DISTRICT OF COLUMBIA
Long-Range Capital Financial Plan **Report**

Issued October 2021

GOVERNMENT OF THE DISTRICT OF COLUMBIA

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Executive Summary

Like all other state and local governments throughout the country, the District of Columbia faces significant challenges in maintaining its critical infrastructure, especially as the District's economy continues to recover from the impacts of the coronavirus pandemic. Whether it is new infrastructure to meet the needs of residents or maintaining current assets such as roads, ambulances, schools, libraries and other public buildings, infrastructure is critical to quality of life and economic prosperity. Over the six-year capital planning period, the District will fund approximately $9 billion in capital projects, with roughly $5.3 billion of that amount funded from selling municipal bonds (debt financing). However, the District's overall need for new or replacement facilities and maintenance of existing facilities far exceeds this funding level. Like any other enterprise, the District has limits on how much it can borrow and must strike an appropriate balance between funding its on-going operations (programs and services) versus capital assets.

Beginning in early 2020, the spread of COVID-19 around the world brought the pattern of steady growth in the national economy to an abrupt halt, ending the longest period of expansion in U.S. history. Unprecedented fiscal relief from the federal government and highly accommodative monetary policy from the Federal Reserve helped to contain much of the economic damage caused by the pandemic and made the resulting recession the shortest in U.S. history. In spring and early summer of 2021, the District made significant progress administering vaccines to residents, and because of those increased vaccination rates and improving health metrics related to COVID-19, on July 25, 2021, Mayor Bowser lifted the District's public health emergency. While the spread of the Delta variant remains a threat, positive signs remain about the ongoing economic recovery. In fact, according the OCFO's Office of Revenue Analysis (ORA), real GDP contracted 3.4% in calendar year 2020 but recovered to pre-pandemic levels in the second quarter of calendar year 2021. Furthermore, ORA states in its revenue estimate released on September 30, 2021, that revenue is on track to surpass the FY 2019 level of $8.3 billion in FY 2021 as the District's economy rebounds from the pandemic. The economic outlook over the period of the current financial plan (FY 2022-2025) has improved modestly, which could be used to support continued growth of the District's capital budget over the next several years.

Fortunately, the District's strong financial condition prior to the onset of the pandemic put it in a far better position to address this unprecedented coronavirus-induced recession than most other state and local governments throughout the nation. Due to prudent financial management practices over the last twenty-plus years, the District has fully funded pensions, maintained strong reserves, and achieved high credit ratings that afford it access to low-cost financing to support its capital program. Additionally, a significant portion of past borrowings can be refinanced in the coming years, providing additional capacity to support capital needs. ***This long-range capital financial plan report shows that if the District commits to borrowing up to its statutory maximum level of twelve percent (12%) of general fund expenses, commits to increase pay-as-you-go (or cash) funding for capital to an amount averaging roughly four percent (4%) of general fund expenditures, and commits to prioritizing funding of existing unmet capital needs over new capital projects, then it can address all deferred maintenance and unmet capital needs, as early as 2031. However, if the District continues to add additional capital projects before addressing identified unmet capital needs, as it has over the past five years, then the timeline to catch up with all unfunded needs will likely be extended to at least 2033.*** This report will detail the tools and methods used by the Office of the Chief Financial Officer to assess and calculate the District's capital funding gap and the funding solution.

The infrastructure needs of the District, which serves as a city, state, county and school district, are substantial. In order to develop a better understanding of the costs for the District to maintain its assets in a state of good repair, a comprehensive asset management planning system was developed. The Capital Asset Replacement Scheduling System, or 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 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?

To determine the District's total capital need, a comprehensive review of all governmental agencies' capital and asset maintenance requirements was completed utilizing CARSS, with each project scored and ranked to ensure that the highest priority projects were funded first. Since the first Long-Range Capital Financial Plan Report was published in 2016, the percentage of assets inventoried in CARSS has steadily increased. Now 100% of the District's assets are captured in CARSS. Condition assessments on all of the District's assets, specifically its facilities, were expected to be completed by the end of fiscal year 2022, however the COVID-19 pandemic, along with other factors, significantly impacted progress on completing condition assessments in the original timeframe. DGS has subsequently hired a new vendor, Accruent, to perform the facilities condition assessments, and an updated timeline for completion of this work is under development at DGS. The OCFO, working in conjunction with the Executive Office of the Mayor (EOM), assembles a Capital Budget Team (CBT) made up of subject matter experts from each of the major asset-owning agencies in the District. The CBT is responsible for scoring, ranking and prioritizing all capital projects requested by the various agencies. This scoring and ranking data are then entered into CARSS, which produces a prioritized six-year Capital Improvement Plan for the District. ***CARSS is now generally recognized as the most comprehensive and detailed capital asset management system of any city or state government in the country.*** *Please refer to Appendix A for a more detailed discussion of the development of CARSS, as well as enhancements to the system since the publication of the 2020 report.*

In addition to CARSS, the District also developed a separate 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. This long-range financial forecasting model determines the amount of available funding for the six-year CIP and helps determine which capital projects the District cannot afford during the six-year CIP period. 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 public-private partnerships, as well as other types of non-traditional funding such as asset recycling.

As previously discussed, the District can fund roughly $9 billion of its capital needs through 2027. However, the CARSS analysis identified approximately $4.5 billion of additional unmet needs that cannot be funded during this CIP period. The higher level of unmet needs compared to last year's report is the result of several factors, including new facility condition assessments that identified the need for a larger than expected number of HVAC replacement projects for DC Public Schools, as well as the need for more extensive renovations for two fire stations and at least one elementary school campus. While the overall size of unmet needs has increased compared to the prior year, only 35% of this funding gap relates to infrastructure maintenance, or re-investment in currently owned assets, as the District has continued to prioritize funding maintenance of existing assets. The remainder of the funding gap relates to new capital projects to support continued growth in the city,

as can be seen in *Table 1*. The table summarizes the primary capital funding needs gap, which averages approximately $757 million per year, or roughly 8.1% of the District's FY 2022 Local Fund revenues.

Table 1.

Total Unfunded Capital Needs During the 6-Year CIP Period

(in $ millions)

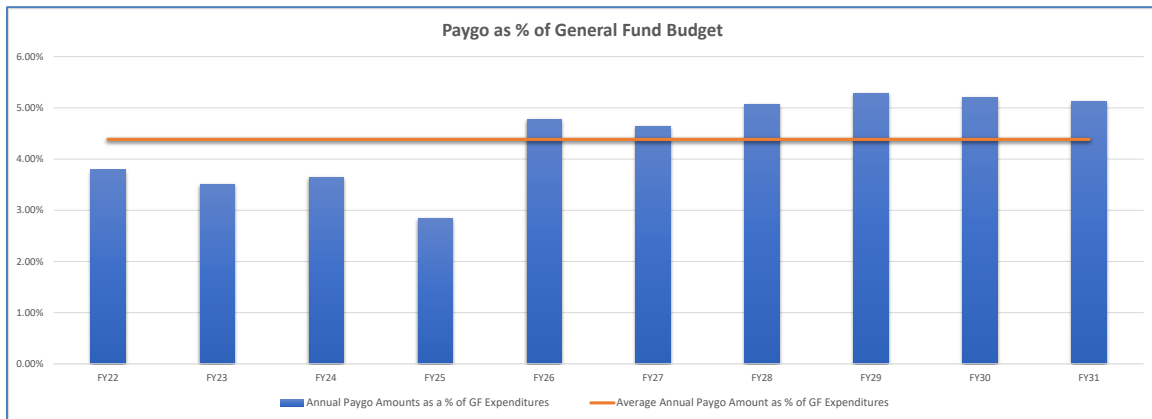| Fiscal Year	2022	2023	2024	2025	2026	2027	6-Year Total
Unfunded Capital Maintenance Projects	$282.8	$241.5	$262.1	$309.3	$267.5	$224.4	$1,587.7
Unfunded New Capital Projects	$216.4	$356.8	$301.9	$987.0	$747.2	$344.5	$2,953.8
Total Unfunded Capital Needs	$499.2	$598.3	$564.0	$1,296.3	$1,014.8	$568.9	$4,541.5

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 *(see the "Paygo Funding" section of this report for more details)*. Under this law, the amount of additional funding contributed to paygo rises annually from a base year in 2020, until it eventually reaches a cap at the amount of annual depreciation, as can be seen in *Figure 1*. The graphic illustrates the prescribed, anticipated increases in paygo compared to annual depreciation, which is currently forecasted to grow at one and one-half percent (1.5%) annually. Over the fifteen-year period studied in this report, paygo transfers for capital, including those amounts dedicated to WMATA, would average approximately $518 million annually. The District's current financial plan, which extends through FY 2025, includes the impact of the increased paygo levels as a result of this legislation.

Figure 1.
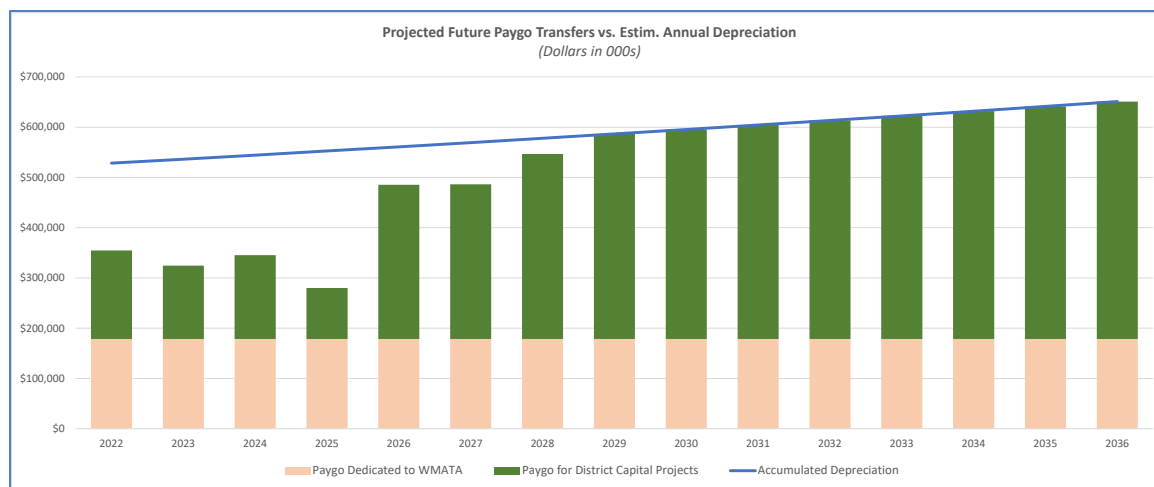
While this projected amount of paygo represents a substantial increase in funding for the capital program over past years, it represents a relatively small part of the local portion of the District's general fund budget. As seen in *Figure 2* below, the annual amount of legislated paygo for capital averages roughly 4.4% of the local portion of general fund expenditures between fiscal year 2022 and fiscal year 2031, which is the earliest projected time when all unmet capital needs are funded.

Figure 2.

Paygo as % of General Fund Budget

Legend: ■ Annual Paygo Amounts as a % of GF Expenditures — Average Annual Paygo Amount as % of GF Expenditures

With the notable exception of the leisure and hospitality and business services sectors, most sectors of the District's economy have so far proven to be resilient, even in the face of the pandemic. The combination of this resilient economy, along with the lower cost of borrowing that results from the District's strong credit ratings, will allow the District to borrow substantial funds into the future to support its capital budget, all while staying below its statutory debt limit. In fact, over time, the funding of deferred maintenance needs, largely from paygo, will allow future debt capacity to be redirected to new capital projects needed to support the District's growing population. As seen in *Figure 3* below, total debt service as a percentage of expenditures is projected to begin decreasing in 2027, which should produce substantial additional borrowing capacity for future capital projects needed in a growing and vibrant city.

Figure 3.

Legend: ■ Total Debt Service as a % of Expenditures — • Max Rate (%)
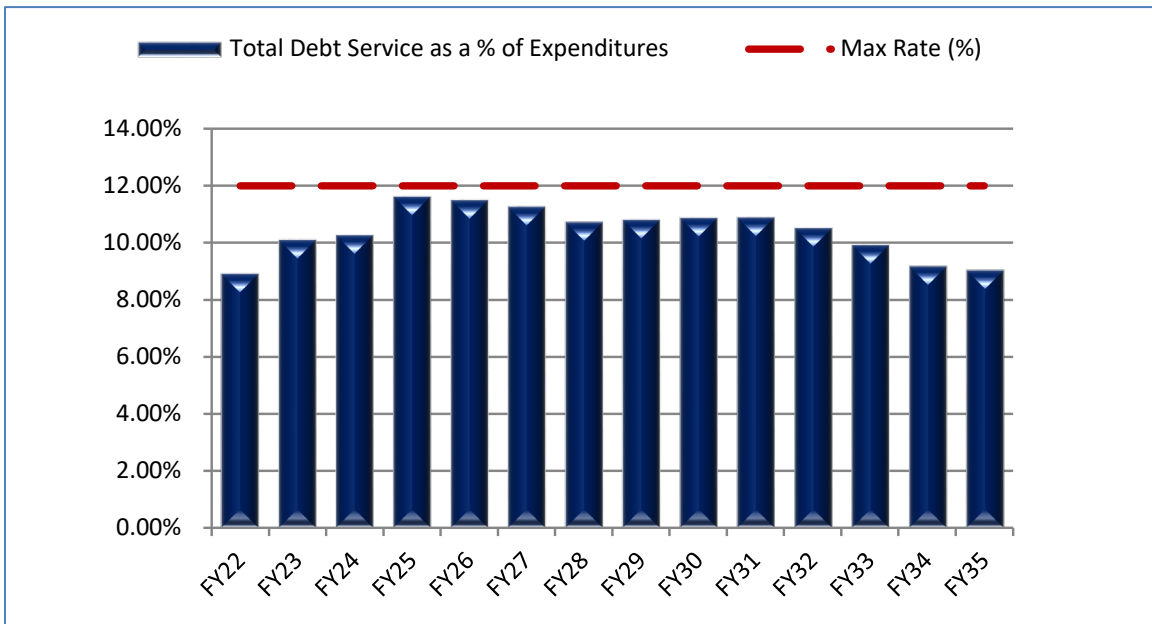
Given the substantially higher projected amount of paygo funding for capital (as seen in *Figure 1*), and the full utilization of the District's borrowing capacity (as seen in *Figure 3*), the long-range capital financial plan model now estimates that the District could "catch up" and fund all existing unmet capital projects identified in CARSS, while continuing to maintain current assets, as early as FY 2031, if maintenance of existing assets are adequately prioritized. As previously indicated, there

remains more than $4.5 billion of identified, unmet capital needs during the current CIP period. These unfunded capital needs would remain outstanding through FY 2027, as the current six-year CIP is at full capacity. However, beginning in FY 2028, assuming no new capital projects are added to the CIP until all identified unfunded capital needs are met, the District could begin paying down the unmet needs gap fairly rapidly, and stay on course to meet its goal of funding all unmet capital needs as early as FY 2031, as seen below in *Figure 4*.

Figure 4.
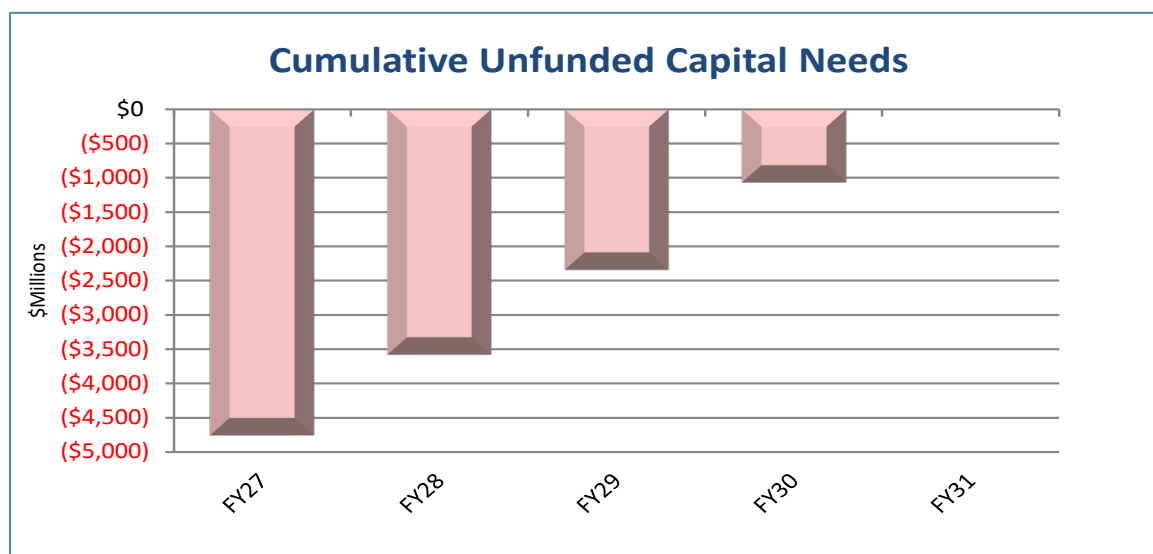
It is important to note that the estimated increases in paygo from local funds shown in *Figure 1* on page *iv* represent significant portions of the projected local funds revenue growth of the District. Allocating this level of additional paygo funding will result in properly maintained equipment and facilities that will, over the long-term, result in lower life-cycle costs and increased resources for other District programs. A large portion of the growth in paygo funding is from dedicated taxes committed to Metro under legislation passed by the District in 2018. The addition of these new revenues, along with debt service savings from future debt refinancings, should allow the District to meet its increased commitment to fund capital while providing reasonable programmatic growth.
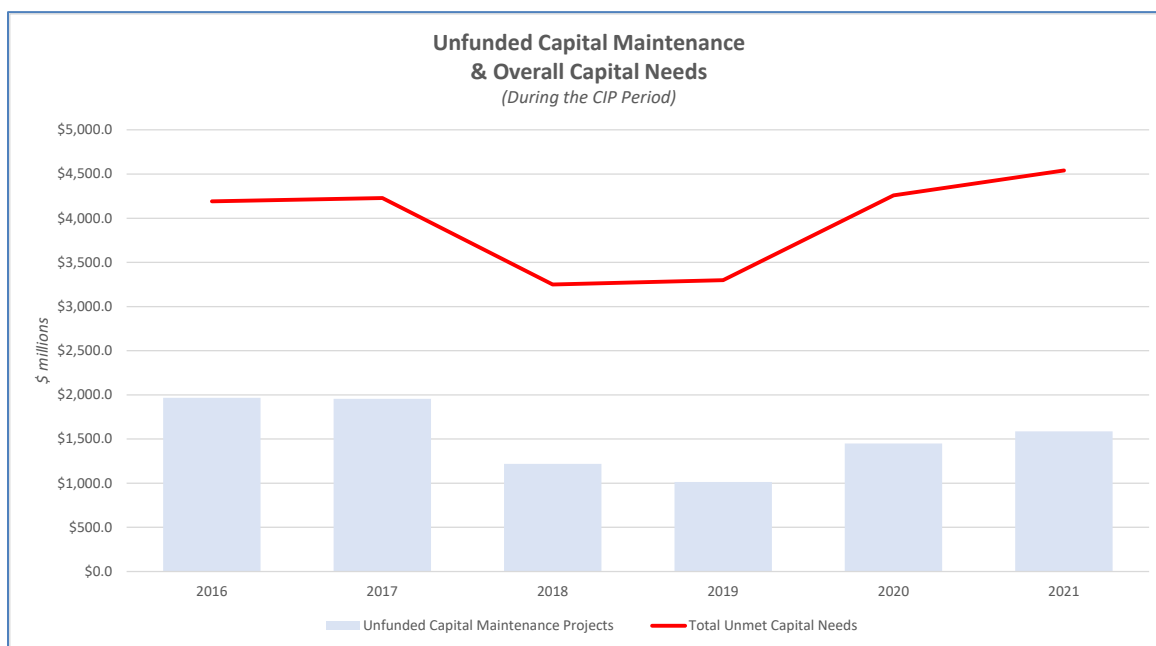
This long-range capital financial plan indicates all existing District assets can be brought to a state of good repair, while also addressing new unfunded capital projects needed to support a growing city, in roughly a decade. In other words, the roughly $4.5 billion of capital needs not funded in the six-year CIP could be funded as early as 2031 with the increased paygo levels required in legislation and borrowing up to the 12% statutory debt cap limit, if all available resources after the CIP (beginning in 2028) period are devoted to funding currently identified unmet needs. Funding of the gap could be further accelerated through additional paygo resources or other monies, such as federal funds, that might become available, as well as using non-traditional funding structures, such as public-private partnerships. However, if additional capital projects are added before addressing currently identified unmet needs, the time period to reach a state of good repair on all District assets could be extended to 2033 or beyond.

From 2016 until the onset of the COVID recession reversed the trend, the overall amount of unfunded capital needs decreased substantially as the District's capital budget grew and became more focused on addressing unmet needs, as can be seen in *Figure 5*. The 2016 report identified total unmet capital funding needs of approximately $4.2 billion, which declined to $3.3 billion in the 2019 report before rising to roughly $4.5 billion in this 2021 report. Much of the growth in unmet needs is driven by more detailed condition assessments that are now being completed on various District assets

that provide a more accurate, and often higher, cost to maintain them. Although total unmet capital needs have increased over the prior year's report, the District is still able to address these 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 greater focus on refinancing existing debt and utilizing the debt service savings for additional borrowing capacity to support the capital budget.

Figure 5.

As shown in *Figure 5*, unfunded capital maintenance needs, which serve as a proxy for deferred maintenance, continued to decrease 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 as a result of capital maintenance project delays due to the ongoing pandemic. While the level of unfunded capital maintenance needs has increased to slightly more than $1.5 billion in this year's report, the overall level of unmet capital maintenance projects, or deferred maintenance, has remained fairly constant at approximately thirty-five percent (35%) of the District's overall unmet capital needs. Despite continuing to recover from a challenging financial situation, the District has continued its commitment and made the choice to address its deferred maintenance backlog and bring its existing assets to a state of good repair.

This long-range capital financing plan provides information that can inform policy discussions regarding long-term capital needs and the strategies to address them. The District has taken a leadership role in the region by responsibly funding its portion of the dedicated funding for Metro, which is an important economic engine for the Washington Metropolitan region. This act alone has effectively solved a significant portion of the capital funding gap previously identified in its earlier reports. In addition to the agreed upon funding for Metro, other non-traditional funding structures such as public-private partnerships should also be prudently pursued where cost-effective, as well as asset recycling initiatives to monetize under-utilized District assets as a new, non-debt source of funding for critical infrastructure. Finally, over the next several years, funding from federal sources,

reallocation of District resources, and/or new revenue sources need to be directed to paygo funding, when possible, to fully address needed infrastructure, including maintenance of existing District assets.

There are still a number of challenges facing the District in its plan to address its unfunded capital needs in the time period identified in this report. Chief amongst those challenges is the ongoing threat of COVID-19. Although the forecasted revenue growth has improved, the outlook remains cautious due to spread of the Delta variant of COVID-19 and a still high level of vaccine hesitancy. Other challenges include the ongoing global shortage of semiconductors and the persistent disruptions to the global supply chain. These disruptions are experienced by the District in many different ways, but one clear example of the impact of these disruptions has been the shortage of new vehicles. While the District has continued to budget and spend funds to replace aging fleet that has exceeded its useful life, it has recently experienced difficulties in obtaining these vehicles. This means that the District will have to continue to operate an aging fleet of vehicles for longer periods of time, at least in the short-term, and incur higher maintenance costs to operate these vehicles that are past their useful lives.

Despite these challenges, if the District is responsible in utilizing its resources and remains focused on executing this long-range capital financial plan by committing an average of roughly 4% of its budget to paygo funds for capital and up to twelve percent of its budget for debt service to support borrowing for capital projects, it will be in the enviable position of being able to address all its critical infrastructure needs in roughly a decade. Simply stated, if the District commits roughly 16% of its general fund revenues to its capital needs, 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.

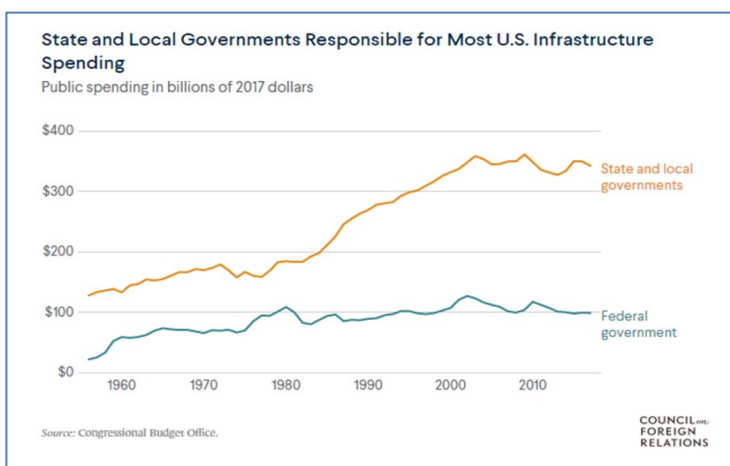# District of Columbia: Long-Range Capital Financial Plan Report

Introduction

As part of the Fiscal Year (FY) 2015 Budget Support Act, the Council of the District of Columbia (Council) 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, released in August 2014, 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 now includes more detailed information on the individual assets of the District.

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 challenges facing the District in identifying its capital infrastructure funding gap during the current 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 the long-range capital financial plan 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, the costs of deferring maintenance, and thus, supports better decision making. ***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 twelve percent (12%) of general fund expenses, as well as commits to increase pay-as-you-go (or cash) funding for capital to a level averaging approximately four percent (4%) of general fund expenses, then it can fund all identified deferred maintenance and new capital needs as early as 2031.***

Background

State and Local Governments Responsible for Most U.S. Infrastructure Spending
Public spending in billions of 2017 dollars
Source: Congressional Budget Office.
COUNCIL on FOREIGN RELATIONS

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. 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 25% of U.S. public infrastructure funding comes from the federal government. 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 bill championed by the Biden administration, and currently being negotiated in Congress, can go some way in addressing the nation's infrastructure needs, but it is clear that the lion's share of the funding and maintenance responsibility for improving the nation's aging and inadequate infrastructure will fall to state and local governments.

The District's Economic Recovery and Outlook

The spread of COVID-19 around the globe brought the pattern of steady growth in the national economy to an abrupt halt, ending the longest period of expansion in U.S. history. Unprecedented fiscal relief from the federal government and very accommodative monetary policy from the Federal Reserve helped contain much of the damage caused by the pandemic and made the COVID recession the shortest in U.S. history. In spring and early summer 2021, the District made significant progress in administering vaccines, and although the spread of the Delta variant has impacted the District like it has the rest of the nation, hospitalizations and deaths are not exhibiting the growth seen in previous waves of the pandemic. The improved health metrics allowed Mayor Bowser to lift the public health emergency on July 25, 2021. While the District's economy has improved, it still has not fully recovered. Some measures, such as income and gross domestic product, recovered quickly, but employment, largely due to the depth of job losses in the hospitality and business services sectors, has a steeper climb back to pre-COVID levels. The outlook for the District's economy is one of continued recovery but at a pace slightly below the national average over the next year. In contrast to the Great Recession's aftermath, when the District's economy fared better than the national economy, it will likely take until FY 2023 for employment levels to return to where they were pre pandemic.

Despite these challenges, the District's economy is still proving to be strong and resilient. Due to prudent fiscal management over the past twenty-five years or more, the District does not face the large pension and retiree health care liabilities that many other state and local governments do. Additionally, at the onset of the coronavirus-induced recession, the District enjoyed fully funded reserves totaling more than 60 days of cash on hand, which meant that it was better positioned than most other state and local governments to weather the financial crisis.

Like other jurisdictions, the District has deferred necessary investment in capital infrastructure in favor of other competing priorities. 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.

Estimate of Total Capital Funding Needs

There were several challenges in accurately assessing the size and scope of the capital infrastructure funding gap of the District, including creating an accurate inventory of the number and condition of all District-owned assets; estimating their related costs of repair or replacement; assessing future capital infrastructure needed to support continued growth of the city; understanding which capital projects might be funded through the use of public-private partnerships or other non-traditional financing sources, such as asset recycling initiatives; and determining the future capital needs of

the Washington Metropolitan Area Transit Authority (Metro). Working closely with agencies within the government to gather information on the District's assets, the OCFO was able to estimate the total potential capital infrastructure needs of the District (both capital maintenance and new projects) to be approximately $15.7 billion over the next decade. A portion of this amount, approximately $2.2 billion, represented the District's share of additional projected funding needed for Metro. Funding for Metro was subsequently addressed through dedicated revenues that were approved by the District in 2018. Therefore, the remaining capital needs of the District, after removing amounts for Metro, were estimated at approximately $13.5 billion over the ten- year period. Although the amounts needed to properly address all the infrastructure needs of the District are substantial, in general, for the District the issue is less one of affordability, but more the period of time over which these capital needs will be funded.

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 importantly 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 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 coronavirus 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 period 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 2022-2027 CIP budget formulation, is approximately $13.5 billion. The District has identified approximately $9 billion of funding, a mix of debt, paygo capital, federal loans and grants, and other funds, over the next six years, in its FY 2022-2027 capital budget for the highest-priority capital projects. This results in a remaining total capital infrastructure funding shortfall of approximately $4.5 billion over the six-year CIP period. This amount includes both unfunded new capital projects needed to support the growing 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 two categories of capital projects: capital maintenance projects (deferred maintenance) and new capital projects. The six-year funding gap for capital maintenance projects is nearly $1.6 billion, or roughly $267 million annually, and the six-year funding gap for new capital projects is approximately $2.9 billion, or approximately $492 million annually. Combined, the annual funding gap is approximately $757 million, which is equivalent to roughly 8.1% of total FY 2022 local funds revenues.

Total Unfunded Capital Needs During the 6-Year CIP Period

(in $ millions)

Fiscal Year	2022	2023	2024	2025	2026	2027	6-Year Total
Unfunded Capital Maintenance Projects	$282.8	$241.5	$262.1	$309.3	$267.5	$224.4	$1,587.7
Unfunded New Capital Projects	$216.4	$356.8	$301.9	$987.0	$747.2	$344.5	$2,953.8
Total Unfunded Capital Needs	$499.2	$598.3	$564.0	$1,296.3	$1,014.8	$568.9	$4,541.5

As seen 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 $3.4 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, as well as a replacement for the District's correctional facility. The estimated costs of just those two large capital projects alone are likely to exceed $1.2 billion.

Annual Capital Funding Gap by Asset Type

(in $ millions)

|		FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	Total
IT Projects & Systems								
	Capital Maintenance Projects	17.5	21.0	15.6	15.5	15.1	14.3	99.1
	New Capital Projects	53.4	43.0	10.6	9.1	5.5	3.0	124.6
Total		$70.9	$64.0	$26.2	$24.6	$20.6	$17.3	$223.6
Equipment & Regulatory								
	Capital Maintenance Projects	11.0	15.0	17.1	12.4	11.7	11.9	79.3
	New Capital Projects	1.0	0.5	-	-	-	-	1.5
Total		$12.0	$15.5	$17.1	$12.4	$11.7	$11.9	$80.8
Fleet								
	Capital Maintenance Projects	7.4	41.9	35.4	35.5	32.1	34.5	186.9
	New Capital Projects	-	-	-	-	-	-	-
Total		$7.4	$41.9	$35.4	$35.5	$32.1	$34.5	$186.9
Horizontal Infrastructure								
	Capital Maintenance Projects	58.8	50.8	117.7	132.4	113.9	70.0	543.6
	New Capital Projects	0.1	5.1	7.5	6.9	37.8	30.5	87.9
Total		$58.9	$55.8	$125.2	$139.3	$151.7	$100.6	$631.4
Facilities								
	Capital Maintenance Projects	188.0	112.8	76.2	113.4	94.7	93.7	678.9
	New Capital Projects	162.0	308.2	283.8	971.0	703.9	311.0	2,739.8
Total		$350.0	$421.0	$360.0	$1,084.4	$798.6	$404.7	$3,418.7
Grand Total		**$499.2**	**$598.3**	**$564.0**	**$1,296.3**	**$1,014.8**	**$568.9**	**$4,541.5**

It is important to note that the long-range capital financial plan analysis assumes that the costs of deferred capital projects beyond the six-year CIP period grow at three percent (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 at a later date 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

In order 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 period of time, 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.

The long-range capital financial model is actually a combination of three 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 at right. A more detailed description of the model, and its various components and assumptions can be found in *Appendix D*.
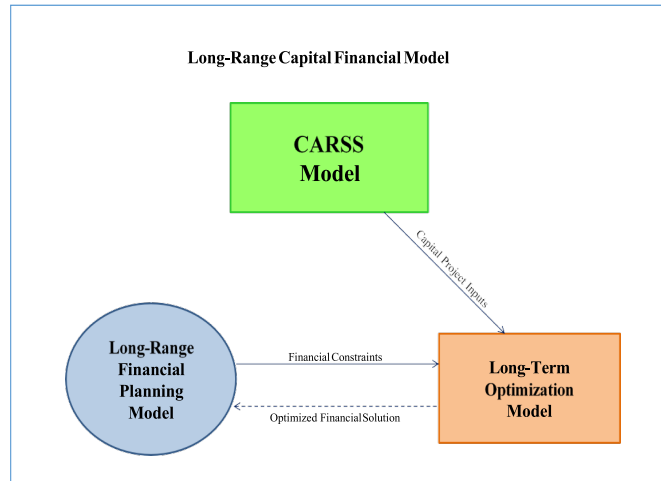
CARSS was used to prioritize, score and rank all the District's various capital projects. Then, under certain capital budget constraints and with a specific priority ranking assigned to each project, CARSS determines which projects can be funded in the CIP each year, and which projects will not receive 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 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 in order to present a complete long-term capital financing plan for the District over the forecasted 15-year period.

The model 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, 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 in the United States, 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, 2021, the District has approximately $11.4 billion of total outstanding debt, of which roughly $10.3 billion (or approximately 91%) are either G.O. bonds or ITS bonds.

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 largely rebounded and are expected to continue to grow, the District anticipates increasing its outstanding debt by nearly forty-six percent (46%), or approximately $4.8 billion in additional G.O. or Income Tax Secured bonds over the next six years, to support its capital improvements plan.
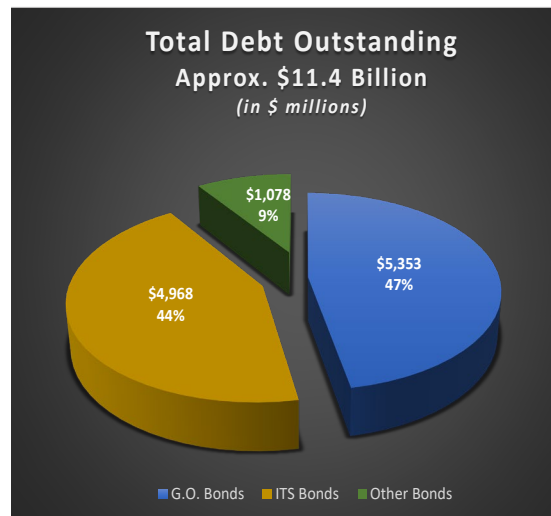
Debt Capacity Limitations

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 for 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 2022-2027 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.

The 12% statutory debt limit is on the higher end as compared to other state and local governments across the country, but 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.

Projected Annual Debt Service as % of GF Expenditures
(as of Sep. 1, 2021)

Fiscal Year	Projected Debt Service
FY 2022	8.92%
FY 2023	10.11%
FY 2024	10.26%
FY 2025	11.63%
FY 2026	11.49%
FY 2027	11.26%

Debt Cap Limit: 12.00%
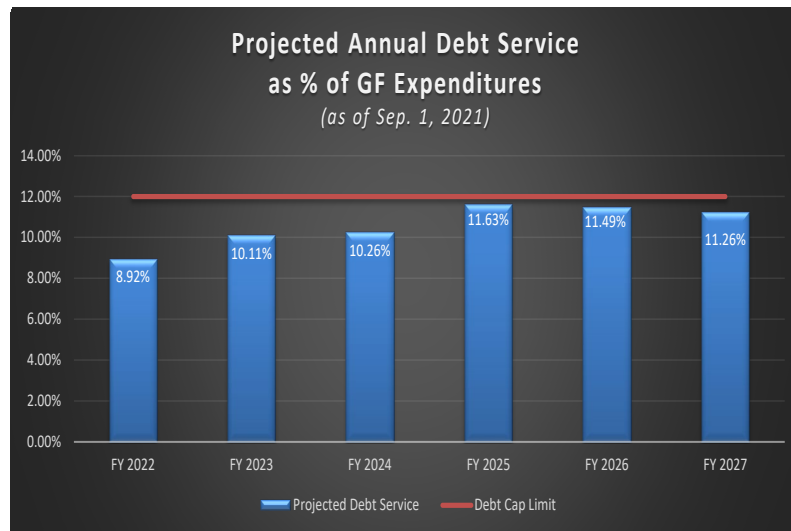
***Paygo Funding Mechanism Through Legislative Action***

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 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, so as to not exceed annual depreciation as reported in the District's most recent Comprehensive Annual Financial Report. As an example of how significantly paygo funding for capital has grown, the adopted FY 2022 budget includes total paygo funding for capital, including amounts dedicated to WMATA, of roughly $355 million in FY 2022 alone, which is almost $200 million more than is legislatively required. Additionally, over the 6-year CIP period projected paygo transfers to the capital budget total nearly $2.3 billion. Note that the adopted budget and financial plan accounts for these significant amounts of paygo and actually exceeds the legislatively required minimum amount in each year, with the exception of FY 2025, where it falls short by roughly $89 million. This is largely due to funding for certain projects being pulled forward to earlier years in the CIP. Although the amount of paygo funding falls short of the requirement in FY 2025, the total amount of paygo funding over the entire 6-year CIP period exceeds the legislative minimum by roughly $312 million, further illustrating the District's commitment to providing the necessary funding to address its critical infrastructure needs.

As shown in the following graph, under the new 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 2029, at which point the calculation to determine future local funds transfers would be capped at the amount of annual depreciation, which is currently forecast to grow at 1.5% annually.

Projected Future Paygo Transfers vs. Estim. Annual Depreciation
(Dollars in 000s)
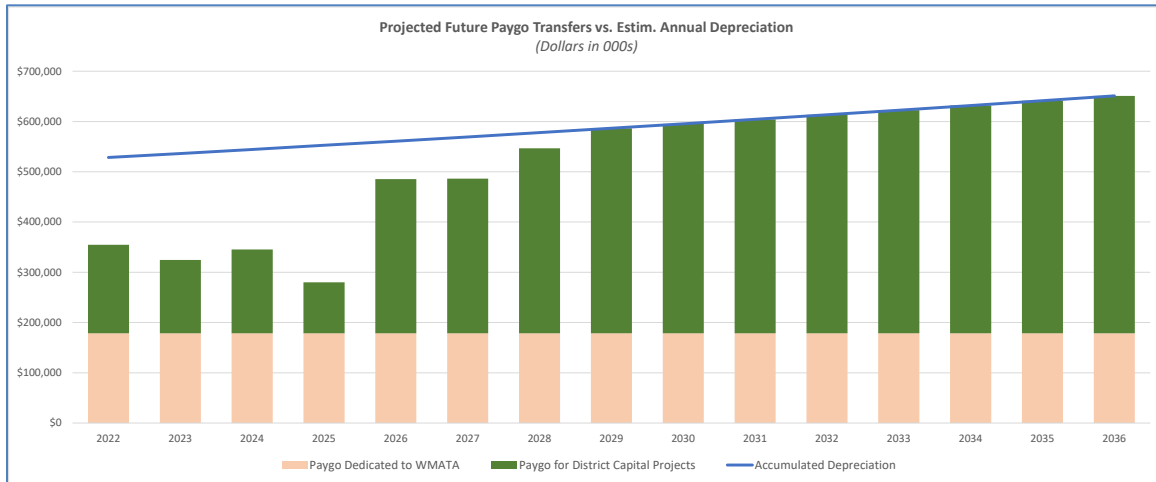
While the estimated increases in paygo from local funds represent significant portions of the projected local funds revenue growth of the District, and a substantial increase in funding for the capital program over prior year's amounts, it actually represents a relatively small part of the local funds 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 2022 and fiscal year 2031, which is the earliest time by which all unmet capital needs could be funded.

Paygo as % of General Fund Budget
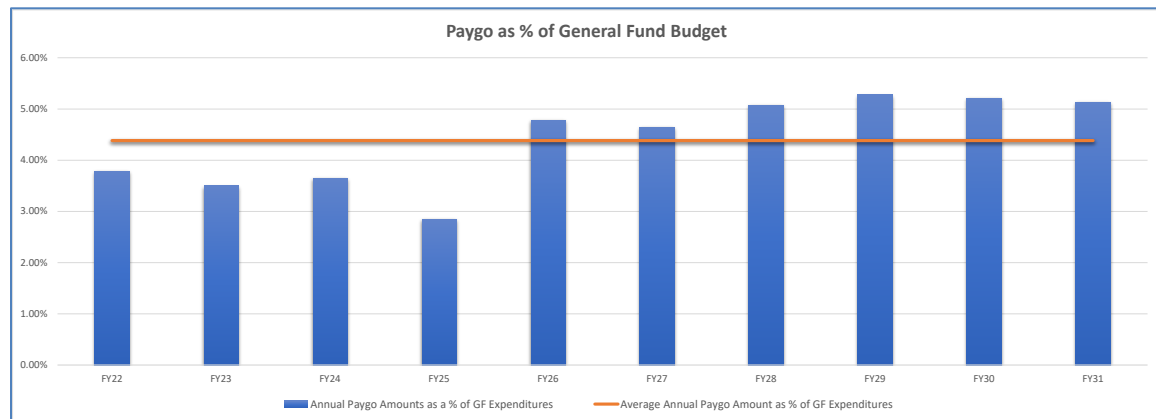
Allocating this level of additional paygo funding is not without challenges given the uncertain nature of the trajectory of the coronavirus pandemic and its impact on both the District and National economies, since capital projects compete with programmatic priorities such as affordable housing, homeless 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. Other options to increase paygo, such as additional federal funding or a new dedicated funding source, might also assist in addressing the District's unfunded capital needs. Additionally, 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, albeit more constrained than in prior budget cycles due to the coronavirus-induced recession.

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, as shown in the graph below.
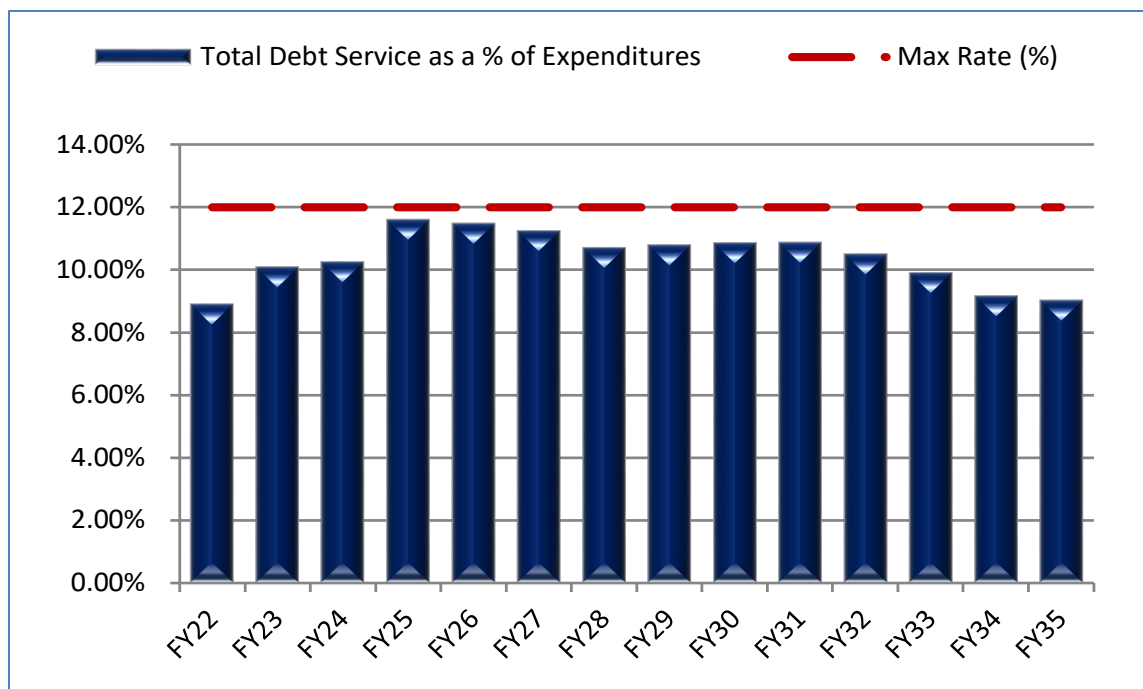
Given these projected amounts of paygo funding for capital, and maximizing the District's bonding capacity, the long-range capital financial model estimates that the District will be able to "catch up" and fund all existing unfunded capital projects identified in CARSS as early as FY 2031. This would 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 $4.5 billion of capital needs not funded in the six-year CIP could be funded as early as 2031 with paygo levels increasing on average to roughly four percent (4%) of the general fund budget and borrowing up to the twelve percent (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 paygo resources or other monies, such as federal funds, that might become available in the federal infrastructure bill, which is currently working its way through Congress, as well as using non-traditional funding structures, such as P3s.

The following graph illustrates the unfunded capital needs, meaning those capital needs not funded as part of the FY 2022-2027 CIP, identified in this 2021 report. Those unmet capital needs, which grow to slightly more than $4.5 billion through FY 2027, begin to be paid down starting in FY 2028, 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 2031 relies on two important assumptions: 1) unmet capital needs identified in this report are prioritized in the years outside of the current CIP, and 2) that all of 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 of the identified unmet capital needs to likely 2033 at the earliest. In addition, if revenues were to fall, or recover at a slower pace than currently anticipated, the time that it would take to fund all of the District's unmet capital needs would likely be extended.

Cumulative Unfunded Capital Needs
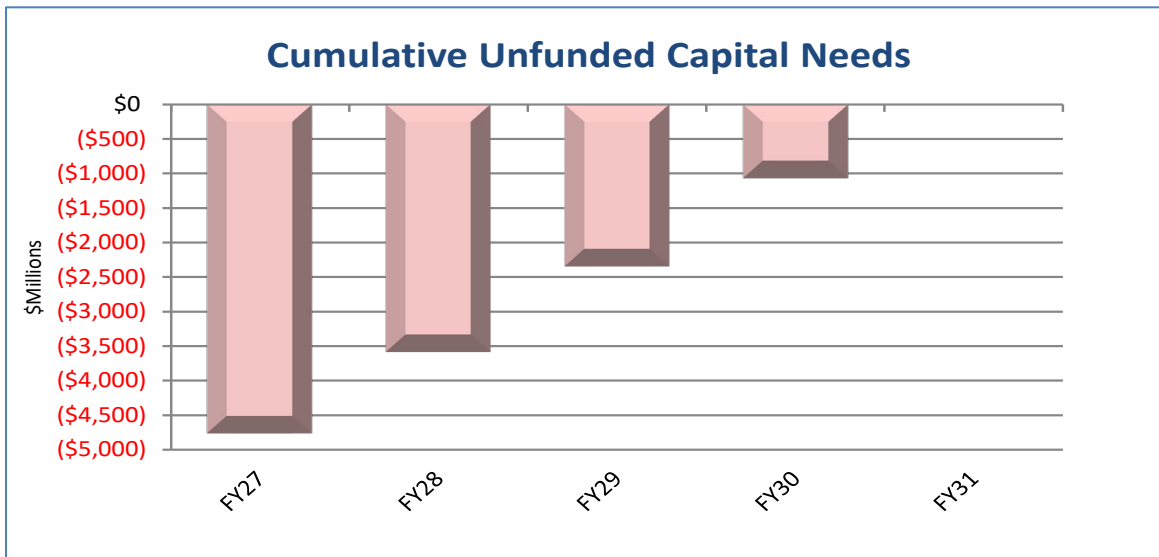
Progress in Addressing Unfunded Capital Needs

Since the first long-range capital financial plan report was produced in 2016, the amount of identified unfunded capital needs were steadily decreasing 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. The 2016 report identified total unmet capital funding needs of approximately $4.2 billion, which declined to $3.3 billion by 2019, due to the growing economy and more focused capital budgets. This overall decrease in unmet capital needs was all the more noteworthy as it occurred at the same time as the District was systematically building out its asset inventory, as well as refining, and in many cases increasing, the estimated costs of construction for certain new capital projects, such as a new correctional facility. This year's report identified total unmet capital funding needs of approximately $4.5 billion, which is slightly higher than the $4.2 billion identified in last year's report. Much of the growth in unmet needs is driven by more detailed condition assessments that are now being completed on various District assets that provide a more accurate, and often higher, cost to maintain various assets, especially District-owned facilities. Although total unmet capital needs have increased, the District is still able to 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 greater focus on refinancing existing debt 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 six-year CIP budget growing from approximately $6.3 billion in 2016 to roughly $9 billion in 2022, a 43% increase, despite the ongoing effects of a global pandemic and resulting recession.

Unfunded Capital Maintenance & Overall Capital Needs
(During the CIP Period)
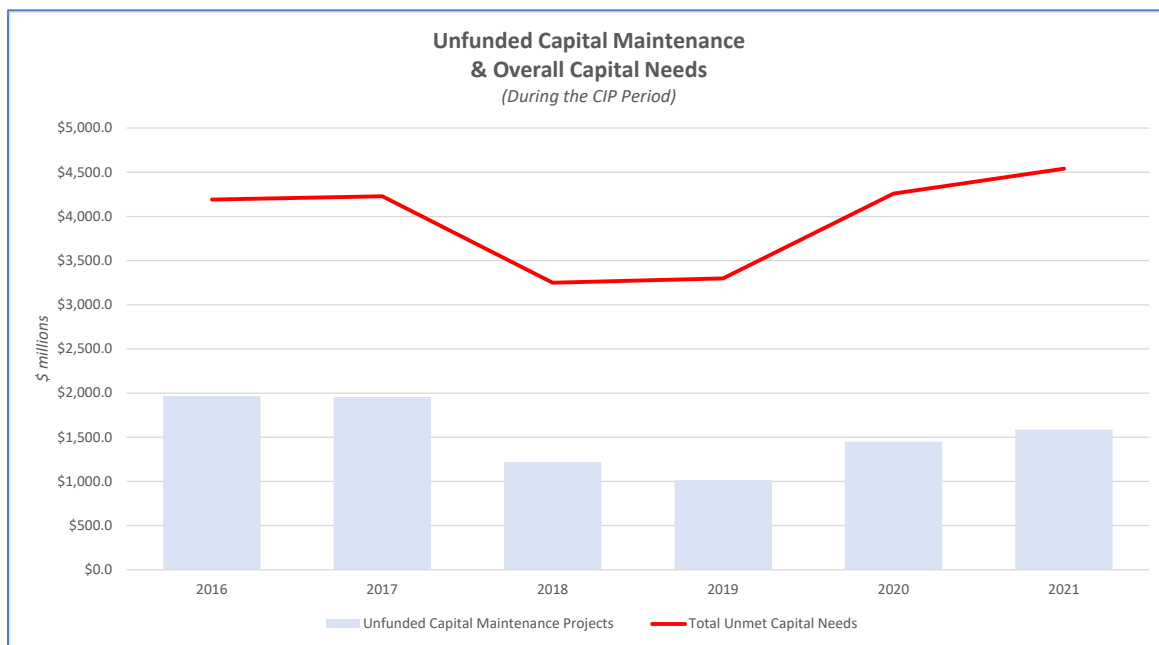
As seen in the chart above, unfunded capital maintenance needs, which serve as a proxy for deferred maintenance, had decreased since the first long- range capital financial plan report in 2016. In the 2016 report, unfunded capital maintenance needs were nearly $2 billion, or nearly half of total unmet 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 as a result of capital maintenance project delays due to the impact the coronavirus pandemic. While the level of unfunded capital maintenance needs has increased to slightly more than $1.5 billion in this year's report, the overall level of unmet capital maintenance projects, or deferred maintenance, has remained fairly constant at approximately thirty-five percent (35%) of the District's overall unmet capital needs. Said differently, although both the total amount of unmet capital needs and the total unfunded capital maintenance projects have increased over last year's report, the fact that unfunded capital maintenance projects remained at roughly the same percentage of the total as the prior year's report demonstrates the District's continued commitment to focus on deferred maintenance. Despite continuing to recover from a challenging financial situation, the District has made the choice to continue to address its deferred maintenance backlog and bring its existing assets to a state of good repair.

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 open up additional private sources of funding that could supplement the District's more traditional tools for funding infrastructure. While P3s have their own benefits and potential drawbacks, the fact that the District has a detailed asset registry and a thorough knowledge of all of its assets and their conditions, 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. As a result, certain capital projects were identified as high priorities, including

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streetlight modernization, a replacement of the Henry J. Daly building (which houses the headquarters of the Metropolitan Police Department), a new correctional facility, and several other high-cost facilities and projects. These projects, 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. For example, both the Henry J. Daly building and a new correctional facility are conservatively estimated to cost between $500 and $700 million each to replace. These types of projects might provide an excellent opportunity for public-private partnerships. In fact, progress is being made in advancing the District's first P3 project. After being beset by many challenges, DDOT and OP3 are currently in the final phases of evaluating the proposals that were received for the smart street lighting P3 project in preparation for an award in the very near future. The successful award, and completion, of this project should hopefully pave the way for a greater use of public-private partnerships to address some of the District's backlog of unmet capital needs.

Washington Metropolitan Area Transit Authority (Metro)

Beginning in 2016, the OCFO conducted a comprehensive financial analysis of the long-term capital and operating position of Metro based on publicly available financial information and in consultation with Metro staff. This analysis was then shared with, and thoroughly vetted by, all of the other jurisdictions in the Metro compact through the Metropolitan Washington Council of Governments (MWCOG), as well as with various other stakeholders throughout the region. This analysis identified a backlog of critical capital needs of approximately $15.5 billion to return the system to a state of good repair (SGR) over the next decade. Given certain assumptions about the long-term level of federal funding for Metro, as well as continued growth in contributions from the compact jurisdictions, the analysis identified a remaining capital funding gap over the next decade of approximately $6.2 billion. The District's share of this estimated shortfall would have been approximately $2.2 billion over that time period, with no discernable way to fund that gap without likely severe cuts to the District's other infrastructure priorities.

As a result of a comprehensive analysis from the OCFO, and working through the Metropolitan Washington Council of Governments, a regional consensus was reached on the need to provide Metro with additional funding to meet their critical capital needs to help return the system to a state of good repair within a decade. After extensive consultation with Metro staff, and the jurisdictions through MWCOG, it was determined that additional funding of approximately $500 million per year was needed by Metro in order to be able to debt finance its capital funding gap to achieve a state of good repair within a decade. While no consensus could be reached on a universal approach to providing this funding, such as a regional sales tax, it was ultimately agreed upon by the District, the State of Maryland and the Commonwealth of Virginia to provide collectively, an additional $500 million annually to Metro beginning in FY 2020 from a variety of sources determined by each respective jurisdiction. The District, for its part, has dedicated a portion of its sales tax base as its source for this new dedicated funding for Metro. During the 2018-2019 legislative session the District of Columbia, the State of Maryland and the Commonwealth of Virginia each adopted legislation to provide their respective shares of the $500 million of additional capital funding for Metro, with annual funding beginning in fiscal year 2020. This regional agreement on new, dedicated funding for Metro's capital program, which had been thought impossible to achieve for decades, should help to solve a looming problem for the region by allowing Metro to address its critical infrastructure needs, thereby keeping this economic growth engine for the region from falling into further disrepair.

Summary and Conclusions

The engineer and historian Henry Petroski says in his book <u>The Road Taken: The History and Future of America's Infrastructure</u> that *poor infrastructure can impose large costs on the U.S. economy. In addition to the threat to human safety of catastrophic failures such as bridge collapses or dam breaches, inadequately maintained roads, trains, and waterways cost billions of dollars in lost economic productivity.* While the District continues to better maintain its assets overall compared to the national average, as scored by the ASCE in their 2021 report card, 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 where the economic recovery will be driven more by the trajectory of the coronavirus than by normal economic cycles. The District could face an additional challenge in meeting the time frame spelled out in this report to catch up with all unmet needs. Ongoing supply chain disruptions and global shortage of semiconductors and vehicles could take an extended time to resolve making procuring replacement parts for assets s in a timely manner more challenging.

The District's approach to proper asset management included the development of CARSS, which 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 building its FY 2022-2027 CIP. The CARSS analysis highlighted a total capital funding need of approximately $13.5 billion during the six-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 six-year capital planning period. The District's highest priority capital needs are funded in the FY 2022-2027 CIP at a cost of roughly $9 billion, however approximately $4.5 billion in capital needs require funding outside of the current CIP period. Approximately $1.5 billion of that unfunded amount, or roughly thirty-five percent, are related to maintenance of existing assets. 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 25% from the amount identified in the initial long-range capital financial plan report in 2016 report, even while dealing with significant challenges caused by the impacts of the COVID-19 pandemic.

As is detailed in this report, if the District commits to borrowing up to its statutory maximum level of twelve percent (12%) of general fund expenses, as well as commits to increase pay-as-you-go (or cash) funding for capital to an amount averaging roughly four percent (4%) of the general fund budget, it can fund all deferred maintenance and new capital needs by as early as 2031. In other words, if sixteen percent (16%) of the District's budget is committed to capital, with the remaining eighty- four percent (84%) spent on operations and programs, the District can have 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 newly enjoyed 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 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.

Finally, although there is a bipartisan infrastructure bill that could provide additional federal funds to support unmet capital needs, the District's current long-term capital plan uses local resources to address its critical infrastructure needs identified by CARSS and its long-range financial planning tools. The fact that the District is largely unique amongst state and local governments in having a comprehensive inventory of all its assets, as well as condition assessment information on many of them, put the District in a position to quickly identify projects and justify the use of any additional federal funding that might flow from the bipartisan infrastructure bill should it become law.

Appendix A

**Approach to Developing the Capital
Asset Replacement Scheduling System (CARSS) &
Highlights of the FY 2022-2027 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 of 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 to replace PowerPlan as the District's software solutions provider for CARSS. The buildout of the new software system supported by Arcadis Gen is expected to be completed during the 2nd quarter of FY 2022.

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, in order 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

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[1] Government Finance Officers Association, *Best Practice: Asset Maintenance and Replacement*, approved by the GFOA Executive Board, March, 2010. Retrieved from: http://www.gfoa.org/asset-maintenance-and-replacement on 9/26/15.

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.

Asset Class	Asset Type	Asset Atributes
Horizontal Infrastructure	• Streets • Sidewalks • Alleys • Bridges	Length, Width, Age, Useful Life, Remaining Life, Curent Condition, Name, Brick, Cement, Gravel, Asphault
Vertical Infrastructure	• General Support Facilities • School Facilities • Parks, Playgrounds, Athletic Fields • Public Libraries	Amenties, Substructure, Shell, Interior, Services, Equipment, Construction, SSL, Apraised Value, Assesed 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, Curent Age, Remaing Life, Maintenance Cost, Repair Cost, Warnty Cost, Milage, Engine Hours, Agency Owner,
Information Technology	• Computer Hardware • Software Purchase • IT Development • Communication Equipment	Comunication 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, Comunication 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 databases 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.
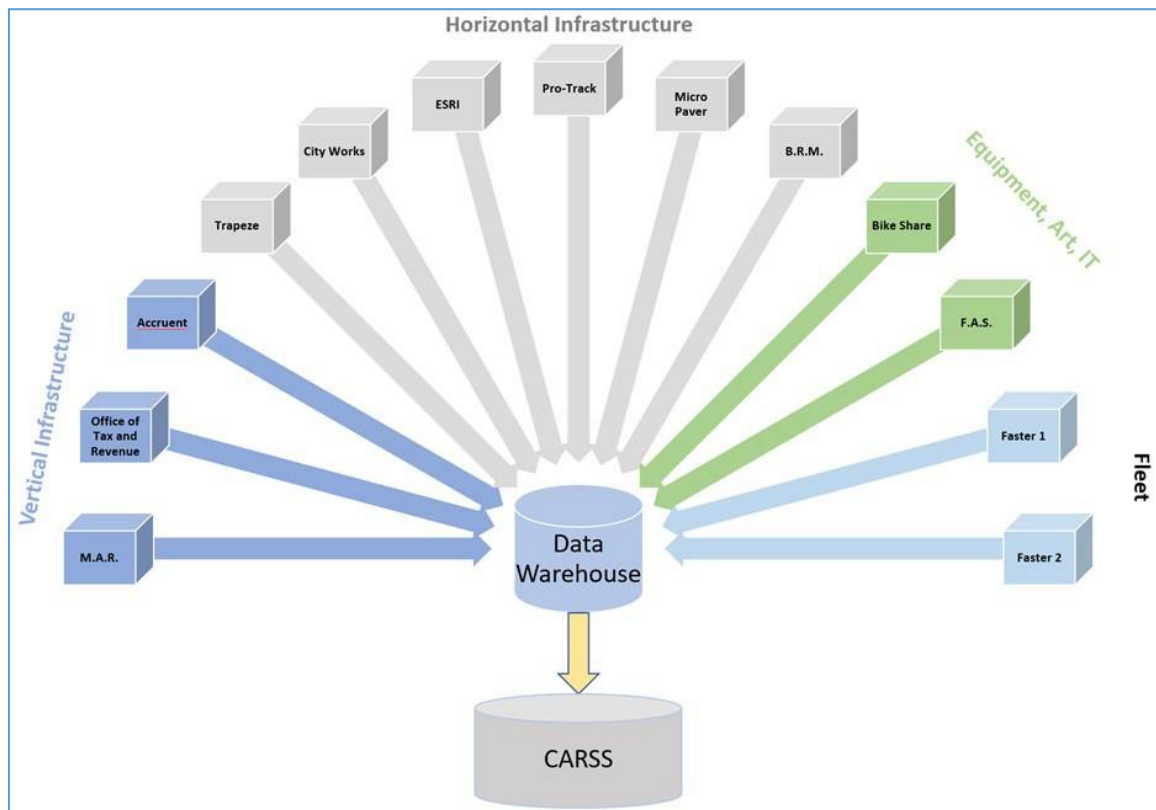
The bottom-up approach has been used for all horizontal infrastructure and facilities, including building system components in the FY 2022-FY 2027 CIP.

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 2022-2027 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 in order 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 2022-2027 CIP. The unfunded projects represent the extent of the District's capital infrastructure funding gap, as seen in the table below.

Figure 1: Infrastructure Funding Gap

Total Unfunded Capital Needs During the 6-Year CIP Period

(in $ millions)

Fiscal Year	2022	2023	2024	2025	2026	2027	6-Year Total
Unfunded Capital Maintenance Projects	$282.8	$241.5	$262.1	$309.3	$267.5	$224.4	$1,587.7
Unfunded New Capital Projects	$216.4	$356.8	$301.9	$987.0	$747.2	$344.5	$2,953.8
Total Unfunded Capital Needs	$499.2	$598.3	$564.0	$1,296.3	$1,014.8	$568.9	$4,541.5

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 2)* reflects all of 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 2: Asset Inventory

Assets and Their Value in CARSS

	Number of Assets *	Percentage of Total Asset Classification		FY 2020 CAFR Book Value of Asset Type ($000) *	% of Assets Captured
Horizontal Infrastructure					
Ramps	564	100%			
Service Roads	124	100%			
Streets (blockkey)	36,262	100%		3,684,746	100.0%
Sidewalks (blockkey)	47,184	100%			
Trails	90	100%			
Alleys (blockkey)	9,578	100%			
Bridges	371	100%		226,079	100.0%
Bikeshare Terminals/Racks	290	100%		13,091	100.0%
Street Car Rail (Track Segments)	41	100%		209,300	100.0%
Total	**94,504**	**100.0%**		**$ 4,133,216**	**100.0%**
Facilities					
Buildings	642	100%			
Building Components	187,584	100%		8,041,903	100.0%
Amenities (Pools, courts, Playgrounds etc)	568	100%			
Total	**188,794**	**100.0%**		**$ 8,041,903**	**100.0%**
Equipment and IT					
Fleet	5,679	100%			
Boats/Ships	23	100%			
Aircraft	2	100%			
Circulator Buses	72	100%		456,246	100.0%
Street Cars	6	100%			
Street Car System Equipment	143	100%			
Equipment (>$5K)	10,785	100%			
IT and Furniture	11,872	100%			
Total	**28,582**	**100.0%**		**$ 456,246**	**100.0%**
Land					
Land (count by parcel)	4,214	100%		$ 978,787	100.0%
Grand Total **	**316,094**	**100.00%**		**$ 13,610,152**	**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 3)* 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 3: Asset Tree

GIS Capability
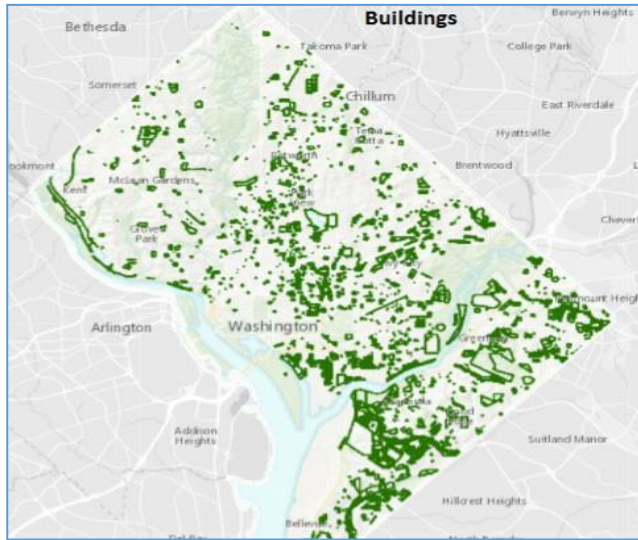
Information on the more than 640 municipally owned buildings within the District has been captured in CARSS and displayed in the related GIS system (see image, left). However, while data might have existed on the type, location and assessed value of a particular building, information on the current condition 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.
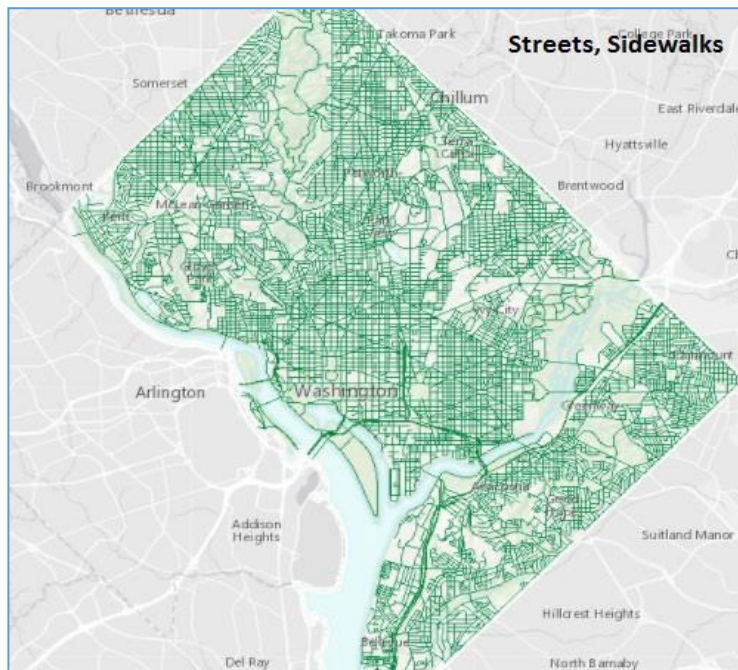
The District now has the ability to map all streets, service roads, sidewalks and alleys utilizing data in CARSS and GIS. In an example of this new ability, the image to the left illustrates all streets and sidewalks in the District.

More impressively is the ability of a user to now "drill down" on any portion of the map to look at 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.
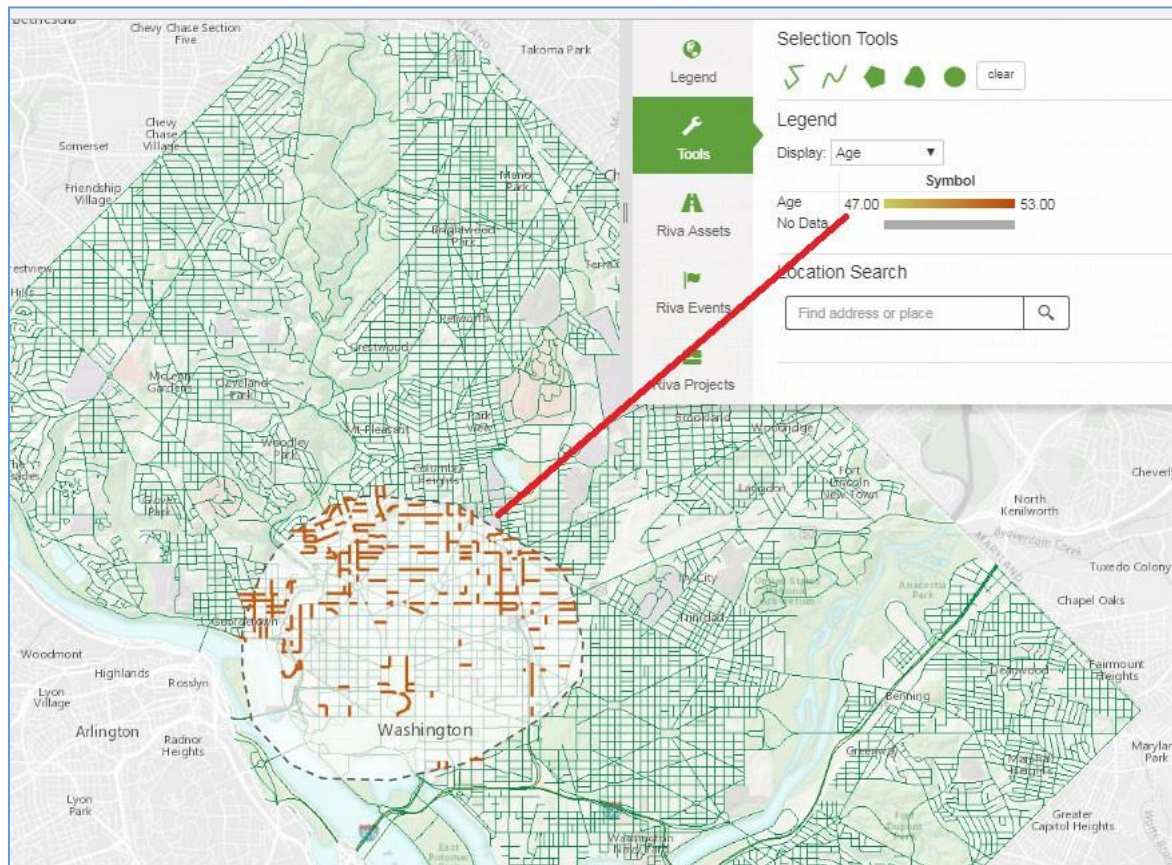
Enhanced Analytical Capabilities

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 4* below reflects the current total miles of all local streets and roads in the District, by ward.

Figure 4: Local Roads – Mileage per Ward
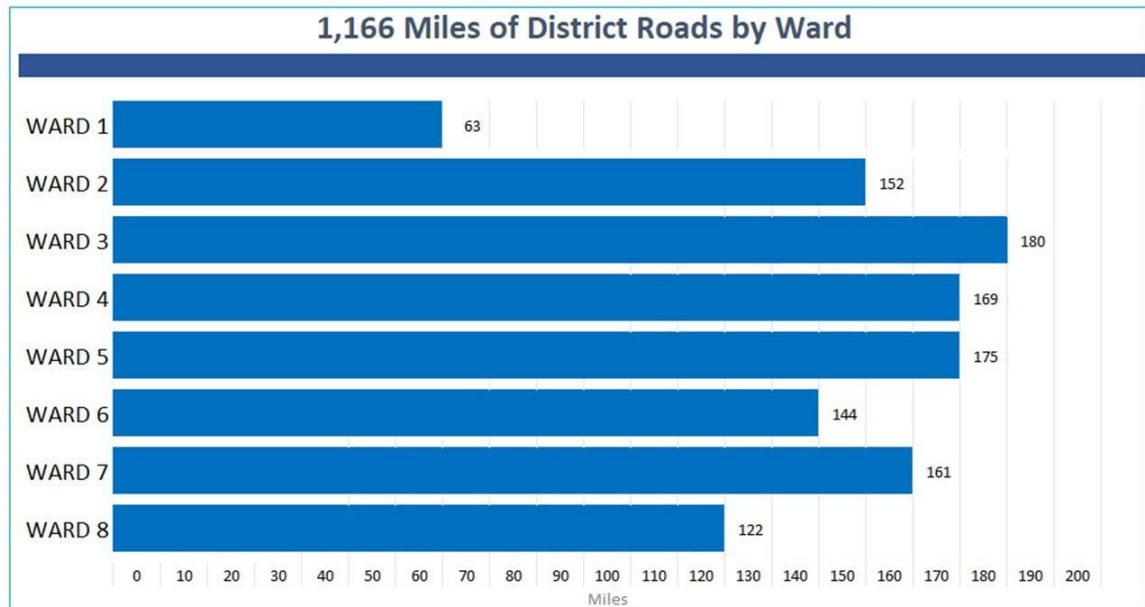
To further highlight the CARSS data and the value of enhanced analytics, *Figure 5* provides summary level details on the condition of various road types. This kind of data is critical in determining the costs and needed budget for maintaining roads across the District.

Figure 5: Road Surface Details & Replacement Costs

Road Type	Condition Average	Total Miles	Total Rehabs	Total Rehab Costs	Total Replacements	Total Replacement Costs	Total Needs	Total Needs Cost
Asphalt	61.94	1,129	24,705	80,183,559	4,256	59,042,452	28,961	139,226,011
Concrete	72.24	37	1,052	3,454,479	171	1,627,487	1,223	5,081,966
Totals	**67.09**	**1,166**	**25,757**	**83,638,038**	**4,427**	**60,669,939**	**30,184**	**144,307,977**

Further analysis can be done looking at the various road conditions by ward in *Figure 6* 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 6: Local Roads Condition - by Ward
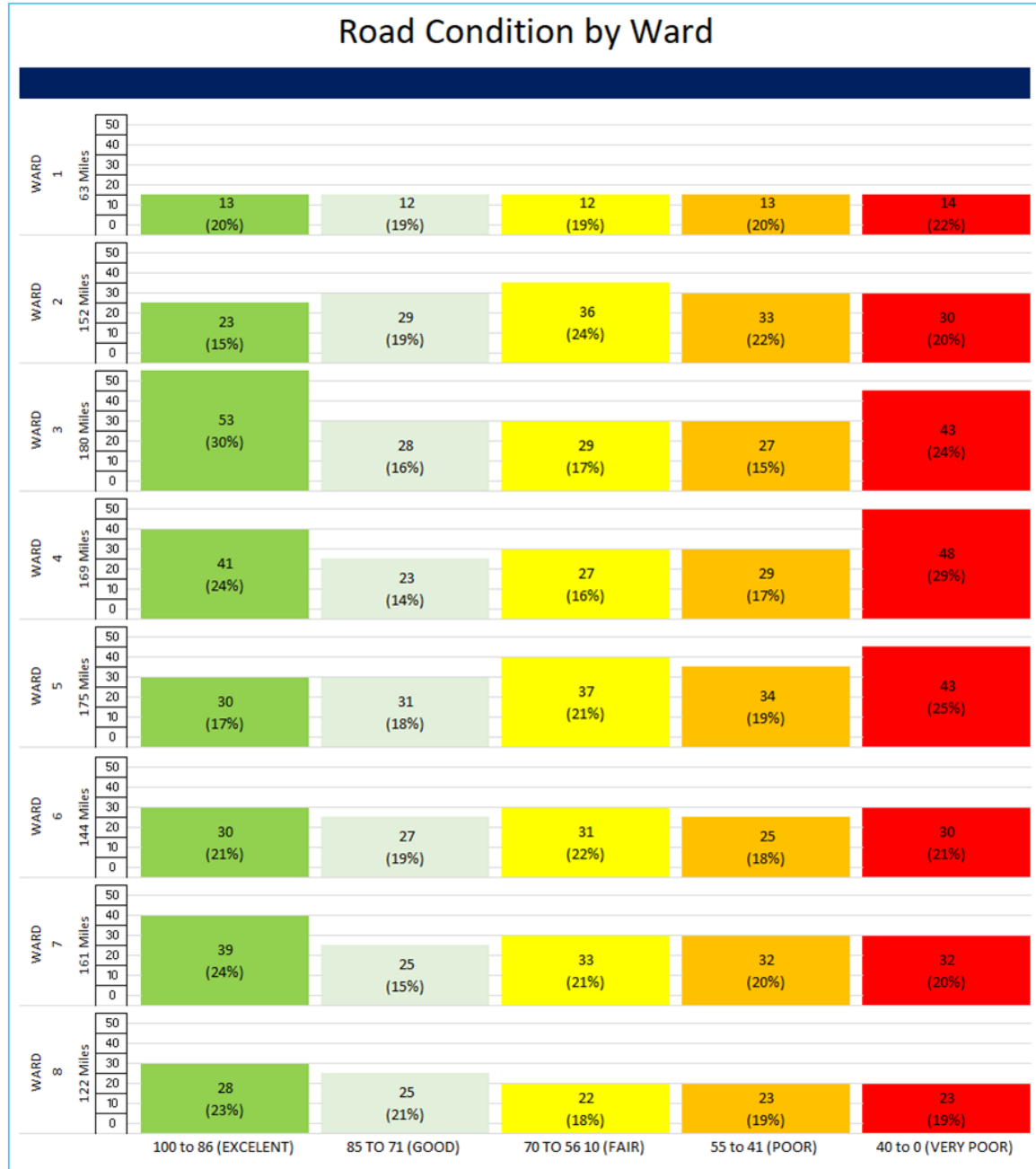
Drilling down further into the data will enable the user to ultimately see the specific information around any given block of roadway in the District. Individual asset information on roadway blocks is presented with a level of detail similar to the individual asset data for vehicles shown in *Figure 9* on page A-15.

Fleet "Drill Down"

When viewing all 5,992 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 7)* 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 7: Total Fleet Assets/ Condition Overview

District's Fleet by Agency

Agency	Number of Vehicles
MPD	1635
DPW	1235
OSSE	579
FEMS	428
DDOT	405
DGS	221
DCRA	90
CFSA	84
DOH	77
DPR	64
DYRS	50
BOES	59
DOEE	40
DCPL	32

* Vehicle Types of 30 or more are displayed
** Active Vehicles only; non-self-propelled vehicles, trailers, and golf carts are excluded
***DPW Manages the Districts fleet excluding: MPD, OSSE, FEMS, DOC, DCHA

Asset Condition Distribution

Condition	# of vehicles
0 to 5 (VERY GOOD)	1,186 (21%)
6 to 10 (GOOD)	1,572 (28%)
11 to 15 (FAIR)	1,272 (22%)
16 to 20 (POOR/REPLACE)	1,651 (29%)

As the chart above shows 1,651 vehicles, or approximately 29% 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 8*, 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 8: FEMS Fleet Data

Fire Emergency Medical Vehicles by Type

Vehicle Type	Number of Vehicles
Ambulances	108
Rescue Squads	90
Command	68
Pumper Trucks	54
Administrative	52
Ladder Trucks	30
Other Response	26

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 9)* 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 9: FEMS Fleet Condition

Ambulances, Pumper Trucks, Command Vehicles, Rescue and Response, Administrative, Ladder Trucks and Other

Asset Condition Distribution

Ambulances 108 Count
- 0 to 5 (VERY GOOD): 22 (20%)
- 6 to 10 (GOOD): 32 (30%)
- 11 to 15 (FAIR): 21 (19%)
- 16 to 20 (POOR/REPLACE): 33 (31%)

Pumper Trucks 54 Count
- 0 to 5 (VERY GOOD): 17 (31%)
- 6 to 10 (GOOD): 13 (24%)
- 11 to 15 (FAIR): 15 (28%)
- 16 to 20 (POOR/REPLACE): 9 (17%)

Command Vehicles 68 Count
- 0 to 5 (VERY GOOD): 20 (29%)
- 6 to 10 (GOOD): 25 (37%)
- 11 to 15 (FAIR): 8 (12%)
- 16 to 20 (POOR/REPLACE): 15 (22%)

Rescue and Response 90 Count
- 0 to 5 (VERY GOOD): 5 (6%)
- 6 to 10 (GOOD): 39 (43%)
- 11 to 15 (FAIR): 21 (23%)
- 16 to 20 (POOR/REPLACE): 25 (28%)

Administrative 52 Count
- 0 to 5 (VERY GOOD): 0 (0%)
- 6 to 10 (GOOD): 12 (23%)
- 11 to 15 (FAIR): 14 (27%)
- 16 to 20 (POOR/REPLACE): 26 (50%)

Ladder Trucks 30 Count
- 0 to 5 (VERY GOOD): 1 (3%)
- 6 to 10 (GOOD): 13 (43%)
- 11 to 15 (FAIR): 6 (20%)
- 16 to 20 (POOR/REPLACE): 10 (33%)

Other 26 Count
- 0 to 5 (VERY GOOD): 3 (12%)
- 6 to 10 (GOOD): 6 (23%)
- 11 to 15 (FAIR): 7 (27%)
- 16 to 20 (POOR/REPLACE): 10 (38%)

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 54 pumper trucks with an average age of approximately 8.3 years and maintenance costs approaching $7 million, the highest of all of the vehicle types. The data further shows that there are 9 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 17% 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 10)* 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 10: Pumper Trucks Data

Acquisition Date	Vehicle Type	Age	Make	Model	Year	Milage	Maintenance Cost
1-Feb-19	Pumper Truck	3.33	PIERCE	ARROW XT	2018	29,898	$25,687
1-Feb-19	Pumper Truck	3.25	PIERCE	ARROW XT	2018	35,500	$26,556
1-Feb-19	Pumper Truck	3.25	PIERCE	ARROW XT	2018	49,318	$33,541
1-Feb-19	Pumper Truck	3.25	PIERCE	ARROW XT	2018	39,742	$36,064
2-Jan-19	Pumper Truck	3.33	PIERCE	ARROW XT	2018	35,719	$20,795
2-Jan-19	Pumper Truck	3.33	PIERCE	ARROW XT	2018	20,176	$10,316
2-Jan-19	Pumper Truck	3.33	PIERCE	ARROW XT	2018	23,875	$11,019
2-Jan-19	Pumper Truck	3.25	PIERCE	ARROW XT	2018	29,599	$23,015
3-Dec-18	Pumper Truck	3.33	SEAGRAVE	PUMPER	2018	26,886	$32,853
3-Dec-18	Pumper Truck	3.33	SEAGRAVE	PUMPER	2018	48,552	$25,437
3-Dec-18	Pumper Truck	3.33	SEAGRAVE	PUMPER	2017	37,407	$22,864
17-Aug-18	Pumper Truck	3.92	SEAGRAVE	PUMPER	2018	33,317	$17,423
17-Aug-18	Pumper Truck	3.92	SEAGRAVE	PUMPER	2018	48,690	$17,296
17-Aug-18	Pumper Truck	3.92	SEAGRAVE	PUMPER	2018	30,975	$17,077
30-Jun-18	Pumper Truck	4.75	PIERCE	ARROW XT	2018	42,808	$20,945
12-Jun-18	Pumper Truck	3.33	SEAGRAVE	PUMPER	2018	43,552	$43,530
12-Jun-18	Pumper Truck	3.33	SEAGRAVE	PUMPER	2018	25,916	$14,757
12-Jun-18	Pumper Truck	3.33	SEAGRAVE	PUMPER	2018	31,358	$14,328
12-Jun-18	Pumper Truck	3.33	SEAGRAVE	PUMPER	2018	22,671	$20,638
12-Jun-18	Pumper Truck	3.33	SEAGRAVE	PUMPER	2018	37,053	$16,807
8-Jun-18	Pumper Truck	3.33	SEAGRAVE	PUMPER	2018	31,444	$30,040
1-Jun-18	Pumper Truck	3.33	SEAGRAVE	PUMPER	2018	42,887	$34,714

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 11)* 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 11: 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
Capitilized Cost	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 2020 report due to the delay in obtaining enhanced facility condition assessments, however that is expected to change as condition assessments are received from Accruent, the new 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, 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 has commenced 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 of the agencies throughout the District that manage capital assets, as well as to budget staff of the EOM and the 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 initiates. 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 is to help DCHA better understand the true size and amount of its deferred maintenance and unmet capital needs. By utilizing CARSS, which is now widely accepted throughout the District, DCHA will have a more authoritative basis for determining its true funding needs then currently exists. This will allow them, along with their partners at the District and elsewhere, 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 unit on that site, as well as all public areas, central HVAC plants, roofs, etc. The chart below *(Figure 12)* shows a representation of the DCHA asset tree as it currently exists in CARSS for the 35 public housing units that are going to be evaluated as part of the 2020/2021 physical needs assessment that DCHA has commenced, as is required by the U.S. Department of Housing and Urban Development.

The chart below illustrates the housing complexes that are either currently in CARSS or are in the process of being added. 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 efficiencies and one-bedrooms up to five-bedroom units, each of which are tracked separately. CARSS also has the ability to 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, as additional data is collected from the physical needs assessments currently being performed by the consultant hired by DCHA, CARSS will have the ability to drill down into the

various sub-systems of individual buildings, such as roofs, windows, doors, HVAC units, common areas, etc., that will allow for more precise tracking of critical assets and more data-driven capital planning.

The District continues to work with capital projects staff at DCHA, along with outside vendors, to develop a comprehensive funding gap needs analysis for all 35 properties that the OCFO has been asked to analyze. CARSS assists the DCHA in developing and refining their 20-year transformation plan 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. Utilizing that data, as well as sophisticated financial models developed by the OCFO's special public housing financial consultants, CSG Advisors, the goal is to work with Authority staff to develop a more data-driven long-term capital budget. This approach will assist District policymakers in evaluating the planned submission of capital budget request from the Authority as they look to possibly be included in the District's upcoming FY 2023-2028 CIP.

Figure 12: DCHA Asset Tree in CARSS
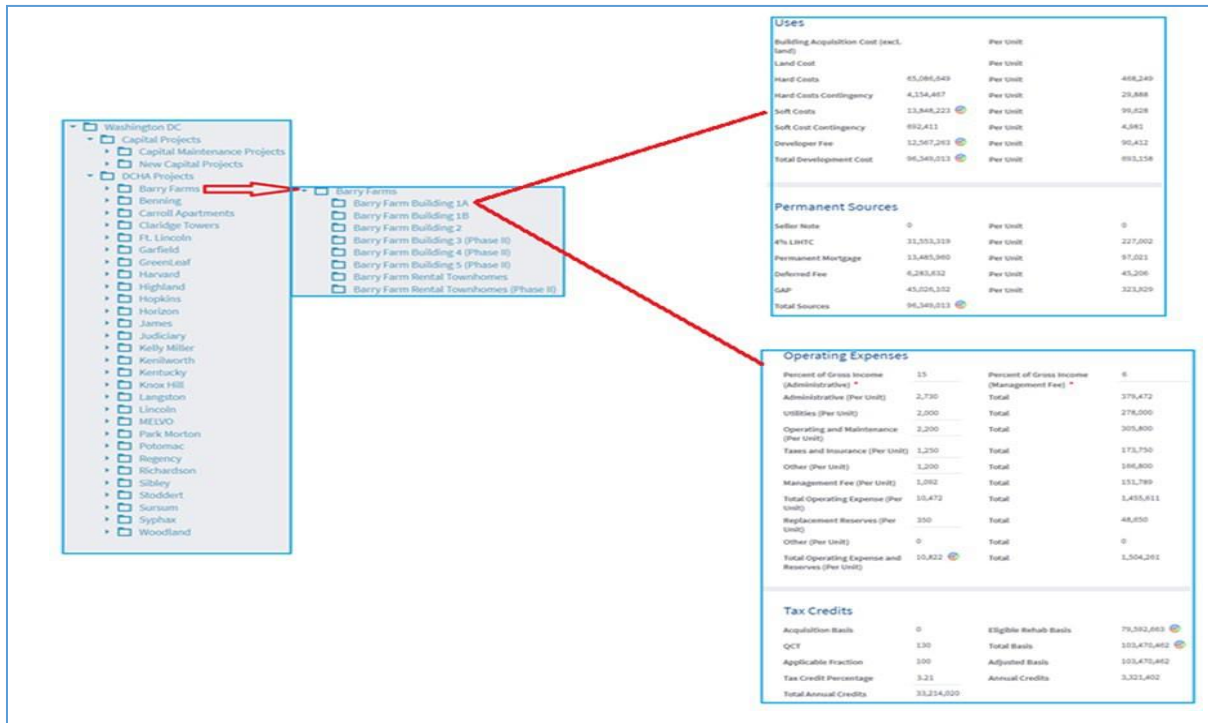
Appendix B

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 304. This total number of capital projects requesting budget is lower than the figure shown in last year's report due to a change in methodology on how capital projects were organized during the review process. 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.
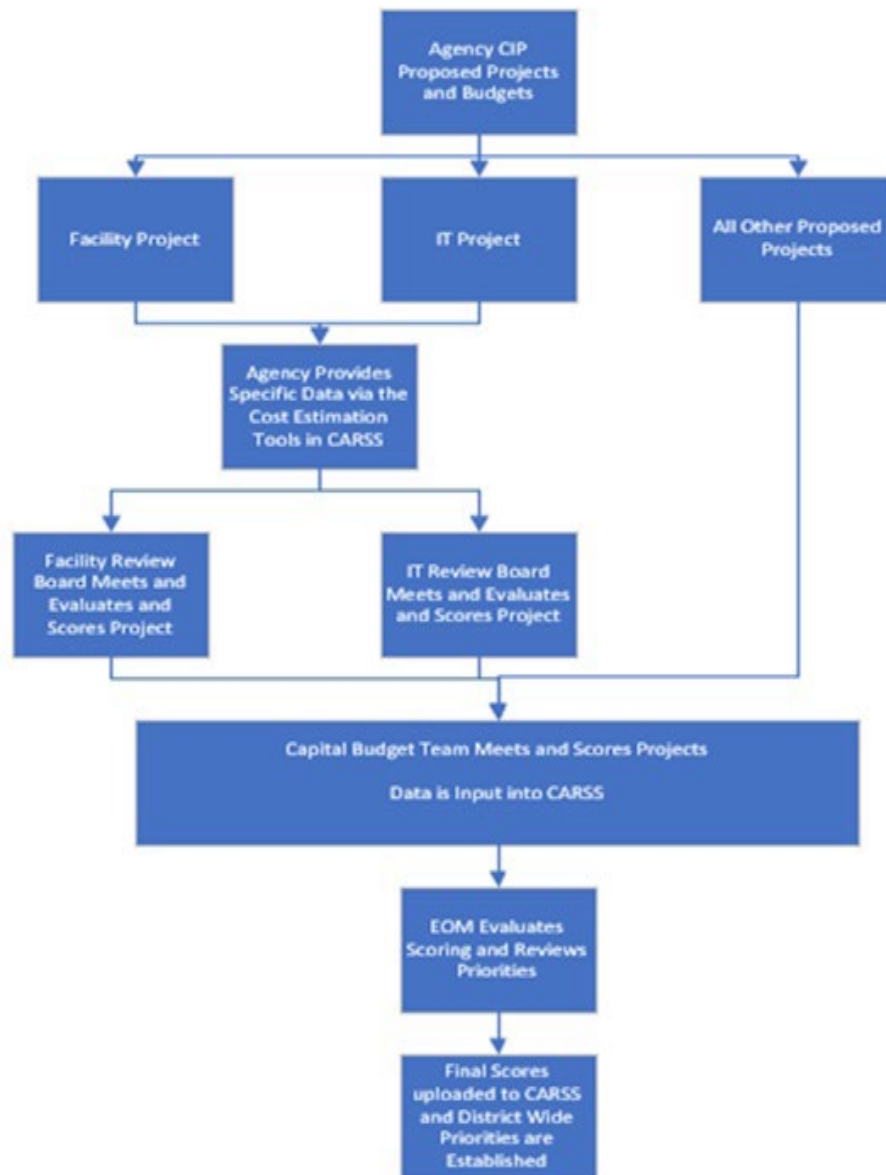
The Mayor's Office of Public Private Partnerships reviewed all projects for their potential as a P3 opportunity. They scored the opportunities on a scale of "0 to 4" where zero reflects no opportunity for the project to be structured as a P3, and "4" representing a very high probability of a P3 opportunity. 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.

```
                    ┌─────────────────┐
                    │  Agency CIP     │
                    │ Proposed Projects│
                    │  and Budgets    │
                    └─────────────────┘
```

Agency CIP Proposed Projects and Budgets

Facility Project

IT Project

All Other Proposed Projects

Agency Provides Specific Data via the Cost Estimation Tools in CARSS

Facility Review Board Meets and Evaluates and Scores Project

IT Review Board Meets and Evaluates and Scores Project

Capital Budget Team Meets and Scores Projects

Data is Input into CARSS

EOM Evaluates Scoring and Reviews Priorities

Final Scores uploaded to CARSS and District Wide Priorities are Established

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.

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

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 361 proposed capital projects, since there was likely no possibility that all of the capital needs could be funded in the current CIP, especially given the decreased revenues caused by the coronavirus-induced recession. 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 361 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 361. 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.
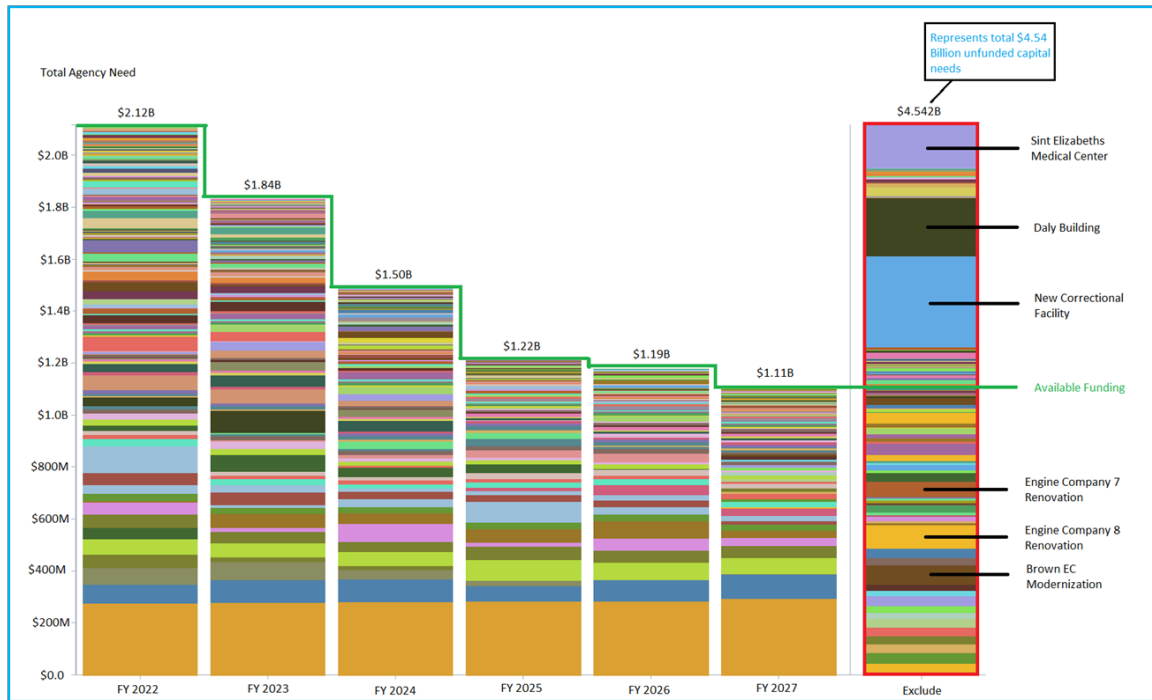
The following screen shot of the visual leveler shows all the capital project requests from the various agencies as part of the FY 2022 – FY 2027 CIP budget formulation process, relative to the amount of funding available, represented by the red lines.
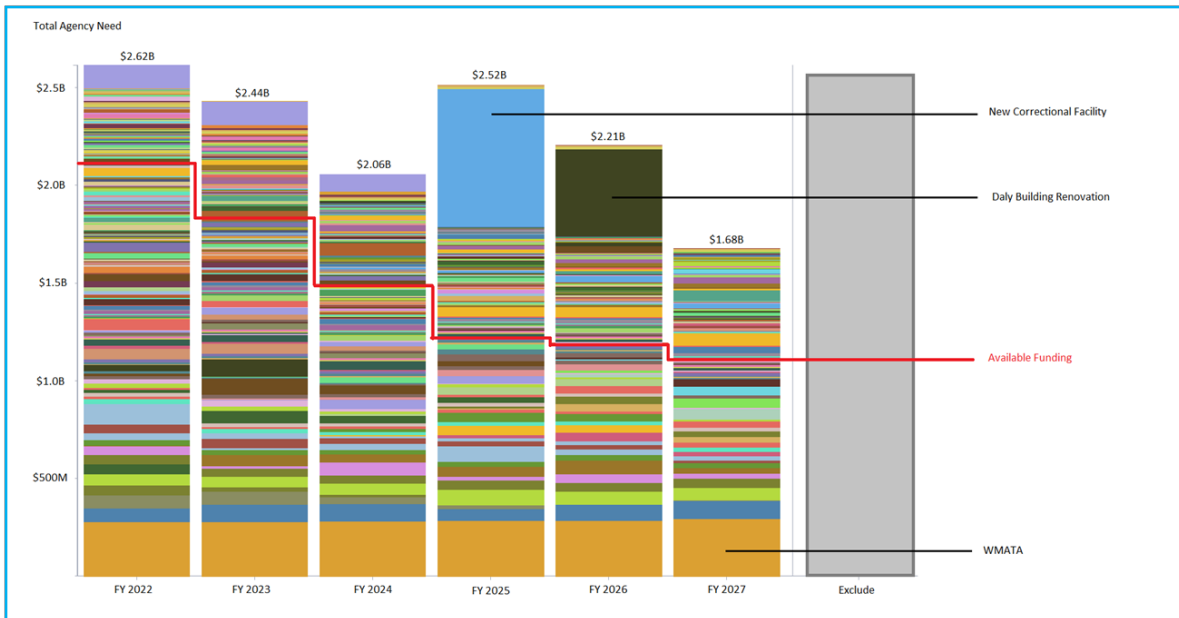
The visual leveler then enables certain administrative users to maneuver the priority of individual projects by year in an attempt to determine a set of projects that can fit within the resource and budget limits for any particular year. The scenarios are captured with the results reflected in each year's 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.

Total Agency Need

Represents total $4.54 Billion unfunded capital needs

$4.542B

- Sint Elizabeths Medical Center
- Daly Building
- New Correctional Facility
- Available Funding
- Engine Company 7 Renovation
- Engine Company 8 Renovation
- Brown EC Modernization

FY 2022: $2.12B
FY 2023: $1.84B
FY 2024: $1.50B
FY 2025: $1.22B
FY 2026: $1.19B
FY 2027: $1.11B
Exclude

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 due to reduced revenues brought on by the pandemic, were placed in the "excluded" column on the far right of the chart (highlighted in red). 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 185 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 through the use of 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 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 developed by PowerPlan;
- Long-Range Financial Planning Model ("LRFPM") – which is a Microsoft Excel based model developed by PFM; and
- Long-Term Optimization Model ("LOM") – an Excel based model utilizing specifically tailored Visual Basic for Applications ("VBA") algorithms to solve for unfunded needs

Long-Range Capital Financial Model
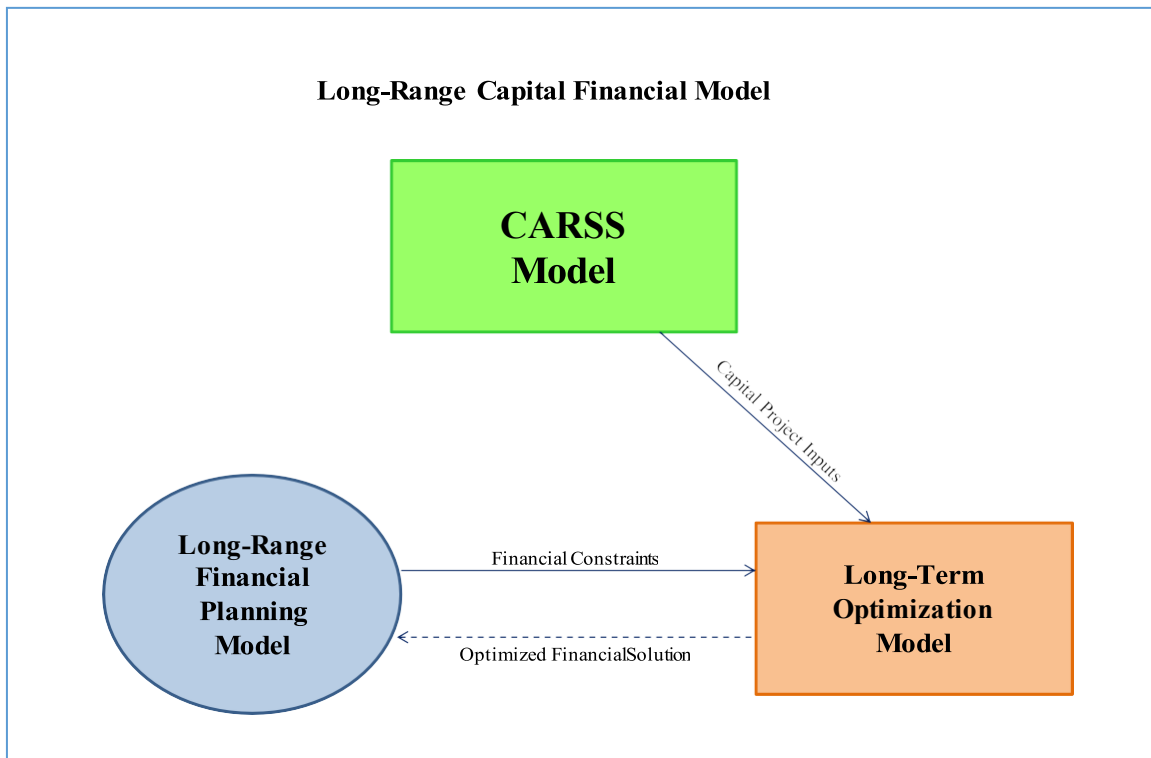
The CARSS model extracts the capital project inputs from various District Agency files and prioritizes, scores and, based on specific District criteria, ranks them in comparison to all other projects across the District. Then, under capital budget constraints and with a specific priority ranking assigned 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 in order 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, 2021, 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 2027 to fund future new capital projects.
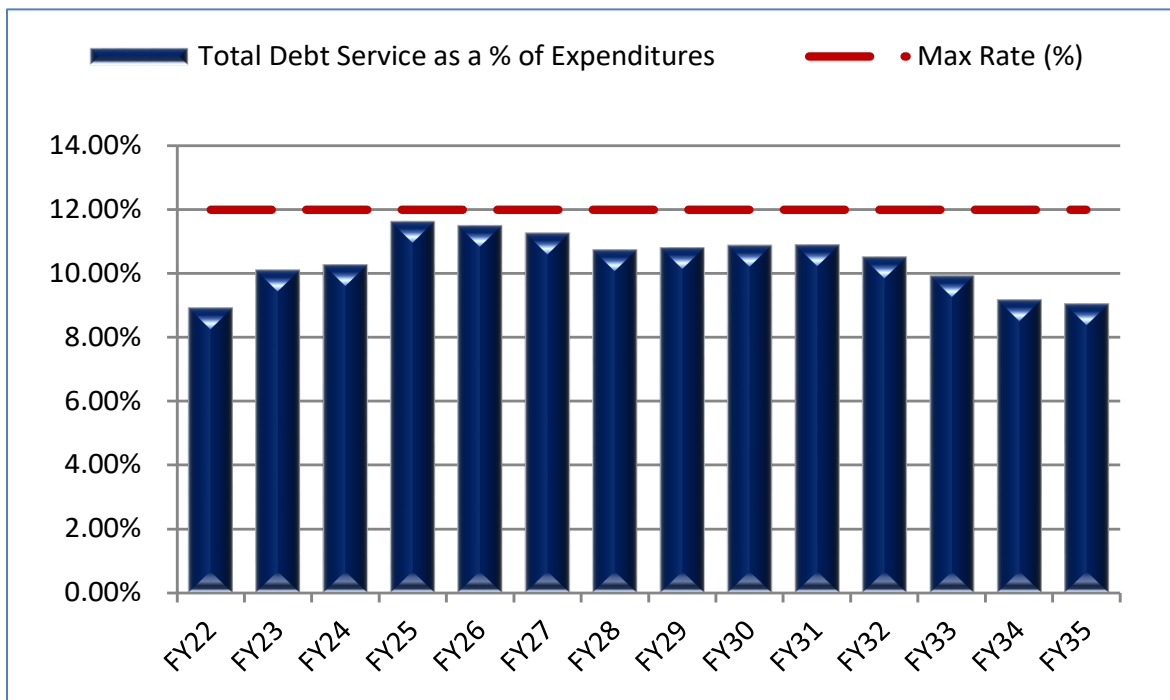
2. Varying levels of paygo or additional federal funding drive the gap:

   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. <u>No additional new capital projects:</u>

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 2022-2027 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.
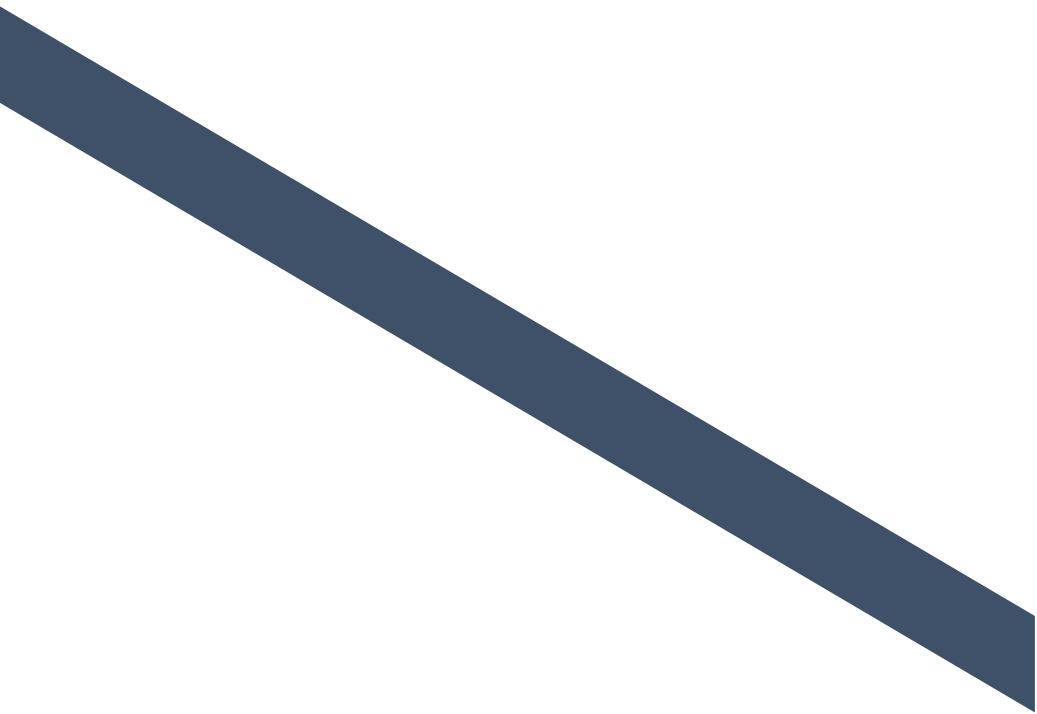
Results of Modeling Efforts

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 2036) 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 limits;
- Summarize all projected debt and expenditure detail through FY 2036; 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 2022-2027 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 is able to 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 in order to fully fund unmet capital needs by a specific year