Memorial bridge, at the regional level with the well-chronicled troubles of the Metro system, and at the local level in the failing state of the District's Henry J. Daly building. The most notable example of failed capital asset maintenance in the area was probably the poor state of repair of schools' facilities in the District until about FY 2008, when the District began to spend billions of dollars over several years to repair and rebuild its school facilities. It can be argued that if an adequate amount of funds had been provided to maintain school facilities in the past the facilities might have lasted for several more years, and thereby decreased the amount of funding dedicated in the CIP for the requirement of their total replacement.

Based on project types, categories and classifications, the CBT then used the established accounting standards for expected useful life of assets, and components, that make up the proposed project and thus the amount of estimated budget the project will require over any number of years. For example, we know that a typical administrative vehicle (with normal expected use) must be replaced every seven years. The CBT applied adjustments needed to the agency requested project budgets to reflect any missing needed investment over the useful life of the asset, and beyond. The budget needs are also inflated by three percent (3%) annually (compounded) to better reflect a degree of cost inflation. For schools building projects, costs are inflated at a higher rate given what we know are current construction bids, the cost increases year over year, and trends in the industry.

Capital projects were then further reviewed to identify if they should be considered as either 'pooled' projects, or potential public-private partnership (P3) opportunities. Pooled projects are used where there are known capital investments of a specific type (roofs, electrical systems, HVACs, etc.) that must take place across several agency assets, but where the specific locations and/or costs are not yet identified.

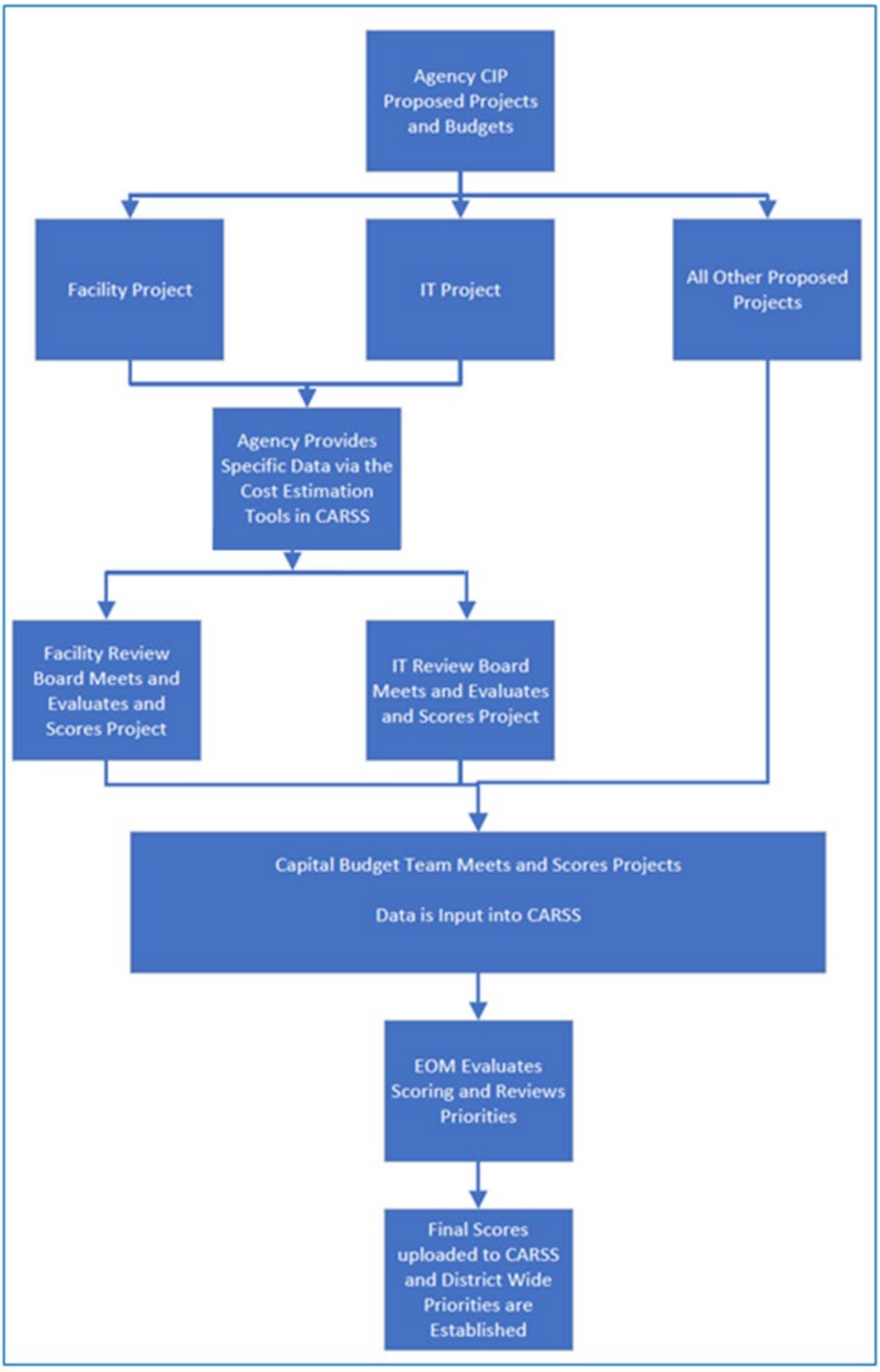
The Mayor's Office of Public Private Partnerships reviewed all projects for their potential as a P3 opportunity. They scored the opportunities on a scale of "0 to 4" where zero reflects no opportunity for the project to be structured as a P3, and "4" representing a very high probability of a P3 opportunity. The data identifying the pooled projects, as well as the P3 potential scoring was entered in CARSS. This data will enable us to better identify the characteristics of certain capital projects and will help us evaluate the potential need for funding and budget where partial funding can be obtained outside of direct District resources.

Project Scoring

To provide better insight and perspective of agency proposed capital projects, three Internal Review Boards ('IRBs') were established as part of the project budget evaluation process. The IRBs reviewed proposed capital projects in three distinct areas; 1) facilities, 2) information technology, and 3) all other capital projects, which encompassed amongst other items, horizontal infrastructure, and fleet. The objective was to provide greater expertise around these particular asset types as a part of the formal evaluation, scoring, and ultimately ranking of these proposed projects for the District. The IRBs were each comprised of nine individuals with subject matter expertise and were headed by a chairperson to provide coordination and communication. The IRBs each met multiple times and used input from the CARSS cost estimation tool set, as provided by agencies as part of their budget request, on which to evaluate and ultimately score the respective facilities, IT, or other proposed capital projects. The IRBs then each met with the Mayor's Office of Budget and Performance Management to formally present their findings and recommendations prior to the start of the CBT review process. The scores then became formalized as a part of the overall CBT scoring for each proposed project.

The process from initial agency submission of proposed projects, the cost estimation process and the work of the IRBs and CBT is shown in the following diagram.

Figure 1



To properly score projects as objectively as possible a mechanism was designed to assist with the process. The tool provides a set of 14 different elements against which projects are individually evaluated. Those elements were then grouped into 3 sections to evaluate the benefits, assess the potential impacts, and determine the extent to which a proposed project would meet District policy priorities.

The scoring criteria for each element was then assigned a weight to ensure that any proposed project received a fair and unbiased score when compared to other projects. In other words, the element weighting "level-sets" projects on the same scale to ensure that a well-defined, proposed new school project receives a similar score to a project to replace HVAC systems in 3 libraries, or a project to upgrade IT software. Thus, a project that maximizes benefits, provides positive impacts to the District, and aligns with priorities, would receive a score of 100 points, regardless of the nature of the project or the asset being acquired.

Actual project scoring is done by the CBT and is simply a matter of assigning each element that the project impacts a score from 1-5. A score of 1 representing that the project only impacted that element minimally, while a score of 5 means the project impacts that element significantly. We have also added a set of more objective criteria to the potential scores to ensure a more common and consistent interpretation of the criteria across projects.

The weighting factors are then automatically applied to the CBT given score in the CARSS application. There is also a set of 12 additional sub-elements that are key priorities. Any project that meets one of those receives a bonus of 5 additional points. The scores from the facility and IT boards are added, as is the 'project importance' score by the Mayor's budget team. The scores in each section are then totaled to determine the overall project score. The scoring initially performed by the Capital Budget Team members and is then reviewed several times to ensure consistency across all proposed projects and District priorities. These scores thus provide the basis for the ranking done in CARSS to determine the priority order of all projects proposed.

The detailed scoring criteria used for all capital projects can be seen on the following charts.

Table 1

Ranking Criteria for Proposed Capital Project Enhancement Budgets

FY 2021 - FY 2026

Agency	Total Cost	*Project Alignment with District Policies*			Evaluation Score	Multiplier	Priority Score
Project		How supportive is the project on a scale of 1-5?			Bonus = x		
Meets District Policy Priorities	Project Examples	1 =	3 =	5 =			
Improve Outcomes for Children and Youth	* Educaion * Public Safety * Playground	Improvements to existing building system (Public Safety and/or Education ONLY)	Expand Existing Asset and renovate facility	creating a new facility	0	5	0
Expand the availability and affordability of high-quality childcare.	* Child Care	If the project provides child care - X = bonus					0
Address the needs of communities and individuals most impacted by violence.	* Ambulances * MPD Vehicles	If the project provides public safety vehicles - X = bonus					0
Expand opportunities that will further close the K-12 achievement gap school modernization.	* Pre-K * School Modernization	If the project provides new Pre-K classroom or is a full school modernization - X = bonus					0
Increase Prosperity across all 8 Wards	* Community (Homelessness, Housing, Employment) * Health	Improves some services offered beyond current levels	Improves current facility - but does not create new employment	Creates New Facility and jobs when project is complete	0	5	0
Expand efforts to produce, preserve, and protect affordable housing.	* New Communities	If the project provides direct support for 'new communities' - X = bonus					0
Reduce health disparities with a focus on health equity.	* Healthy Living	If the project provides improved health care - X = bonus					0
Continue efforts to make homelessness rare, brief and non-recurring.	* Wellness Centers	If the project provides support for homelessness - X = bonus					0
Put more DC residents on a pathway to the middle class.	* Libraries * Recreation Centers	If the project provides some form of economic growth toward the middle class- X = bonus					0
Enhance DC government services	* Transportation * Good Government * Mobility Infrastructure * Facility Renovation * Security Enhancements	Provides some Infrastructure improvement or, some customer service improvement	Improves infrastructure or significantly improve customer service beyond current levels	Creates new horizontal infrastructure asset	0	5	0
Strengthen the DC transportation and mobility infrastructure and experience	* Local Road Rehab * Pedestrian, Bike or Public Transit * DDOT Fleet	If the project provides improved transportation - X = bonus					0
Take the DC government customer service experience to the next level.	* Smart City - DC Net, GIS	If the project provides improved customer service - direct to citizens - X = bonus					0
					Subtotal =		**0**

Table 2

Ranking Criteria for Proposed Capital Project Budgets – Continued

Agency	Total Cost	*Project Alignment with District Policies*			Evaluation Score	Multiplier	Priority Score
Project		How supportive is the project on a scale of 1-5?			Bonus = x		
Cost-Benefit Factors	Project Examples	1 =	3 =	5 =			
Readiness (catalyst project, implements Small Area Plan, etc.)		Good project but still needs more planning around accurate budgets, spending and PM	Well planned with appropriate budget and spending levels to be successful	Well planned project, with designated PM, correct budget and spending plan AND, ties to District Comp/Trans plans	0	5	0
Impact on Operating Budget	*(After Purchase or Completion)*	Increases operating costs	Has no Impact on operating costs	Lowers Operating cost after implementation	0	5	0
Potential to Generate New Revenue/taxes for the District		When complete, could generate some increase of revenue/taxes	When complete, WILL generate some increase of revenue/taxes	When complete, at least 50 % of the additional revenue generated would be reinvested in CIP	0	5	0
Potential for Economic Impact through Job Creation		When complete, could create additional employment opportunities	When complete, WILL generate additional employment	When complete, will create employment - at least 50% of which will be for District residents	0	5	0
					Subtotal =		0
Project-Specific Criteria	Project Examples	1 =	3 =	5 =			
Health and Safety Improvements	(Not for new buildings or renovations)	Has positive impact on specific user groups/citizens	Significant Improvement to end users/citizens	Legally required improvement	0	5	0
Federally Required Mandate		Must be completed - but no time frame given	Must be completed between 2-5 years	Must be completed in the next 2 years	0	5	0
Reduces Environmental Impact		Reduces energy consumption below the level used prior to placing the new asset in service	Facility is LEED Certified	Reduces total Environmental footprint by 30% from prior use	0	5	0
Extends Useful Life of Asset receiving the budget		Extends the useful life of the asset receiving the budget > 2 years and <5	Extends the useful life of the asset receiving the budget > 5 years and <10	Extends the useful life of the asset receiving the budget > 10 years	0	5	0
Equipment & Vehicles		Improves comfort	Improves Service	Life Safety Improvement	0	5	0
Enhances Security & Public Safety		If the requested budget completes a project started in a prior CIP = bonus points					0
Closes Out Existing Project		If the requested budget completes a project started in a prior CIP = bonus points					0
Leverages External Public or Private Investments		If the requested budget is a P3 Opportunity = bonus points					0
Master Project		If the requested budget is for Master Project = bonus points					0
Equipment and Systems Improvement		Improves comfort	Improves Service	Life Safety Improvement	0	5	0
					Subtotal =		0
Investment Review Board							
Facility Investment Review Board		(out of one hundred)			0	0.1	0
IT Investment Review Board		(out of one fifty)			0	0.5	0
Project Importance		OBPM to Score			0	7	0
			Subtotal =				0
			Overall Score				**0**

Appendix C

Overview of How
Capital Projects Were Prioritized

Overview of How Capital Projects Were Prioritized

Once sufficient details outlining the nature and structure of needed projects and their budgets existed, the next task was to determine an objective approach to prioritize the 327 proposed capital projects, since there was likely no possibility that all of the capital needs could be funded in the current CIP. The CARSS model will ultimately analyze this at an asset-by-asset level by evaluating the relative risks to the District of deciding whether to fund certain capital projects.

One ranking mechanism that was considered was to establish District priorities by asset type, classification, or category. However, this approach does not allow for an objective comparison of different asset types against each other. For example, given scarce funding resources, how should the decision be made to objectively compare the relative importance of an emergency vehicle versus a school facility versus I.T. equipment? It was determined that a better approach would assess each project on a stand-alone basis, and its relative importance for funding versus the other 327 projects, to ensure that a project to repair an HVAC system in a school was scored on a level playing field with a new accounting system, as an example.

Using the standard system of scoring projects that was established (see Appendix B), the Capital Budget Team (CBT) and other subject matter experts spent time over several weeks to individually score each of the capital projects. The scores of individual projects were reviewed several times to assess consistency and a genuine sense of logic, and to ensure they were as objective as possible. The criteria and the scores were then applied to the CARSS model, which created a project ranking from 1 to 327. As we complete the asset-by-asset driven model, an assignment of risk will also be created using a variety of different factors. In the interim, we are using the scoring as the proxy for risk at a project level. The logic is that the higher the score assigned (or 'level of importance'), the greater the risk to the District for not funding that capital project.

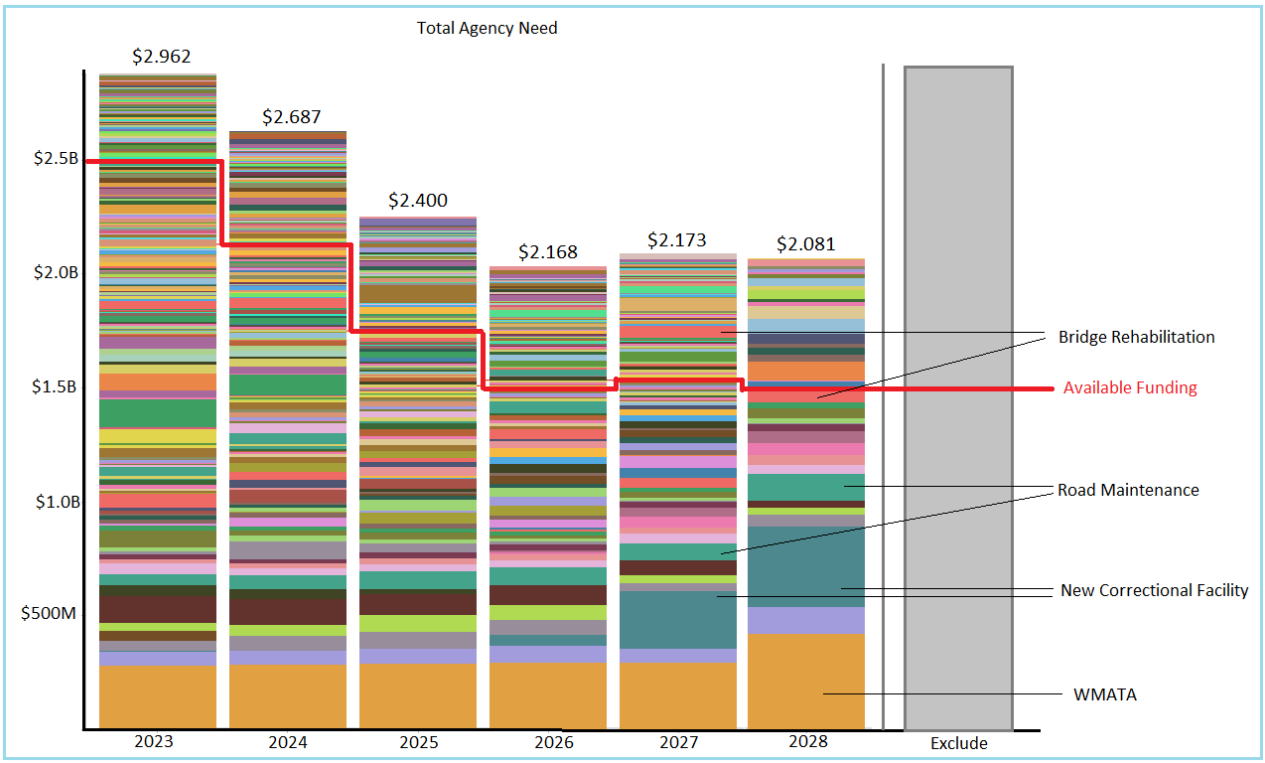
In addition to scoring by IRBs for facilities, IT and other capital projects, and the CBT, agencies also ranked each of their proposed capital projects in order of the agency's priorities. This enabled the CBT to better coordinate final decisions for capital projects which were scored similarly by the CBT, serving as a tie breaker based on their relative importance to the various agency needs.

The data load into CARSS included the proposed funding source (debt, paygo, rights-of-way fees, federal budget, etc.) of each project, for each year of the six-year CIP period. Available budget totals based on the District's borrowing capacity and the approved financial plan are also fed into CARSS by year and by funding source. Thus, the capital projects can be segregated by funding source and type to better ensure that the proposed budgets match the revenue and funding available.

The result, at this phase of the process, provides a priority scoring of all projects that can be funded within the budget constraints of the District, in any particular year. CARSS provides a mechanism (called a "visual leveler") that allows users to see a graphic representation of all capital priorities and budget constraints and determine a measure of risk to the District.

The following screen shot of the visual leveler shows all the capital project requests from the various agencies as part of the FY 2023 – FY 2028 CIP budget formulation process, relative to the amount of funding available, represented by the red lines.

Figure 1

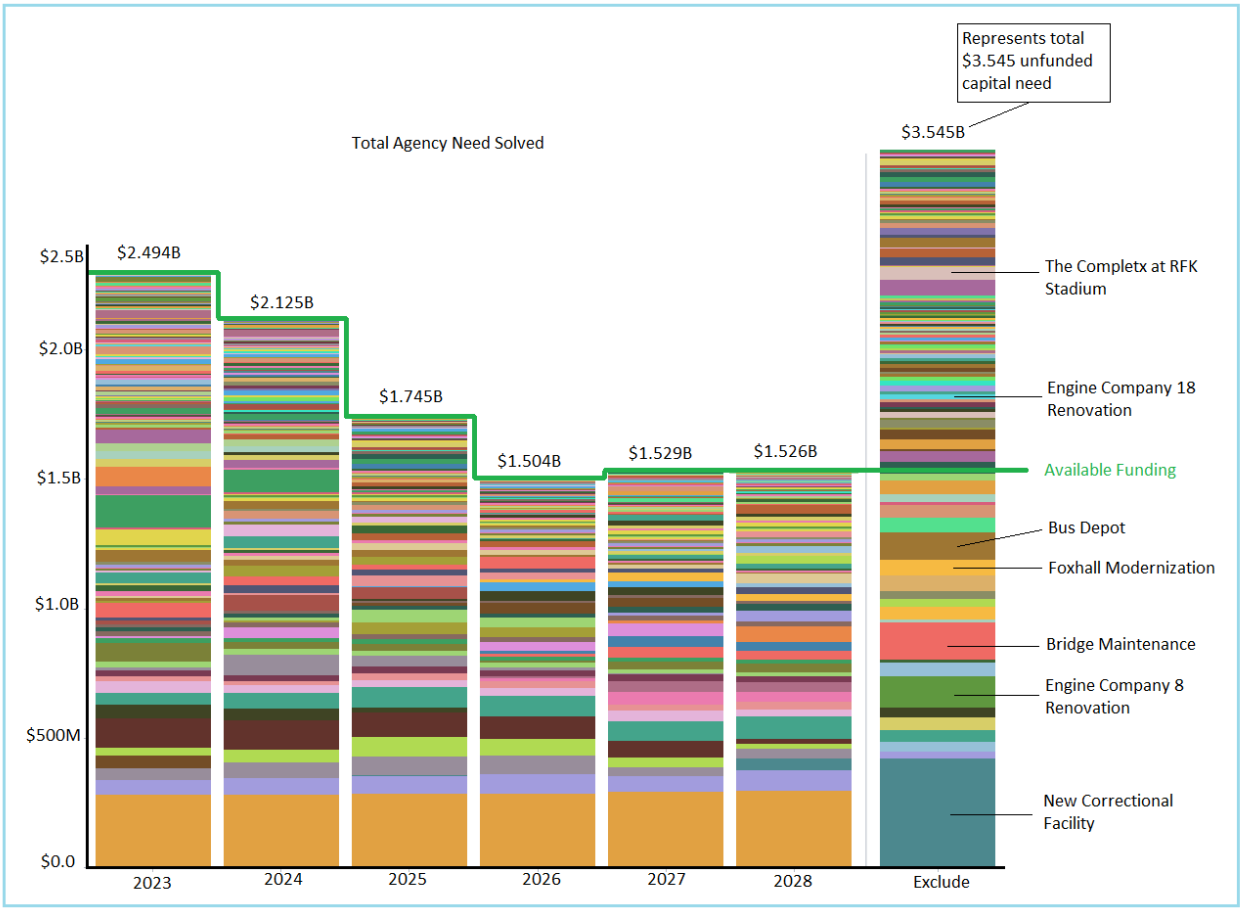


The visual leveler then enables certain administrative users to maneuver the priority of individual projects by year in an attempt to determine a set of projects that can fit within the resource and budget limits for any particular year. The scenarios are captured with the results reflected in each year's set of projects, and in summary as a change to the District's risk factor. Authorized users can propose and save different scenarios for further discussion and analysis.

In addition to allowing individual projects to be maneuvered by year, the visual leveler in CARSS will also automatically solve the funding problem using a combination of project scoring, risk, and budget limits to optimize the decision of which projects to fund in any particular year, and which projects will have to be excluded given budget limits. The optimization is captured both project- by-project, and year-by-year.

Below is a screen shot of the District's capital projects budget needs after running the solver (optimization) function.

Figure 2



After utilizing CARSS to optimize project priorities for the CIP period, capital projects that did not have a sufficiently high priority, as well as those that had to be deferred were placed in the "excluded" column on the far right of the chart. This data was then extracted and used to determine the identified gaps in budget needs year-by-year. The Capital Budget Team then conducted another detailed review and scrubbing of the remaining, unfunded, or underfunded capital projects, along with identifying which of these remaining projects had a high potential to be structured as a P3. This resulted in a remaining total of 177 capital projects with verified budget needs that reflected true unfunded capital projects of the District. This set of projects, which spanned across all four areas of categorization (i.e., facilities, horizontal infrastructure, fleet, as well as IT and other), defines, at this point in time, our best estimate of the total unfunded capital needs of the District, and the financing challenge that needs to be addressed outside of the current CIP period.

The CARSS analysis does not exclude those capital projects identified as likely to be structured as P3s from the overall calculation of total unmet needs. Given the uncertainty of when, or even if, the P3 procurements might take place for certain capital projects, it was thought to be more prudent to include those projects in the overall calculation of needs for now. When greater certainty arises about individual projects being procured as P3s they can be removed from the analysis at that time. It is important to note that any capital needs that are eventually financed as a P3, either using an availability payment by the District, or some other payment mechanism, which at least some portion of the payment stream will likely be considered as a long-term obligation of the District, or debt, will almost certainly be subject to the District's statutory borrowing limitations.

Appendix D

Description of the
Long-Range Capital Financial Plan Model

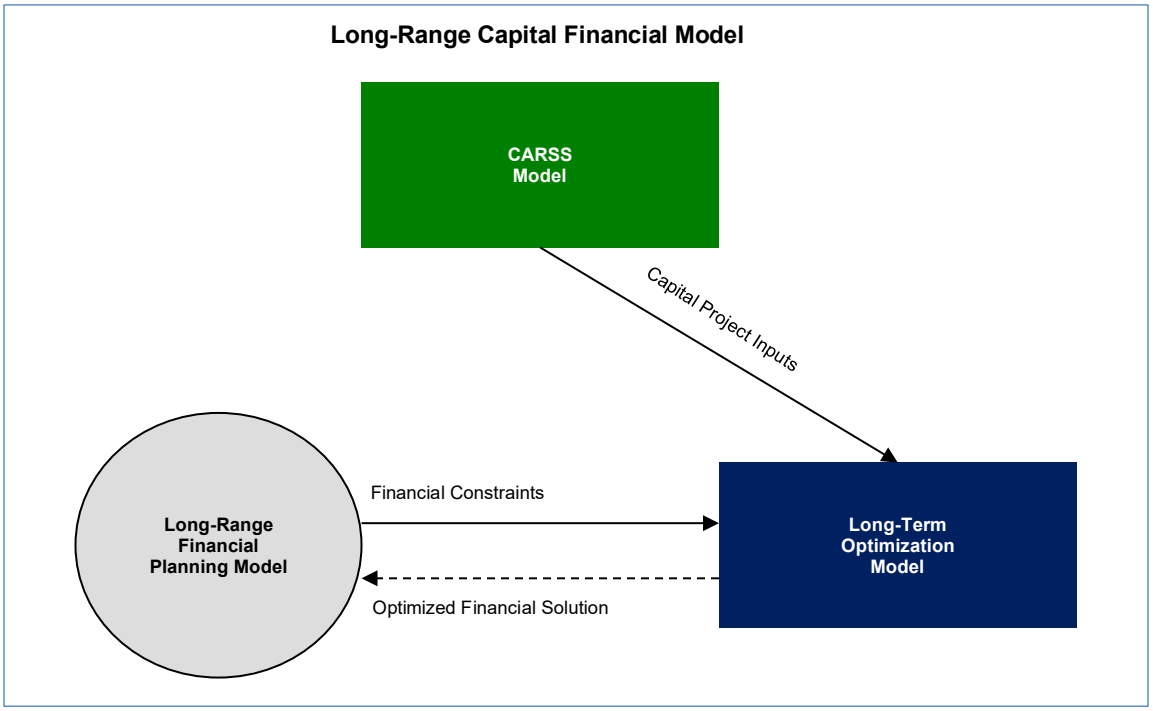
Description of Long-Range Capital Financial Plan Model

In order to address the complex challenge of financing the unfunded capital infrastructure needs identified in the capital asset replacement scheduling system (CARSS), while remaining within the various constraints imposed by the District's borrowing limits, the OCFO engaged the services of our external financial advisor, PFM Advisors LLC ("PFM") to develop a long-range financial planning model. This modeling effort will assist the District in identifying financial strategies to fund the identified capital needs gap in the earliest year possible given various constraints, such as the amount of paygo or additional federal funding available over various periods.

The Long-Range Capital Financial model is a combination of three discreet models that work in conjunction to identify the optimal financial result. The various components are:

- CARSS – an asset management planning ("AMP") software solution managed by Arcadis Gen.
- Long-Range Financial Planning Model ("LRFPM") – which is a Microsoft Excel based model developed by PFM.
- Long-Term Optimization Model ("LOM") – an Excel based model utilizing specifically tailored Visual Basic for Applications ("VBA") algorithms to solve for unfunded needs.

Figure 1



The CARSS model extracts the capital project inputs from various District Agency files and prioritizes, scores and, based on specific District criteria, ranks them in comparison to all other projects across the District. Then, under capital budget constraints and with a specific priority ranking assigned to each project, it determines which projects can be funded in the Capital Improvement Plan (CIP) each year, and which projects will not receive funding (due to their lower priority ranking). The detailed list of unfunded capital projects is then imported into the Long-Term Optimization model, along with certain debt and source assumptions from the Long-Range Financial Planning Model, to solve for the optimal solution to finance the unfunded capital gap as soon as possible. The financing information from the Long-Term Optimization model is then exported back into the Long-Range Financial Planning Model to present a complete long-term capital financing plan for the District over the forecasted 15-year period.

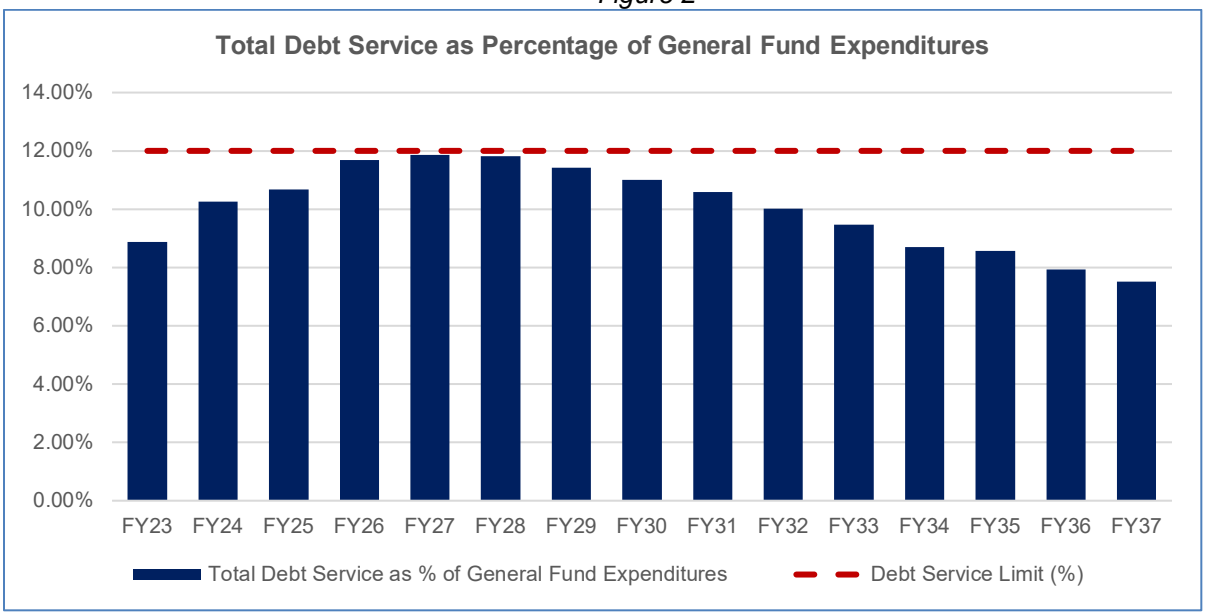
Model Assumptions

The long-range capital financial model makes several assumptions in analyzing funding solutions for the backlog of unfunded capital needs. These include the estimated borrowing costs for future debt issuances and the level of future funding from other non-debt sources for capital projects. It also reflects that General Fund expenditures of the District are projected to rebound and increase during the four-year financial plan period, as is reflected in the September 30, 2022, revenue forecast from the OCFO, before then being projected to grow at approximately 3% in the out years of the CIP and into the future. In addition to those assumptions, there are three key assumptions in the model, which drive how the model optimizes various funding solutions. These include:

1. Optimization of debt issuances:

   The model is structured to maximize the amount of debt issued in each fiscal year immediately outside of the current CIP period, while remaining within statutory debt limits, until paygo amounts have increased significantly, and thereafter lowering the amount of debt issued annually to achieve a more balanced overall mix of funding to meet the District's capital needs. This also provides substantial borrowing capacity after 2028 to fund future new capital projects.

Figure 2



2. Varying levels of Paygo or additional federal funding drive the gap:

   The major variable that drives the incremental increase in the amount of unfunded capital projects is the amount of annual paygo, additional federal funding, or other additional revenues assumed.

3. No additional new capital projects:

   As the model factors all of the many variables in solving for the best solution to fund the backlog of unfunded capital needs, it assumes that no new capital projects, outside of those that were part of the FY 2023-2028 capital needs assessment, are added to the list of capital projects in future years prior to existing unfunded needs being met, unless they are completely funded from additional paygo, federal funds, or other additional resources from private sources.

Results of Modeling Efforts

This modeling effort will allow the District to accomplish several capital financial planning goals. Specifically, it will allow the District to:

- Alter individual assumptions within internal and external source categories and drive source projections, with specific focus on paygo funding levels.
- House all existing debt service (by series).
- Project the District's debt service through the end of its 15-year forecast period (FY 2037) by exporting sizing results calculated in DBC Finance, a bond modeling software program.
- Utilize VBA algorithms to maximize the amount, and optimize the structure, of future debt issuances to ensure that the District stays within its statutory debt limit.
- Summarize all projected debt and expenditure detail through FY 2037; and
- Calculate the projected ratio of debt to expenditures on an individual fiscal year basis throughout the entire financial planning period.

The engine of the model lies in the VBA algorithms. These tools allow the model to directly interface with other internal models to ensure the District maintains the flexibility to incorporate the most current source data and CARSS assumptions into each analysis. It also allows the District to optimize and project the maximum amount of debt that can be issued in each fiscal year (under the 12% cap), while simultaneously determining the earliest possible fully funded year of all unfunded capital projects. The District will also be able to quantify the amount of paygo needed to fund entire backlogs of unfunded capital needs over various time periods. Outputs of the Long-Range Capital Financial Model include two reports: a "Gap Report," which (based on the CARSS file) details and quantifies the current capital projects funding gap in each fiscal year using that year's sources of funds; and a "Funded Report" which lists the unfunded capital projects from the FY 2023-2028 CIP that receive funding, and in which years outside of the current CIP period and summarizes the allocation of sources based on fiscal year projections of debt service.

This approach provides some distinct advantages for the District for their long-term planning needs over other alternatives. Primarily, this application of the Long-Term Optimization model in conjunction with the District's systems greatly simplifies an iterative problem by turning it into a single discreet answer. It accomplishes this by automating the iterative steps while also ensuring that the result conforms to the necessary financial targets for the district. For this purpose, the District can maintain a high degree of confidence that the solution represents their best course of action for catching up on unfunded costs. Secondarily, since the model is built in Excel, there is a high degree of flexibility available for the District to reconfigure the model in a manner that answers other potential questions that pertain to their long-term capital planning needs. For example, the District could assume much larger, or smaller, future bond issuances in the model, and then use the model to determine the various amounts of paygo, or other funding sources, that would be required to fully fund unmet capital needs by a specific year.

GOVERNMENT OF THE
DISTRICT OF COLUMBIA

Office of the Chief Financial Officer
1350 Pennsylvania Avenue, Suite 203, Washington, DC 20004
202.727.2476