



GOVERNMENT OF THE
DISTRICT OF COLUMBIA

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

PRODUCED BY THE OFFICE OF THE CHIEF FINANCIAL OFFICER



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District of Columbia: Long-Range Capital Financial Plan Report

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District of Columbia: Long-Range Capital Financial Plan Report

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 given the budget shortfalls caused by 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 \$8.2 billion in capital projects, with roughly \$4.3 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, especially in these uncertain times brought on by the COVID-19 pandemic.

In early March 2020, Mayor Muriel Bowser issued public health emergency orders related to the coronavirus outbreak, which initiated stay-at-home orders, closed all non-essential businesses and schools, banned all large gatherings and generally brought the economy of the District to a halt in order to combat the spread of the virus. This unprecedented shutdown of the District's economy required the Office of the Chief Financial Officer (OCFO) to make a downward revision estimated revenue in April by a combined \$1.5 billion in fiscal years 2020 and 2021 alone. This precipitous drop in revenues necessitated slashing the District's capital budget by roughly \$1 billion from what Mayor Bowser had intended to submit in her budget proposal prior to the onset of the pandemic. In addition, in its most recent revenue estimate released on September 30, 2020, the OCFO further revised downward forecasted revenues for the FY 2021-2024 budget and financial plan period, which is likely to put additional downward pressure on the District's capital budget over the next several years.

Fortunately, the District's strong financial condition 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, strong reserves and strong credit ratings that afford it access to low-cost financing. While restrictions on gathering remain and a wider reopening of the District's economy is not anticipated until sometime in 2021, the OCFO is still projecting increased economic activity and revenues in FY 2022. Finally, 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, and commits to increase pay-as-you-go (or cash) funding for capital to an amount averaging roughly four percent (4%) of general fund expenses, then it can fund all deferred maintenance and new capital needs by 2031.*** This time frame to catch up with all unmet needs is beyond the prior time frame of 2028 identified in last year's report. The three-year delay is due to the identification of additional capital needs and the impact of the pandemic on District revenues. 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 for all the District's assets. 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 needs, 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. In addition, condition assessments on all the District's assets have either been completed or are expected to be completed by fiscal year 2022. 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 2019 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 approximately \$8.2 billion of its capital needs through 2026. Decreased funding due to the onset of an economic recession brought about by the coronavirus pandemic has caused the District's overall capital funding gap to increase to approximately \$4.3 billion, or roughly the same level identified in the 2017 long-range capital financial plan report. Approximately 34% of this gap relates to infrastructure maintenance, or re-investment in currently owned assets.

Table 1 below summarizes the primary capital funding needs gap, which averages approximately \$710 million per year, or roughly 8.3% of the District's FY 2021 Local Fund revenues.

Table 1.

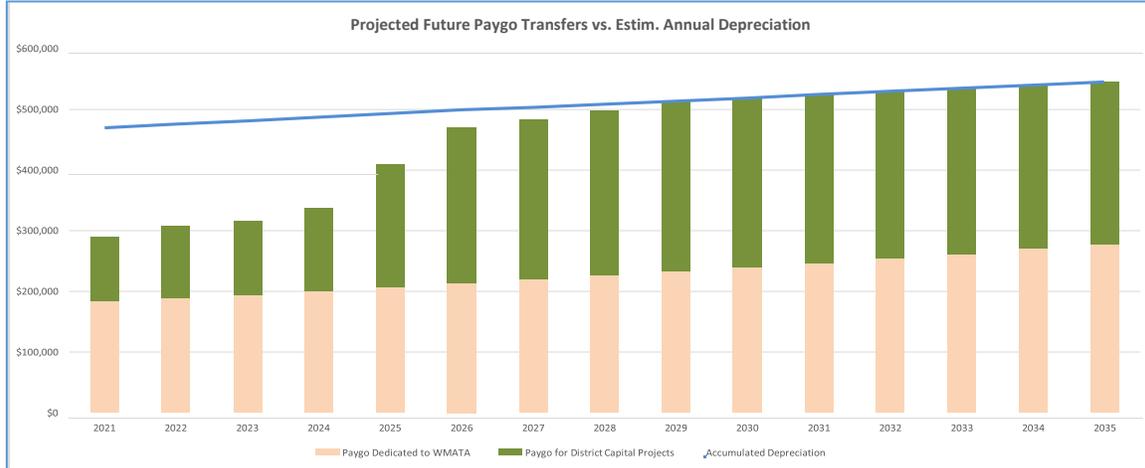
Total Unfunded Capital Needs During the 6-Year CIP Period

(in \$ millions)

Fiscal Year	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	6 year Total
Unfunded Capital Maintenance Projects	\$191.3	\$346.9	\$307.4	\$220.1	\$210.4	\$173.1	\$1,449.2
Unfunded New Capital Projects	\$311.0	\$297.7	\$280.6	\$237.0	\$980.8	\$701.6	\$2,808.6
Total Unfunded Capital Needs	\$502.3	\$644.6	\$588.0	\$457.1	\$1,191.2	\$874.6	\$4,257.9

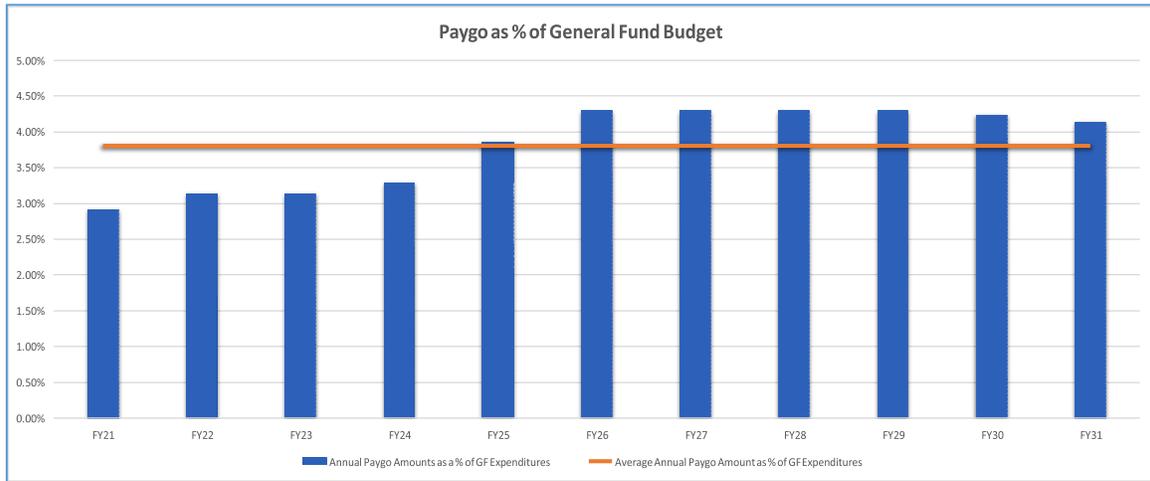
In Fiscal Year 2017, the District Council adopted legislation to increase the amount of paygo provided to support capital program needs as part of the FY 2018 Budget Support Act (*see the “Paygo Funding” section of this report for more details*). Under this law, the amount of additional funding contributed 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 two percent (2%) annually. Over the fifteen-year period studied in this report, paygo transfers for capital would average approximately \$454 million annually. The District’s current financial plan, which extends through FY 2024, includes the impact of the increased paygo levels as a result of this legislation.

Figure 1.



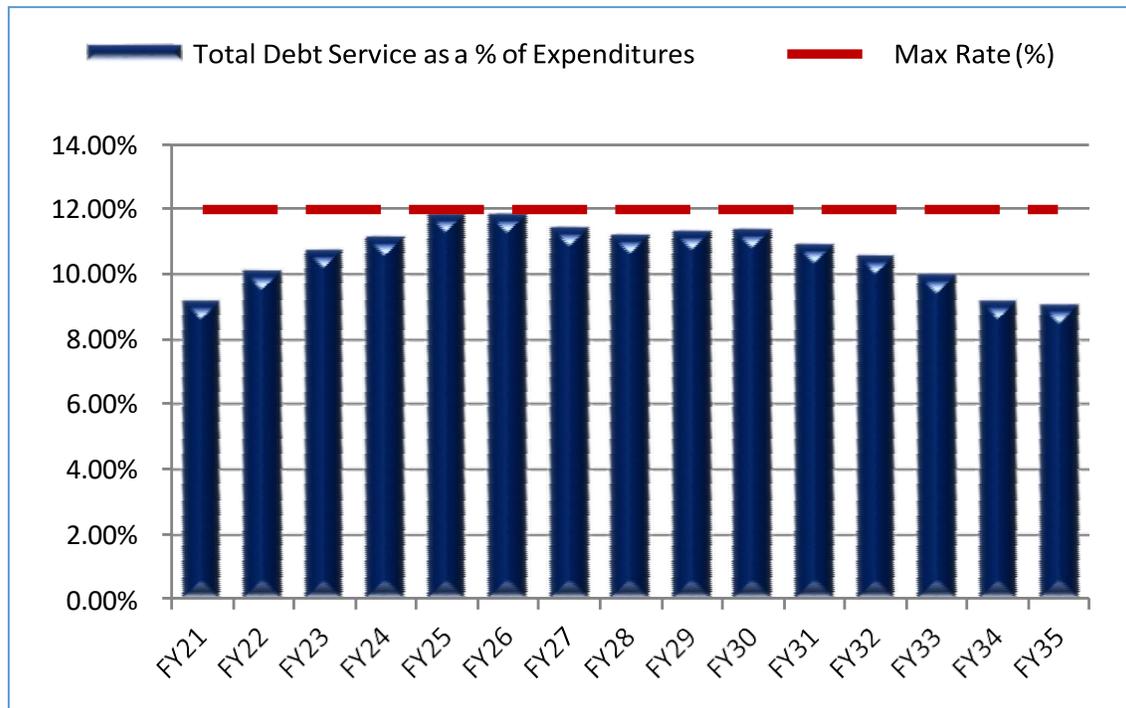
While this projected amount of paygo represents a substantial increase in funding for the capital program over past years, it represents a relatively small part of the local portion of the District’s general fund budget. As can be seen in *Figure 2* below, the annual amount of legislated paygo for capital averages almost 4% of the local portion of general fund expenditures between fiscal year 2020 and fiscal year 2031, which is when all unmet capital needs are projected to be funded.

Figure 2.



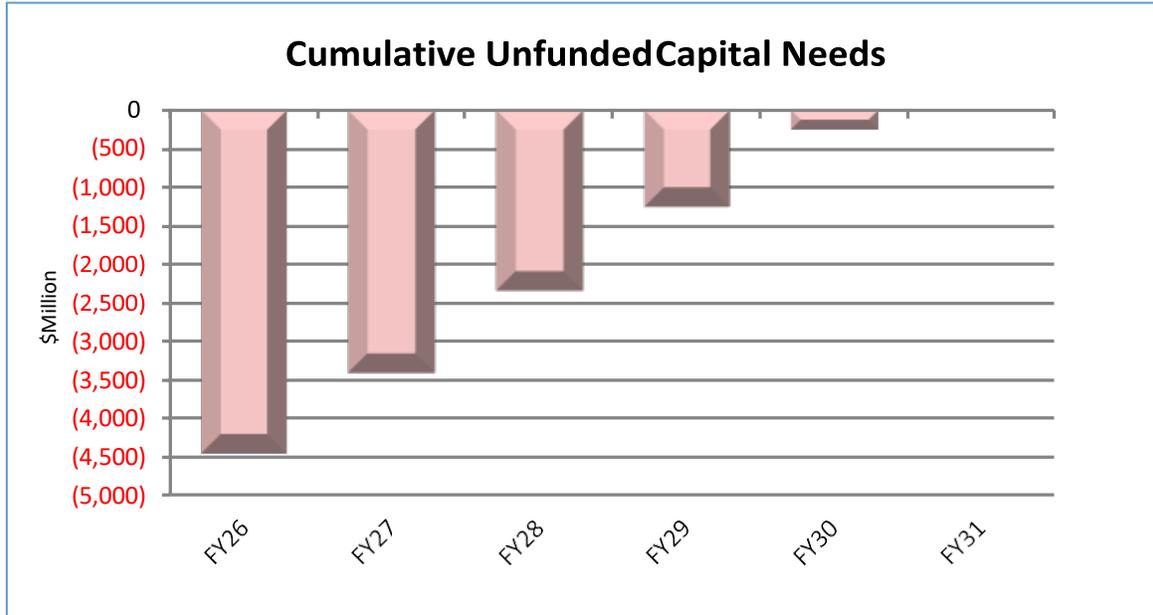
Most sectors of the District’s economy have so far proven to be resilient, even in the face of the pandemic. The combination of this resilient economy, along with the lower cost of borrowing that results from the District’s strong credit ratings, will allow the District to borrow substantial funds into the near 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 can be seen in *Figure 3* below, total debt service as a percentage of expenditures is projected to begin to decrease beginning in 2027 and thereafter, which should produce substantial additional borrowing capacity for future capital projects needed in a growing and vibrant city.

Figure 3.



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 will be able to “catch up” and fund all existing unfunded capital projects identified in CARSS, while continuing to maintain current assets, by FY 2031. As previously indicated, there remains nearly \$4.3 billion of identified, unfunded capital needs during the current CIP period. These unfunded capital needs would remain outstanding through FY 2026, as the current six-year CIP is at full capacity. However, beginning in FY 2027, 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 identified, unfunded capital needs gap fairly rapidly, and stay on course to meet its goal of funding all unmet capital needs by FY 2031, as seen below in *Figure 4*. The new target of 2031 to fund identified unmet capital needs is three years longer than shown in last year’s report, due to reduced projected revenues during the CIP period, resulting in a smaller capital budget than in prior forecasts. If economic activity, and the resulting tax revenues to the District, rebound more quickly than are currently forecasted, capital budgets could increase, which would allow unmet needs to be addressed more quickly.

Figure 4.



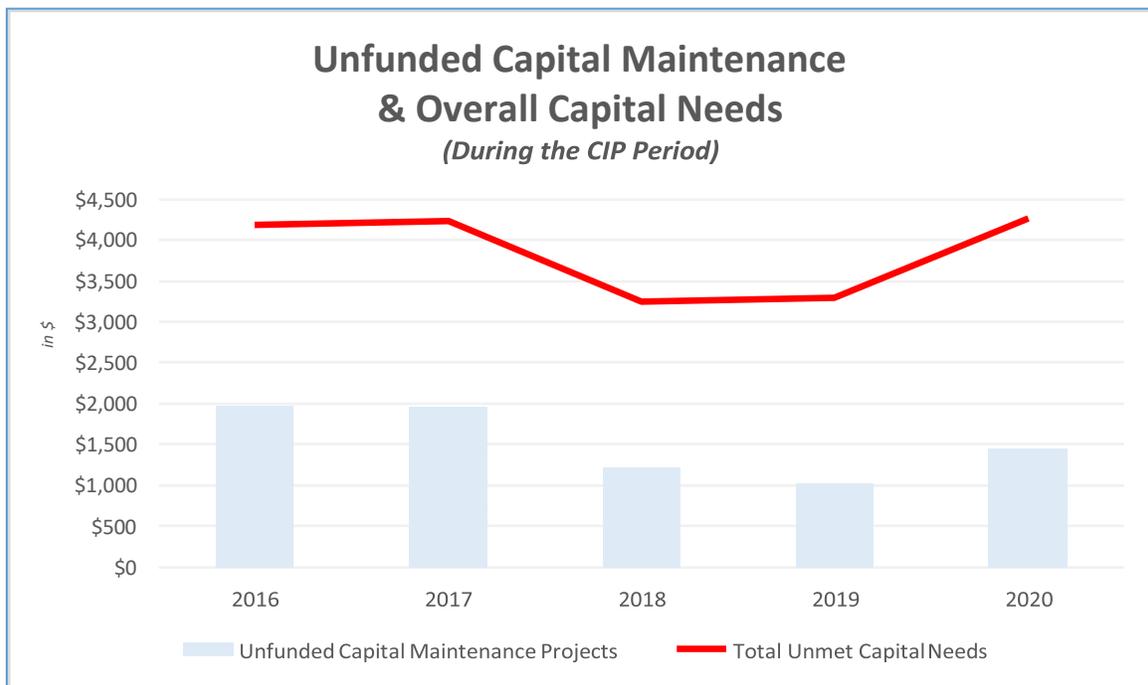
It is important to note that the estimated increases in paygo from local funds shown in *Figure 1* on page *iv* represent significant portions of the projected local funds revenue growth of the District. Allocating this level of additional paygo funding will result in properly maintained equipment and 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 allows all existing District assets to be brought to a state of good repair, while also addressing new unfunded capital projects needed to support a growing city, in approximately a decade. In other words, the roughly \$4.3 billion of capital needs not funded in

the six-year CIP could be funded by 2031 with the increased paygo levels required in legislation, as well as borrowing up to the 12% statutory debt cap limit. 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.

Since the first long-range capital financial plan report was produced in 2016, the amount of overall unfunded capital needs had decreased substantially as the District’s capital budget has grown and become more focused on addressing those unmet needs, as can be seen in *Figure 5*, until the onset of the economic recession caused by the coronavirus pandemic reversed that trend. 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 \$4.3 billion in this 2020 report. While the current CIP is roughly \$1 billion lower than what was originally planned by Mayor Bowser prior to the onset of the pandemic, the current \$8.2 billion CIP is still approximately 30% higher than the 2016 CIP, due in large part to the strength and resilience of the District’s economy, lower borrowing costs due to the District’s strong credit ratings and a greater focus on refinancing existing debt and utilizing the debt service savings for additional borrowing capacity to support the District’s capital budget.

Figure 5.



In addition, as the District’s capital budgets have increasingly focused on bringing existing assets into a state of good repair, the unmet capital maintenance needs had continued to decrease quite rapidly until the onset of the coronavirus-induced recession and the resulting cuts to the capital budget reversed that trend in 2020. As shown in *Figure 5*, unfunded capital maintenance needs, which serve as a proxy for deferred maintenance, had 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, before

rising to approximately \$1.5 billion in this year's report. This decreased level of unmet capital maintenance needs represents roughly thirty-four percent (34%) of the District's total unfunded capital needs. Despite the current 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. Said differently, although drastically reduced revenues and a smaller capital budget have increased the overall amount of unmet capital needs, the District is continuing to focus on and make progress in reducing its deferred maintenance backlog, albeit with more constrained resources.

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 new, 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.

Once an effective vaccine for the coronavirus is widely available the District's economy, much like that of the national economy, is expected to rebound. In its September 30, 2020, quarterly revenue estimate, the OCFO forecasted that the District's economic recovery would mimic that of the national economy, with the sharp contractions of the spring followed by a recovery process that will stretch into calendar year 2022. A return to a strong and growing economy that the District had experienced prior to the onset of the coronavirus pandemic, along with prudent fiscal practices over the past twenty-five years, should provide the District with the resources to address its critical infrastructure needs. If the District is responsible in utilizing these resources and remains focused on executing this long-range capital financial plan by committing an average of roughly four percent (4%) of its budget to paygo funds for capital and up to twelve percent (12%) 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 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

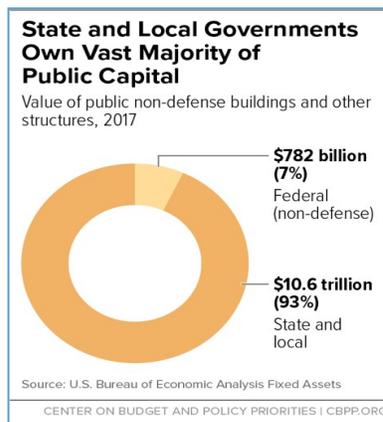
Introduction

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. In addition, the development of the long-range capital financial plan will allow the District to have a truly data-driven and more transparent CIP process. Finally, the long-range capital financial plan will help policy makers understand the true costs of maintaining the District’s current assets, as well as the costs of deferring maintenance, so that capital budgeting decisions can be better informed and justified. *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 deferred maintenance and new capital needs by 2031.*

Background



State and local governments own the vast majority of public infrastructure in the United States, and therefore, bear the lion’s share of responsibility for maintaining these critical assets. In fact, a 2019 report from the Center on Budget and Policy Priorities titled It’s Time for States to Invest in Infrastructure, which analyzed data from the U.S. Bureau of Economic Analysis, showed that as of 2017, state and local governments owned \$10.6 trillion (or 93%) of all public non-defense buildings and other structures in the U.S. This fact highlights the scope of the challenge facing state and local governments as they are charged with maintaining this vast array of assets, all while federal spending on infrastructure has continued to decline.

A November 2019 report by *The Volcker Alliance* titled, America's Trillion-Dollar Repair Bill: Capital Budgeting and the Disclosure of State Infrastructure Needs, states that, "*State and local governments provide about 80 percent of US public infrastructure spending. But reported infrastructure spending may not sufficiently address America's critical need to repair public assets, such as roads, highways, waterworks, and buildings, that are vital to the functioning and growth of the nation's economy.*" The report further states, "*We estimate that the cost of making deferred repairs at the state level may be as large as \$873 billion, equivalent to 4.2 percent of US gross domestic product, or almost three times the value of all investment by states and localities in nonresidential fixed assets. Combined with a reported federal backlog of \$170 billion, the national total deferred maintenance cost may be at least \$1 trillion. The sum may be even larger because while states disclose voluminous information about their general fund budgets, the same cannot be said for their capital budgeting practices, which vary widely among states.*"

Impact of the Coronavirus Pandemic on the District's Economy and Capital Budget

Like many other state and local governments across the country, in mid-March 2020, District of Columbia Mayor Muriel Bowser issued public emergency and public health emergency orders in order to combat the spread of the coronavirus. These actions had the effect of closing all non-essential businesses, including schools, retail stores, restaurants and hotels and placed severe restrictions on travel and large gatherings, such as sporting events and conventions. This had a drastic and immediate negative impact on the District's economy. Based on these actions, the OCFO issued a revised revenue forecast in late April that drastically revised the District's anticipated revenues downwards by approximately \$722 million in FY2020 alone, and by a combined \$2.5 billion over the four-year budget and financial plan period of FY2021-2024. This downwards revision of expected revenues caused the Mayor to revise her proposed budget that was presented to, and later adopted by, the District Council. Amongst other impacts, the lower revenues supported a much lower level of borrowing, which necessitated a reduction of the District's CIP of approximately \$1 billion over the six-year period (FY2021-2026).

On May 21, 2020, the ReOpen DC advisory group issued recommendations, which can be found at (coronavirus.dc.gov/reopende), that included four phases of reopening. The phases followed the epidemiology and outlined specific milestones to achieve before moving from one phase to another. Progression from phase 1 to phase 2 occurred effective June 21, 2020, relaxing restrictions on certain businesses, particularly in-person retail and outdoor seating at restaurants. However, progression from phase 2 to phase 3 has been slower than what was expected back in April due to the continued proliferation of the virus and the lack of an effective treatment or vaccine. In its most recent official revenue estimate published on September 30, 2020, the OCFO now expects that the next stage of recovery to begin in early calendar year 2021 and large events and conventions not expected to take place until the end of calendar year 2021. This revised recovery timeline resulted in a further downwards revision to anticipated revenues of a combined \$782 million over the four-year period from FY 2021-2024. This lower level of anticipated revenue could potentially put further downwards pressure on the District's CIP, as it would support lower levels of borrowing in order to stay within its statutory debt limits.

Despite the lower projected revenues, the District of Columbia is still in a sound financial position. Due to prudent fiscal management over the past twenty-five plus years, the District does not face the large pension and retiree health care liabilities facing many other state and local governments. Additionally, at the onset of the coronavirus-induced recession the District enjoyed fully funded reserves and more than 60 days of cash on hand, which meant that the District was better positioned than most other state and local governments to weather the financial crisis. However, the District's past practices mirror that of other jurisdictions in its deferral of necessary investment in capital

infrastructure in favor of other competing priorities. In 2016, the ASCE released an infrastructure report card focusing solely on the infrastructure of the District, and while its overall grade (C-) was slightly better than the national grade (D+), it is still far from adequate. The District faces significant challenges in being able to balance the need to maintain and repair aging, existing infrastructure, while also making needed investments to keep pace with the demand for new infrastructure brought on by continued population growth with the need to direct much more limited resources to critical programs, all during a global health pandemic. However, as will be discussed later in this report, the District is somewhat unique amongst other state and local governments, as it has shown the ability to both significantly increase its funding to bring down its backlog of deferred maintenance, while at the same time still maintain borrowing capacity to fund new capital projects that are needed to support the continued growth of the city.

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 District 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 \$14.7 billion over the next decade. A significant portion of this amount, approximately \$2.2 billion, represented the District's share of additional projected funding needed for Metro, which has subsequently been addressed through new 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 \$12.5 billion over that same 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.

The District's Approach to Asset Management (CARSS)

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 District's 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 covering asset management, as well as concepts outlined out 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 as we further refine, and continue 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 4th question and identify a solution to fund the identified funding 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 of the District 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 new 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 condition assessments for other assets. These condition assessments were expected to be completed in fiscal year 2020, however delays caused by the coronavirus pandemic, and the necessity to change vendors, have delayed its completion. The condition assessments are now expected to be finalized by fiscal year 2022. 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 those assets has allowed the District to have a much more precise idea on 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, a genuine sense of 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, which 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 also 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 as part of the FY 2021-2026 CIP budget formulation, is approximately \$12.5 billion. The District has identified approximately \$8.2 billion of funding, from a mix of debt, paygo capital, federal loans and grants, and other funds, over the next six years, in its FY 2021-2026 capital budget for the highest-priority capital projects. This results in a remaining total capital infrastructure funding shortfall of approximately \$4.3 billion over the six-year CIP period, which 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 following chart 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 \$1.5 billion, or roughly \$242 million annually, and the six-year funding gap for new capital projects is approximately \$2.8 billion, or approximately \$468 million annually. Combined, the annual funding gap is approximately \$710 million, which is equivalent to roughly 8.3% of total local funds revenues.

Total Unfunded Capital Needs During the 6-Year CIP Period

(in \$ millions)

Fiscal Year	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	6 year Total
Unfunded Capital Maintenance Projects	\$191.3	\$346.9	\$307.4	\$220.1	\$210.4	\$173.1	\$1,449.2
Unfunded New Capital Projects	\$311.0	\$297.7	\$280.6	\$237.0	\$980.8	\$701.6	\$2,808.6
Total Unfunded Capital Needs	\$502.3	\$644.6	\$588.0	\$457.1	\$1,191.2	\$874.6	\$4,257.9

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 \$3.1 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 is likely to exceed \$1.2 billion.

Annual Capital Funding Gap by Asset Type

(in \$ millions)

	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	Total
IT Projects & Systems:							
Capital Maintenance Projects	14.3	13.0	13.3	12.0	8.1	7.7	68.4
New Capital Projects	47.2	21.7	14.6	14.8	3.6	2.1	104.0
Total	\$61.5	\$34.7	\$27.9	\$26.8	\$11.8	\$9.8	\$172.4
Equipment & Regulatory:							
Capital Maintenance Projects	18.1	12.5	11.3	8.1	12.2	8.8	71.0
New Capital Projects	0.7	1.6	1.2	1.3	1.4	1.0	7.1
Total	\$18.7	\$14.1	\$12.5	\$9.4	\$13.6	\$9.8	\$78.0
Fleet:							
Capital Maintenance Projects	4.3	19.1	46.6	46.5	39.3	23.6	179.3
New Capital Projects	-	-	-	-	-	-	-
Total	\$4.3	\$19.1	\$46.6	\$46.5	\$39.3	\$23.6	\$179.3
Horizontal Infrastructure:							
DDOT							
Capital Maintenance Projects	53.9	177.6	142.0	84.0	84.0	63.5	604.9
New Capital Projects	35.0	27.0	50.0	3.3	19.7	-	135.0
Total	\$88.9	\$204.6	\$192.0	\$87.4	\$103.7	\$63.5	\$740.0
Facilities:							
Capital Maintenance Projects	100.8	124.8	94.1	69.5	66.7	69.5	525.6
New Capital Projects	228.1	247.3	214.9	217.6	956.1	698.5	2,562.5
Total	\$329.0	\$372.2	\$309.0	\$287.1	\$1,022.8	\$768.0	\$3,088.1
Grand Total	\$502.3	\$644.6	\$588.0	\$457.1	\$1,191.2	\$874.6	\$4,257.9

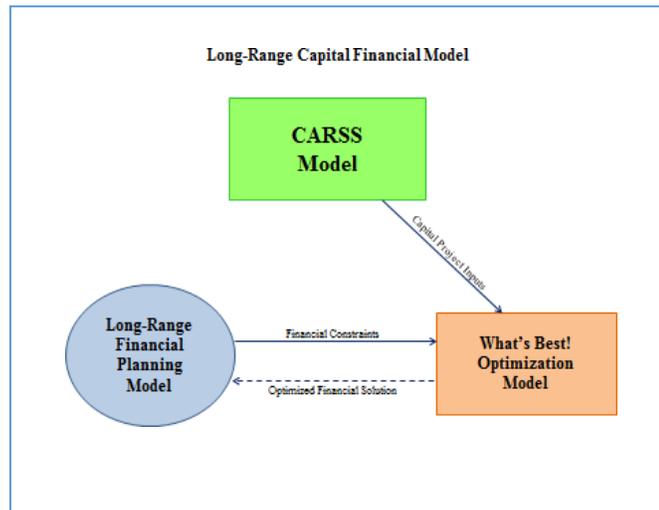
It is important to note that the long-range capital financial plan analysis assumes that the costs of deferred capital projects beyond the six-year CIP period grow at three percent (3%) annually until those projects are funded. In addition, CARSS incorporates cost curves for various assets in the database to more accurately measure the cost of repair or replacement 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 in conjunction to identify the optimal financial result. The long-range capital financial model is comprised of CARSS, and a long-range financial planning model that utilizes a linear optimization tool to generate the optimal financial solution for a given time period. 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 analyzed in the financial planning model utilizing linear optimization that funds the highest priority projects first, along with certain debt and resource assumptions, to solve for the optimal solution to finance the unfunded capital gap as soon as possible.

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. This information is then used to present a complete long-term capital financing plan for the District over the forecasted 15-year period.

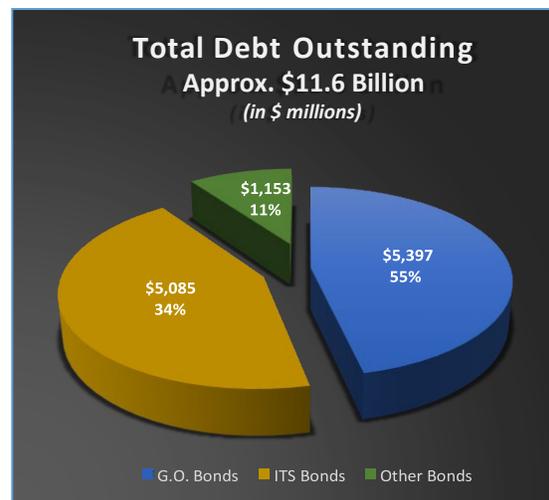
A detailed description of the methodology used to classify and score the various capital projects, along with the scoring criteria, can be found in *Appendix B*. In addition, a detailed description of how projects were prioritized in CARSS can be found in *Appendix C*.

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, 2020, the District has approximately \$11.6 billion of total outstanding debt, of which roughly \$10.5 billion (or approximately 90%) 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. This is particularly important given the fact that tax revenues are expected fall over the next several years given the impact of the coronavirus pandemic, while at the same time the District's current capital improvement plan anticipates increasing outstanding debt by nearly thirty-seven percent (37%), or approximately \$4.25 billion in additional G.O. or Income Tax Secured bonds over the next six years.

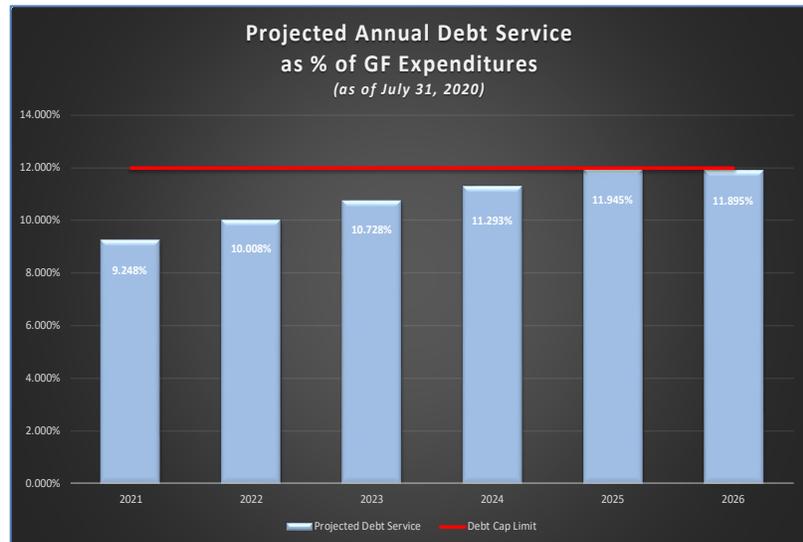
Debt Capacity Limitations

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 is now one of the highest-rated 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 order to confirm 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 2021-2026 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.



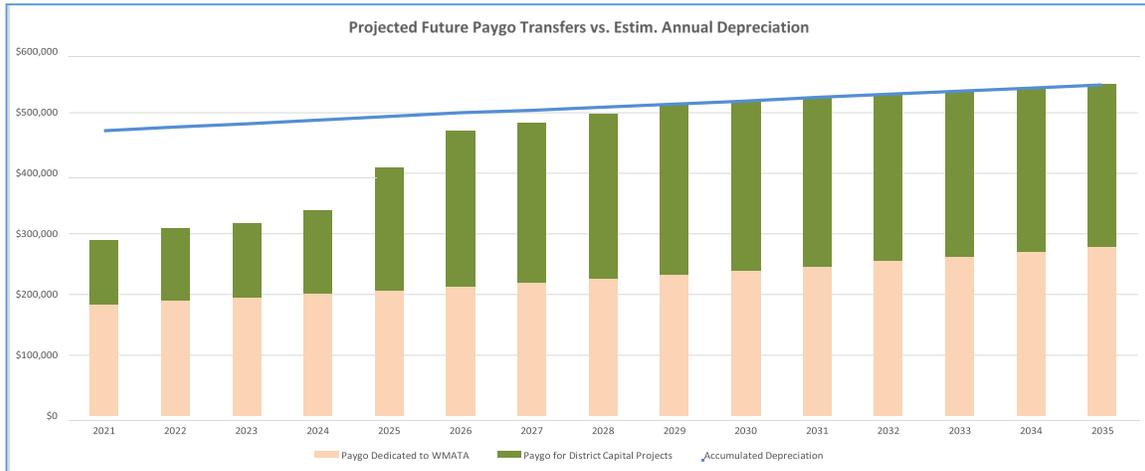
Paygo Funding Mechanism Through Legislative Action

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.

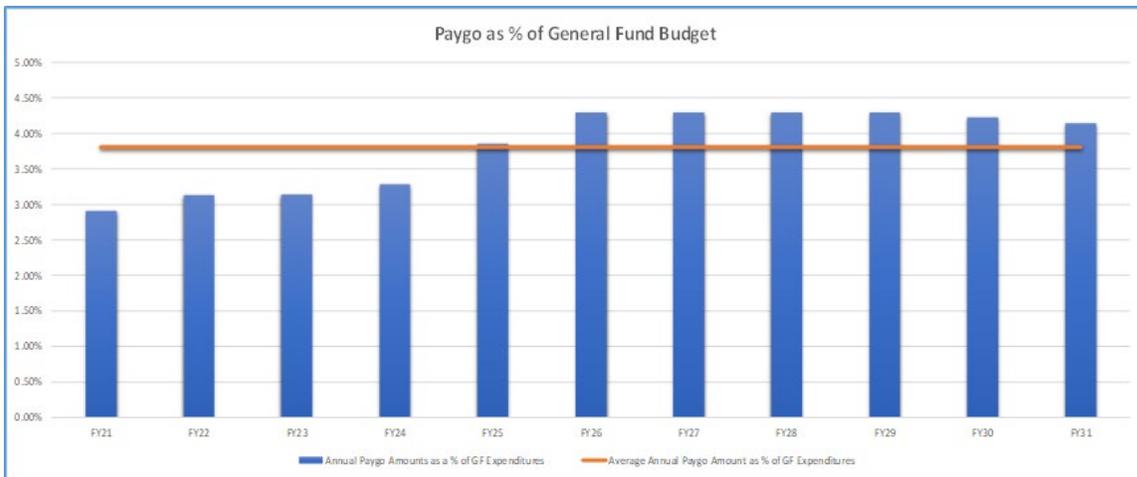
The Budget Support Act of FY 2018 included an amended provision for the use of paygo as part of the Capital Infrastructure Preservation and Improvement Fund. The provision specifies that for FY 2020, the financial plan shall include a minimum local funds total transfer of paygo to the CIP of \$58,950,000, plus any associated special purpose revenues dedicated to capital. For fiscal year 2020 the total amount of paygo is projected to be roughly \$95 million. 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 (CAFR).

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 or 2030, 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 2% annually.



It is important to note that 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 can be seen in the following graph, the annual amount of local funds transfers of paygo for capital averages slightly less than 4% of the local funds portion of total general fund expenditures between fiscal year 2020 and fiscal year 2031, by which time all unmet capital needs are projected to be funded.



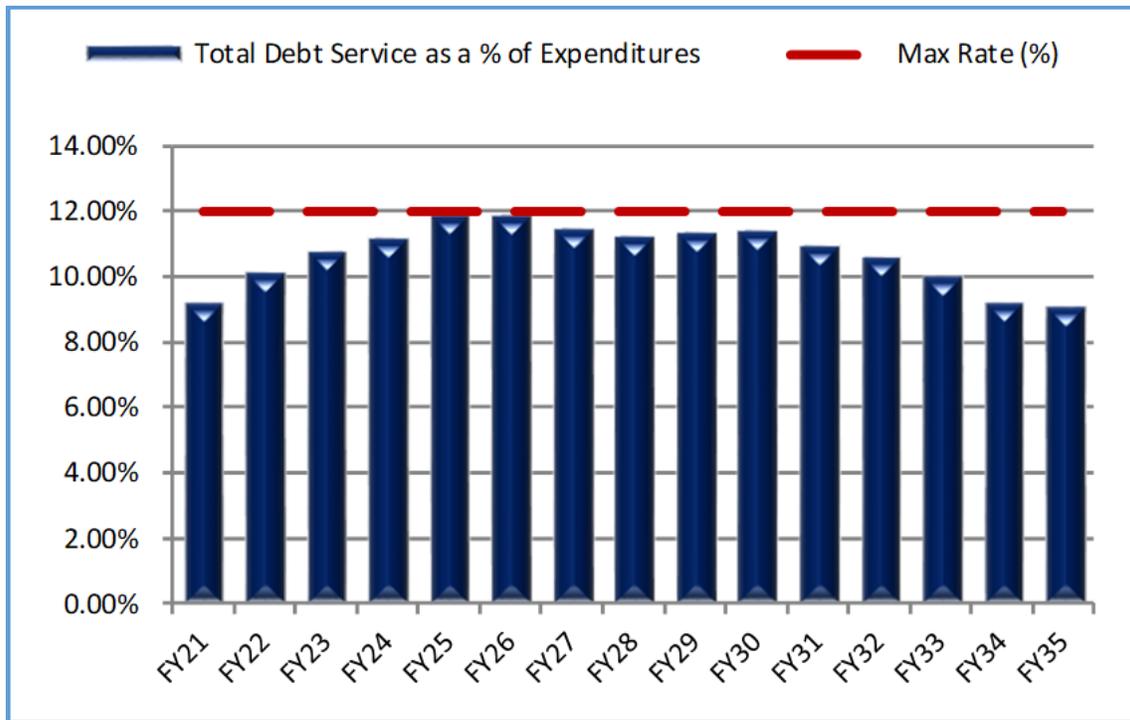
Allocating this level of additional paygo funding is not without challenges given the uncertain nature of the trajectory of the coronavirus pandemic and its impact on both the District and National economies, since capital projects compete with programmatic priorities such as affordable housing, homeless 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. A large portion of the growth in paygo funding

represents dedicated taxes committed to Metro under legislation passed by the District in 2018. 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.

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 approach ongoing capital asset maintenance needs.

Funding Solution for the District’s Unmet Capital Needs

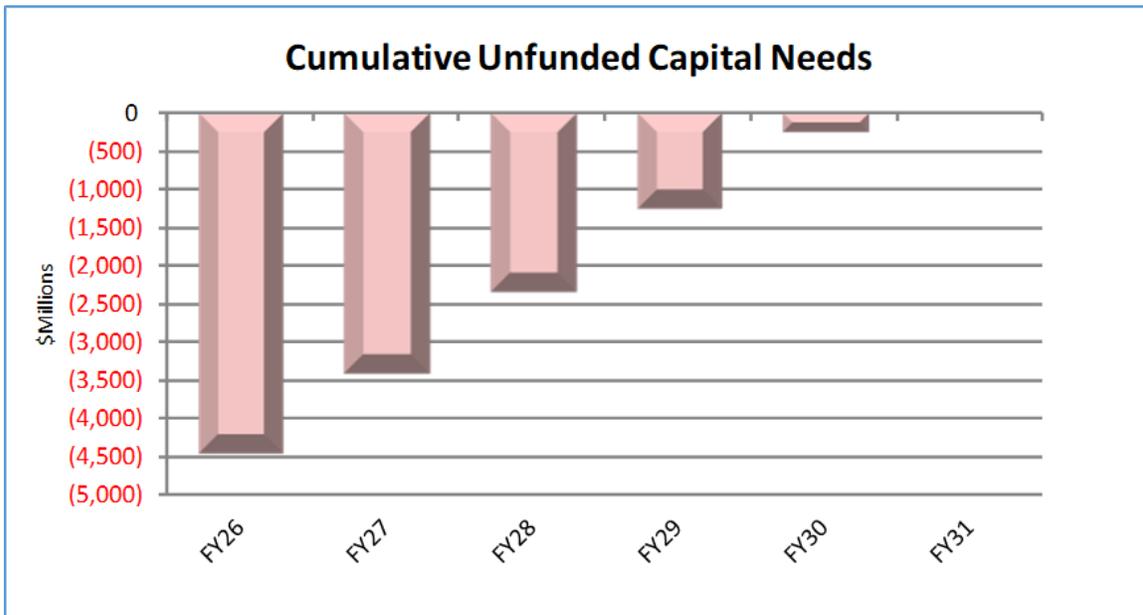
The District’s long-range financial planning model incorporated both the projected amounts of additional paygo funding, as discussed earlier, as well as maximized the amount of borrowing for capital, all while staying below the District’s statutory debt limits, as shown in the graph below.



Given these projected amounts of paygo funding for capital, as shown on page 11 of this report, as well as utilizing 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, while continuing to maintain current assets, by 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 \$4.3 billion of capital needs not funded in the six-year CIP could be funded by 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.*** 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 P3s.

The following graph illustrates that the unfunded capital needs, meaning those capital needs not able to be funded as part of the FY 2021-2026 CIP, identified in this 2020 report. Those unmet capital needs, which grow to nearly \$4.3 billion through FY 2026, since enough funding is not available in the current CIP, begin to be paid down starting in FY 2027, assuming no new additional capital projects are added to the CIP before addressing these identified unmet needs. The analysis that results in unmet needs being funded by 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 considerably extend the time frame to “catch up” with all of the identified unmet capital needs. In addition, if revenues were to fall further, or recover at a slower pace, than currently anticipated it could also extend the time that it would take to fund all of the District’s unmet capital needs.

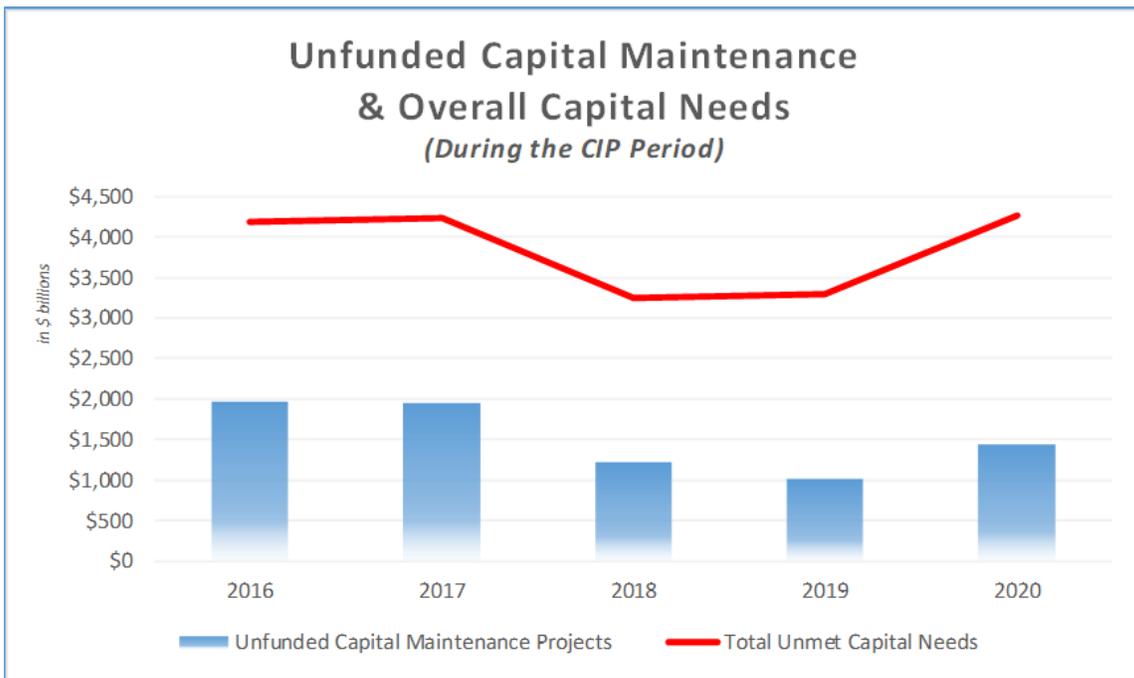


Progress in Addressing Unfunded Capital Needs

It is important to note that since the first long-range capital financial plan report was produced in 2016, the amount of identified unfunded capital needs had steadily decreased every year until the onset of the recession this year brought about by the coronavirus pandemic. The District’s capital budgets had 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 shows a reverse in that trend, with unmet capital needs returning to 2016/2017 levels, or roughly \$4.3 billion, which is explained by drastically decreased revenues brought on by the coronavirus-induced recession necessitating a substantially smaller capital budget.

The continued resilience of the District’s economy, despite the pandemic recession, along with near-record low borrowing costs due to the District’s very strong credit ratings, as well as a greater focus on refinancing existing debt and utilizing the debt service savings for additional borrowing capacity to support its capital improvement’s budget, should still allow the District to address its unmet capital needs, albeit at a somewhat slower pace. This greater focus on returning its critical infrastructure to a state of good repair, even with more severely constrained revenues than in the past, has resulted in the District’s six-year CIP budget growing from approximately \$6.3 billion in 2016 to roughly \$8.2 billion in 2020, or roughly a 30% increase, despite the onset of the pandemic.



In addition, as the District’s capital budgets have increasingly focused on bringing existing assets into a state of good repair, unmet capital maintenance needs continued to decrease year over year as well, until the trend reversed somewhat this year. As can be seen in the chart above, unfunded capital maintenance needs, *which serve as a proxy for deferred maintenance*, continued to decrease every year, both in terms of total dollar amount and as a percentage of total unmet needs, since the first long-range capital financial plan report in 2016. While that trend reversed somewhat in 2020 due to the onset of the pandemic-driven recession, the growth in deferred maintenance needs has

not been as dramatic as the growth in overall total unmet capital needs. In the 2016 report, unfunded capital maintenance needs were nearly \$2 billion, or nearly half of total unmet capital needs. In the 2020 report unmet capital maintenance needs rose from roughly \$1 billion in 2019 to just under \$1.5 billion in 2020. Unfunded capital maintenance now only represents approximately thirty-four percent (34%) of the District's total unfunded capital needs. A practical example of this increased focus on addressing deferred maintenance can be seen in the increased capital budget for DDOT to continue the Mayor's focus of repairing roads and sidewalks throughout the District. In a Washington Post article by Katherine Shaver on October 3, 2020, DDOT Director Jeff Marootian says that, Mayor Bowser has continued to prioritize infrastructure funding, and that the city is on pace to repave more roads this fiscal year than last year. In fact, the article quotes Director Marootian as saying, "*We've been able to repave roads and rebuild sidewalks because the Mayor has made it a priority for us.*"

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

As the District continually looks for ways to effectively fund its deferred maintenance backlog and fund new capital projects to support continued growth, all while remaining within its statutory debt limits, it 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, which include debt financing, paygo and federal grants or loans. 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 to be funded utilizing a P3 structure, as well as being able to perform a more detailed comparison against more traditional public sector funding methods, along with more precise cost-benefit analyses of various funding methods.

Public-Private Partnerships

While there is no singular definition of a public-private partnership (P3), the World Bank generally defines a P3 as, "*A long-term contract between a private party and a government entity, for providing a public asset or service, in which the private party bears significant risk and management responsibility, and remuneration is linked to performance.*"

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) over the last several years. During that time, certain capital projects were identified as high priorities for the District, including 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. 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.

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 scheduled to begin 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

A September 17, 2020, article in The Bond Buyer by William Glasgall states that, "*With the economic shock of the COVID-19 pandemic producing estimated state and local budget shortfalls of about \$450 billion for fiscal 2020-2022, according to Moody's Analytics data, governments from coast to coast are cutting costs by shelving current infrastructure projects, and postponing ballot measures or legislative initiatives for funding.*" Further, the article states, "*Congressional inability to agree on further federal stimulus aid following passage of the \$2 trillion CARES Act in March means states and municipalities are unlikely to see budgetary relief that would free up dollars for infrastructure at least until after the presidential election in November.*" The District, like every other state and local government in the nation, will face significant 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. However, the District is in a much better position than most other state and local governments to address these financial challenges. Through the prudent financial decisions over the past twenty-five years, it entered the economic downturn with fully funded pensions and retiree health care trusts, fully funded federally and locally mandated

reserves and very strong bond ratings that provide low costs of borrowing to finance its infrastructure needs.

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 2021-2026 CIP. The CARSS analysis highlighted a total capital funding need of approximately \$12.5 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 2021-2026 CIP at a cost of roughly \$8.2 billion, however approximately \$4.3 billion in capital needs require funding outside of the current CIP period. Approximately \$1.5 billion of that unfunded amount, or roughly thirty-four 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 District's capital budgets the amount of identified deferred maintenance has been reduced by roughly 25% from the amount identified in the 2016 report, even in the midst of significantly decreased capital budgets caused by the coronavirus-induced recession.

Past prudent financial decisions by the District, including building its strong levels of reserves and fully funded pension and retiree healthcare trusts, along with its borrowing capacity and paygo legislation still allow it to effectively address its unfunded capital needs in about a decade. 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 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 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, while there is still great uncertainty around the trajectory of the coronavirus pandemic and the development and distribution of a vaccine, the District, like other state and local governments across the country, will be under tremendous financial pressure to provide additional services to residents while dealing with severely constrained revenues brought about by the recession. As it states in The Bond Buyer article mentioned earlier, *"Infrastructure postponements, whether for new projects or maintenance, pose risks for the future long-term health of local economies as well as a shorter-term jobs recovery in a nation still plagued by unemployment over 8%."*

Appendix A

Approach to Developing the Capital Asset Replacement Scheduling System (CARSS) & Highlights of the FY 2021-2026 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 created by the District in conjunction with our software solutions partners at PowerPlan.

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

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.

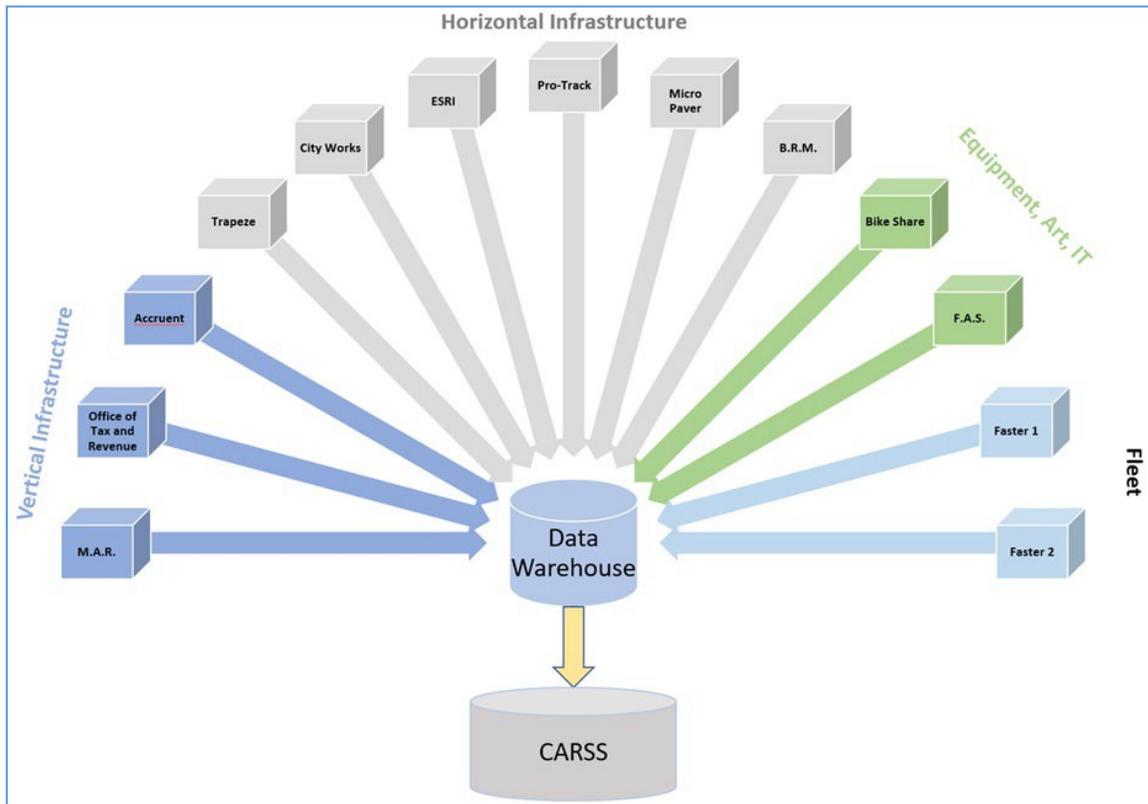
Below is a breakdown of the various asset classes and some of the project classifications that were used in this phase of the CARSS project, along with some of the various types of attributes that are captured about each.

Asset Class	Asset Type	Asset Attributes
Horizontal Infrastructure	<ul style="list-style-type: none"> • Streets • Sidewalks • Alleys • Bridges 	Length, Width, Age, Useful Life, Remaining Life, Current Condition, Name, Brick, Cement, Gravel, Asphalt
Vertical Infrastructure	<ul style="list-style-type: none"> • General Support Facilities • School Facilities • Parks, Playgrounds, Athletic Fields • Public Libraries 	Amenities, Substructure, Shell, Interior, Services, Equipment, Construction, SSL, Appraised Value, Assessed Value, Ward, ANC, Uniformat, Address, Lot Square Footage.
Fleet	<ul style="list-style-type: none"> • School Buses • Fire & EMS vehicles • Police Vehicles • Passenger Vehicles 	VIN, License Plate, Make, Model, Year, Agency Owner, Useful Life, Current Age, Remaining Life, Maintenance Cost, Repair Cost, Warranty Cost, Mileage, Engine Hours, Agency Owner,
Information Technology	<ul style="list-style-type: none"> • Computer Hardware • Software Purchase • IT Development • Communication Equipment 	Communication Equipment, Audio Visual Equipment, date purchased, Purchase amount, replacement cost, location, agency owner.
Equipment and Art	<ul style="list-style-type: none"> • Bike Share • Equipment • Art • Furniture 	Address, Count, Recreational Equipment, Laboratory Equipment, Fire Fighting Equipment, Communication Equipment, Machinery and Tools,

Recap of Where the District is Now: 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 approach using data from the already existing databases across all District agencies has been completed. Thirteen different databases from across 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 then 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 2021-FY 2026 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 to the impact of tradeoffs.

During the FY 2021-2026 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 represented a significant improvement in the District’s ability to build more detailed and data-driven capital budgets than had been the norm until only a few years ago.* This approach synthesized the much greater level of detailed data now available on each of the District’s assets into capital projects that corresponded 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 represented all known capital needs of each agency. Those capital projects for both capital maintenance projects, as well as for new capital projects, were then compared to the projects that actually received funding as part of the FY 2021-2026 CIP. The unfunded projects represent the extent of the District’s capital infrastructure funding gap, as can be seen in the table below.

Figure 1: Infrastructure Funding Gap

Total Unfunded Capital Needs During the 6-Year CIP Period

(in \$ millions)

Fiscal Year	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	6 year Total
Unfunded Capital Maintenance Projects	\$191.3	\$346.9	\$307.4	\$220.1	\$210.4	\$173.1	\$1,449.2
Unfunded New Capital Projects	\$311.0	\$297.7	\$280.6	\$237.0	\$980.8	\$701.6	\$2,808.6
Total Unfunded Capital Needs	\$502.3	\$644.6	\$588.0	\$457.1	\$1,191.2	\$874.6	\$4,257.9

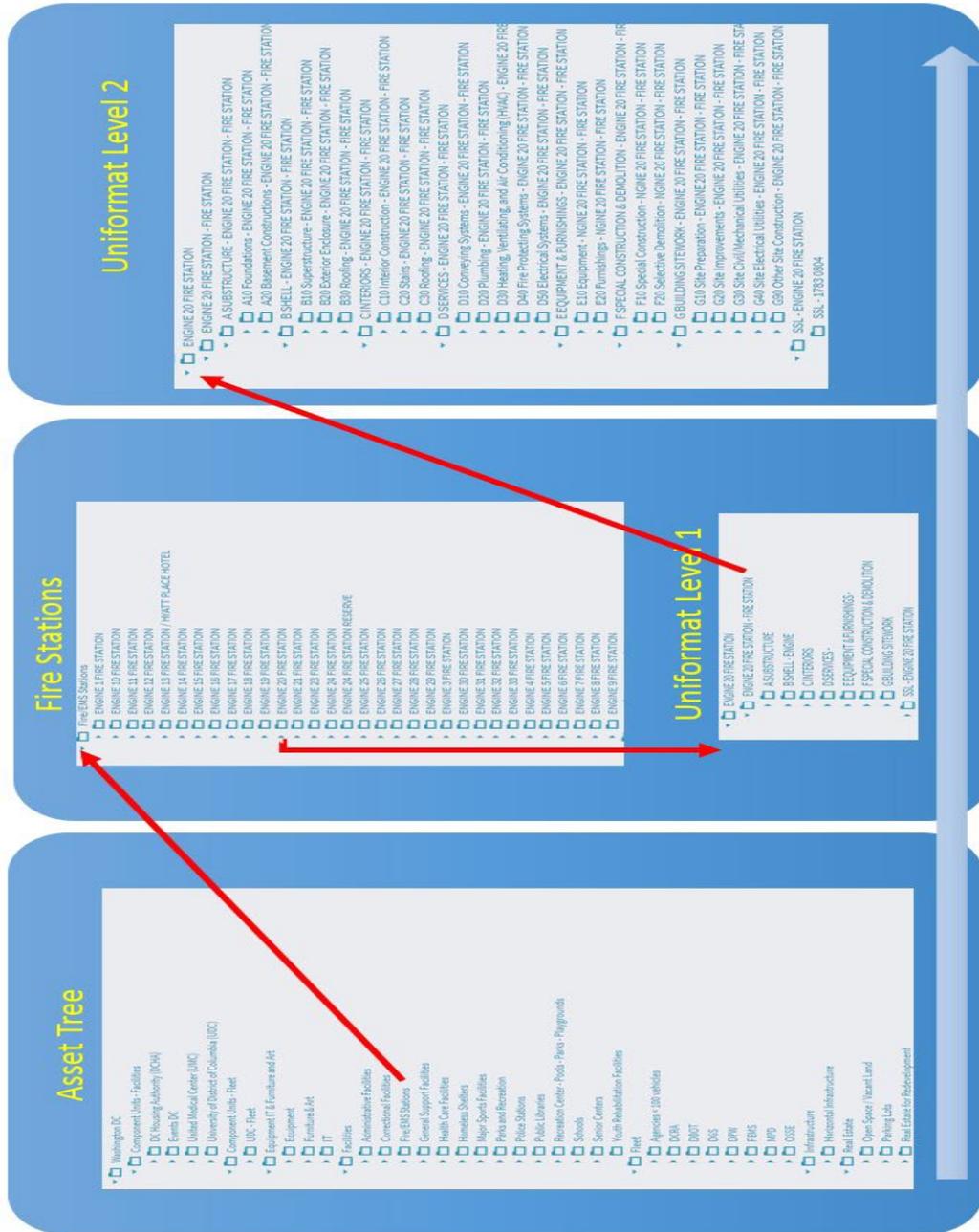
This more granular approach to asset data is only possible, because of the comprehensive asset inventory that the District has built over the last several years. The table below (*Figure 2*) reflects all of the District’s assets, broken down into various categories such as horizontal infrastructure, facilities, etc., that are captured in CARSS and their value as reflected in the 2019 Comprehensive Annual Financial Report.

Figure 2: Asset Inventory

Assets and their Value in CARSS						
	Number of Assets *	Percentage of Total Asset Classification	FY 2019 CAFR Book Value of Asset Type (\$000) *	% of Assets Captured		
Horizontal Infrastructure						
Ramps	564	100%	3,445,161	100.0%		
Service Roads	124	100%				
Streets (blockkey)	36,262	100%				
Sidewalks (blockkey)	47,184	100%				
Trails	90	100%				
Alleys (blockkey)	9,578	100%				
Bridges	371	100%				
Bikeshare Terminals/Racks	290	100%				
Street Car Rail (Track Segments)	41	100%				
Total	94,504	100%			\$ 3,864,471	100%
Facilities						
Buildings	642	100%	7,567,567	100.0%		
Building Components	187,584	100%				
Amenities (Pools, courts, Playgrounds etc)	568	100%				
Total	188,794	100%			\$ 7,567,567	100%
Equipment and IT						
Fleet	5,992	100%	461,649	100.0%		
Boats/Ships	23	100%				
Aircraft	2	100%				
Circulator Buses	72	100%				
Street Cars	6	100%				
Street Car System Equipment	143	100%				
Equipment (>\$5K)	10,785	100%				
IT and Furniture	11,872	100%				
Total	28,895	100%			\$ 461,649	100%
Land						
Land (count by parcel)	4,214	100%	\$ 964,409	100%		
Grand Total	316,407	100%	\$ 12,858,096	100%		
* Does not include construction in progress						
** Does not include assets from District component units - UDC, DCHA, UMC, and Events DC						

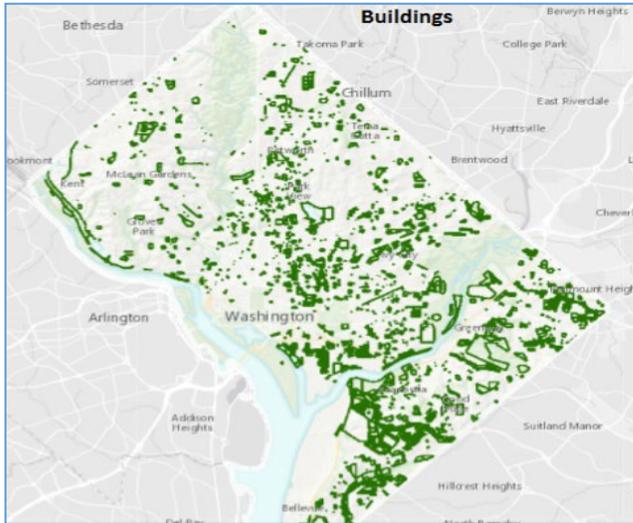
This “bottom up” more granular approach enables the District to have data around each asset along with its current condition and cost for repair or replacement. The screen shot below (Figure 3) shows a portion of the asset tree structure that is used in CARSS to organize the asset-level data - using 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



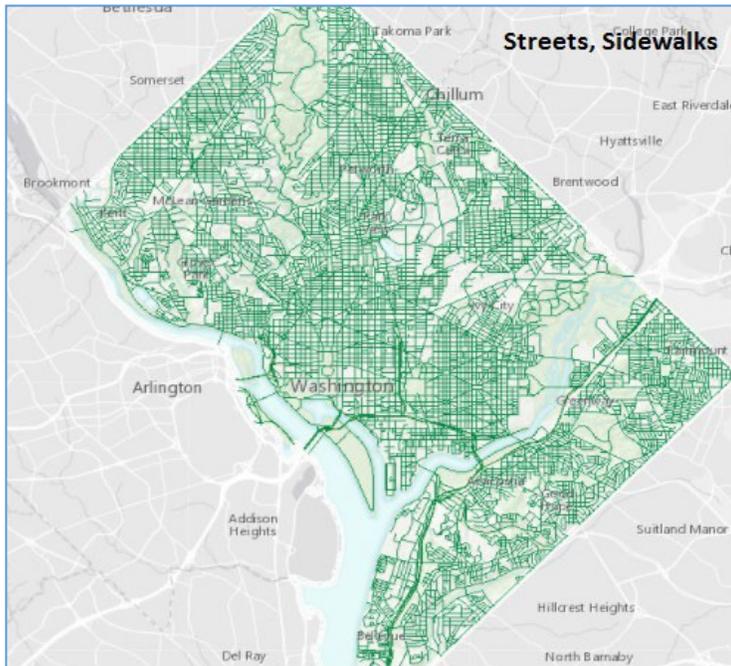
GIS Capability

Tremendous amounts of data on individual assets currently exists and was pulled into the centralized CARSS database from existing databases spread throughout various District agencies.



As seen in the image to the left, information on the more than 640 municipally owned buildings within the District has been captured in CARSS and displayed in the related GIS system. 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 was not up to date. Subsequently, DGS and its contractor have been performing facility condition assessments (FCAs) on all District-owned buildings with the goal of assessing each one of them no less than once every three years. The information

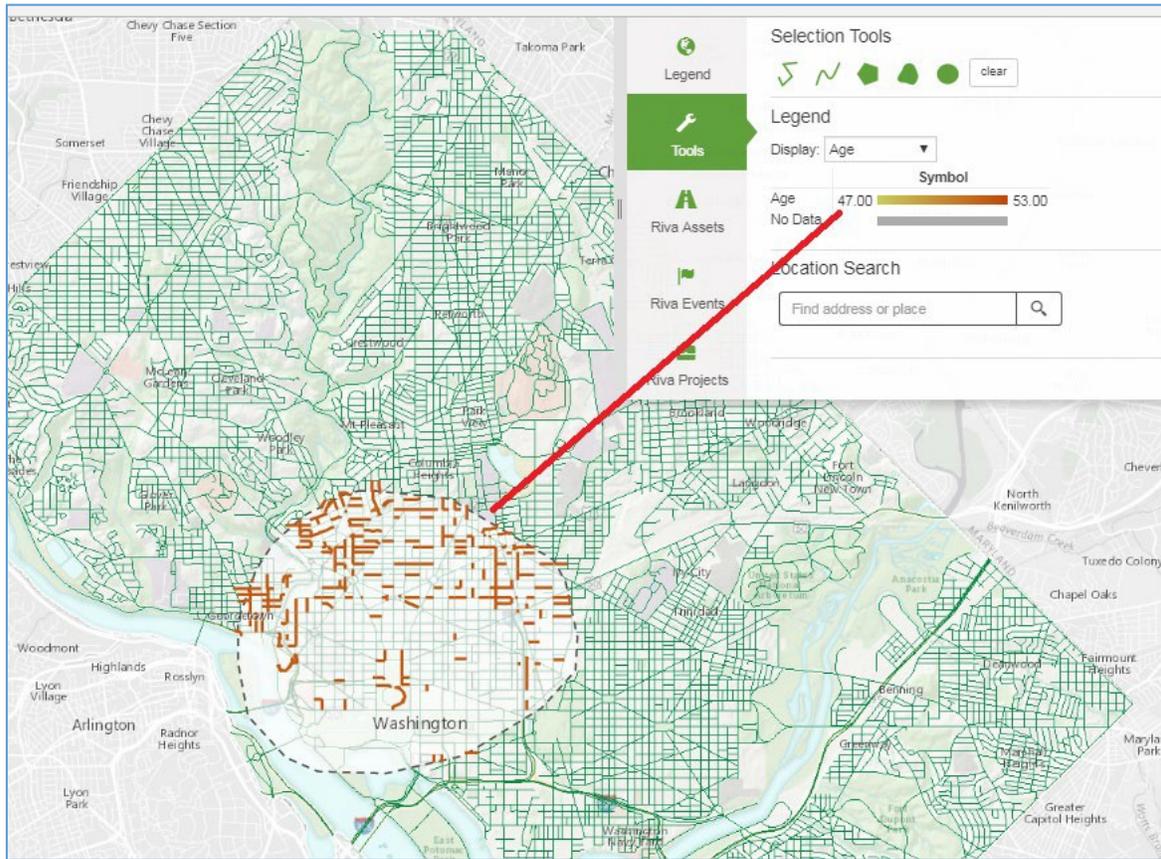
from the FCAs is uploaded into the CARSS database, allowing for more accurate calculations of costs for repair and maintenance of various facilities and their sub-components, such as roofs, HVAC, etc., thereby facilitating a more data-driven approach to building the capital budget for DGS. The additional building components/systems can be seen in CARSS where the current information 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, the ability to focus on just those segments that are in poor condition to help better prioritize those assets most in need of capital maintenance.

Local Streets GIS 'Drill Down'



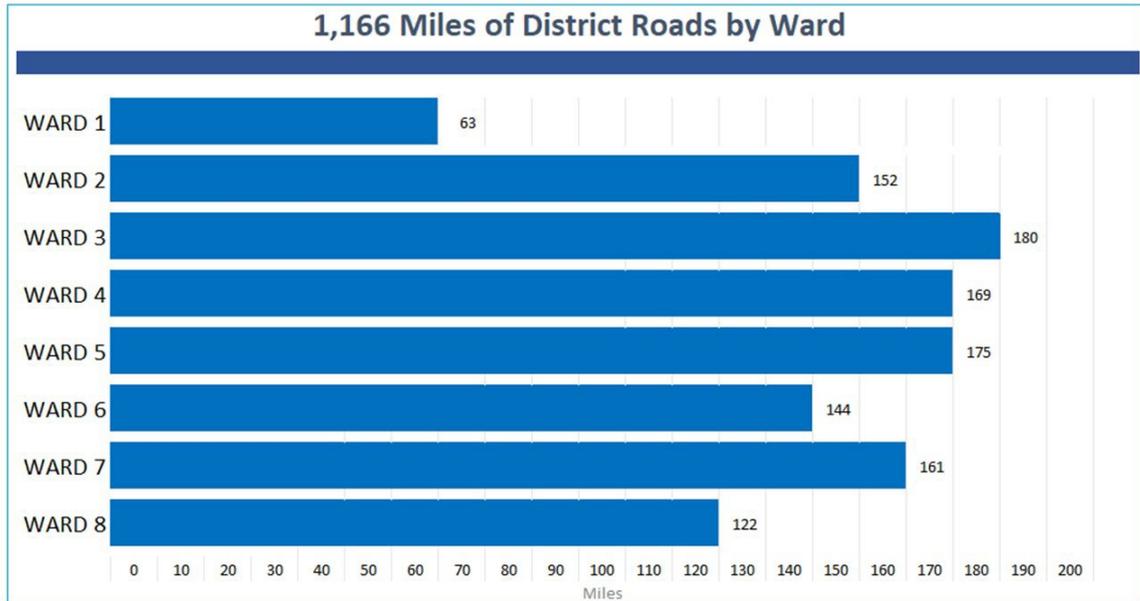
Enhanced Analytical Capabilities

We have enhanced CARSS data using an analytical tool set. This allows for the creation of easily defined, and user-friendly, analysis and “drill down” capability from any asset type down to 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 more accurately forecast capital needs for horizontal infrastructure. *Figure 4* below reflects the current the total miles of all local streets and roads in the District, broken out by ward.

Figure 4: Local Roads – Mileage per Ward



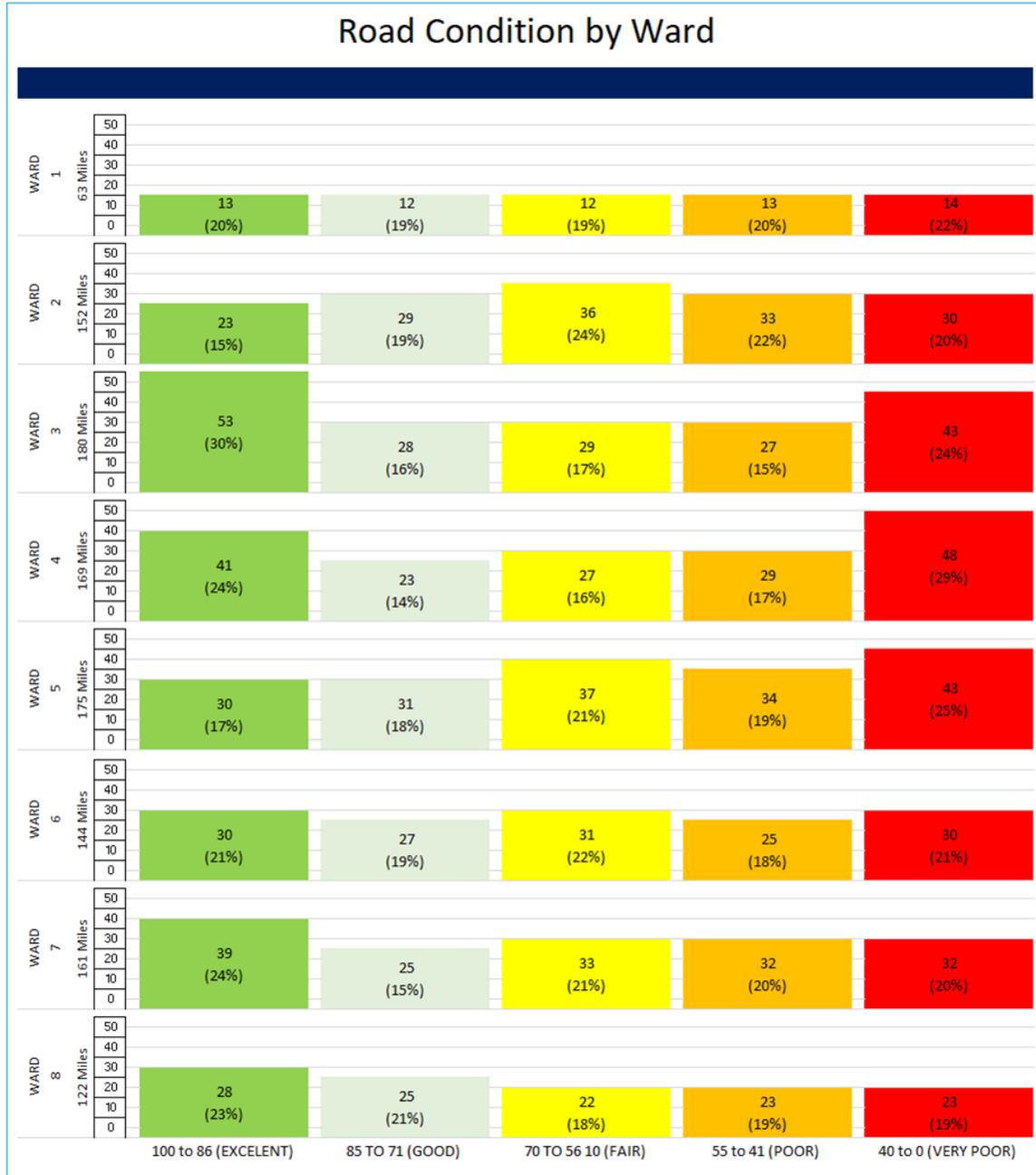
To further highlight the CARSS data and the value of enhanced analytics, *Figure 5* provides summary level details on the condition of various road types. This kind of data is critical in determining the costs and needed budget of maintaining roads across the District.

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



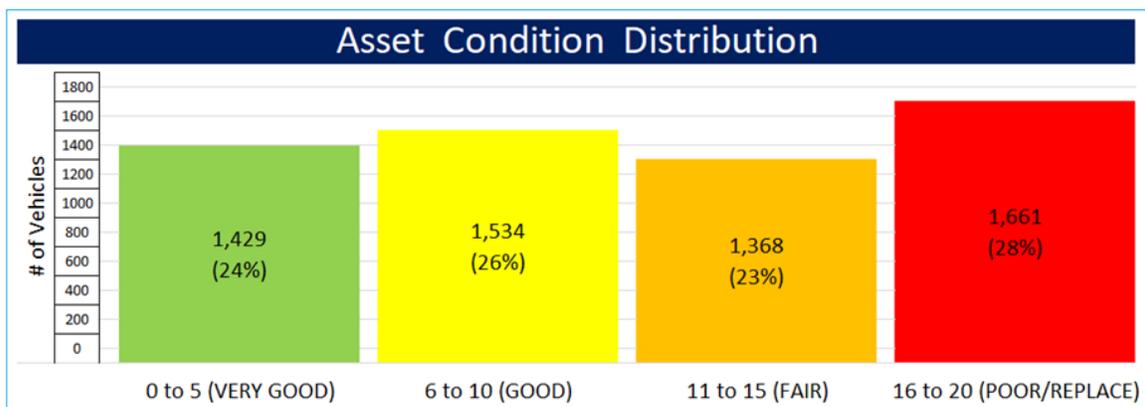
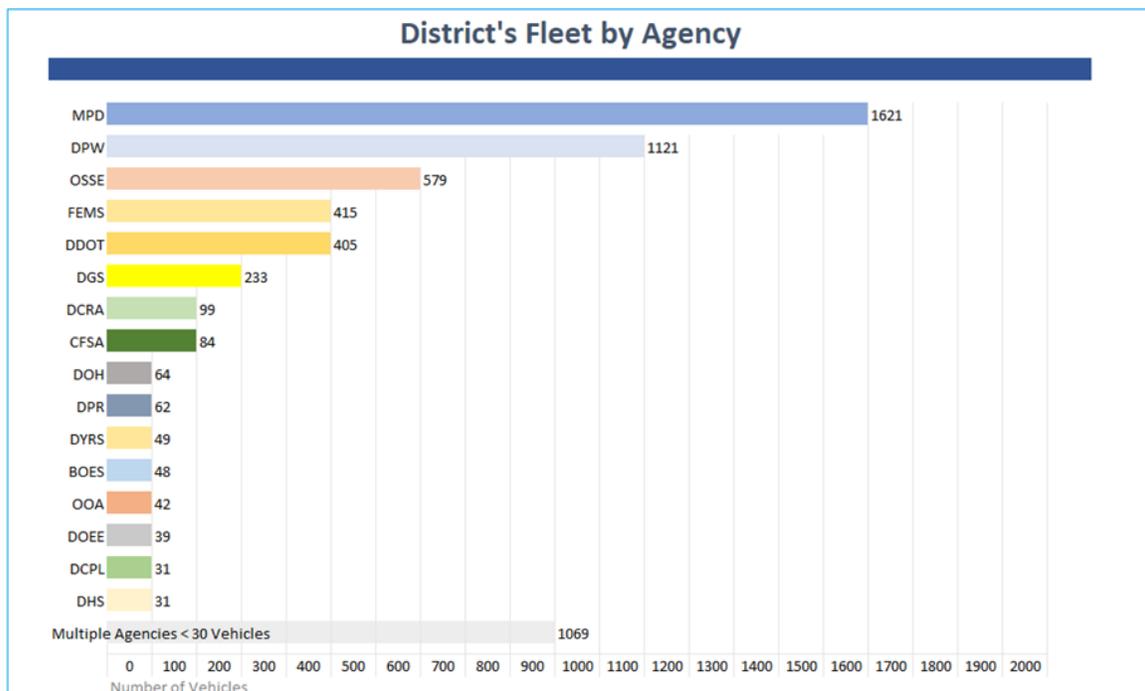
Drilling down further into the data will enable the user to ultimately see the specific information around any given block of roadway in the District. Individual asset information on roadway blocks are presented with a level of detail similar to the individual asset data for vehicles information shown in *Figure 9* on page A-15.

Fleet “Drill Down”

When viewing all 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 CARSS database, pulling information from the databases of the various owner agencies, shows 5,992 fleet assets currently owned by the District (*see Figure 7*).

Further drilling down into the data using our analytics tools the ability exists to produce user-friendly graphics showing 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

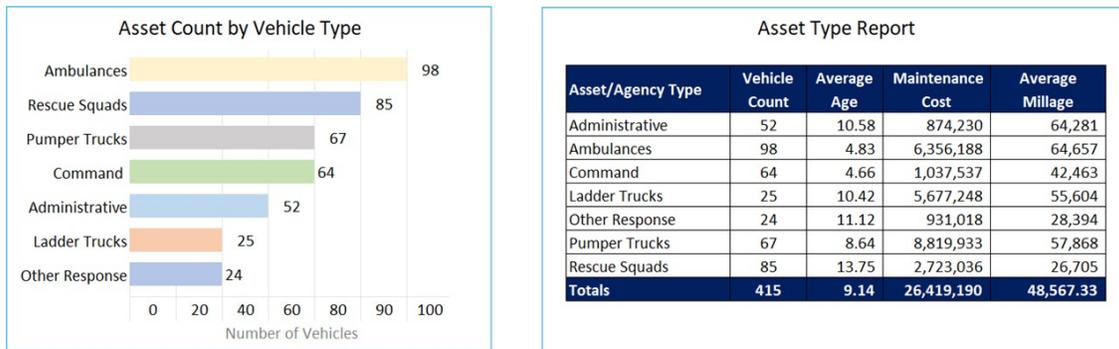


As the data shows 1,661 vehicles, or approximately 28% of the District’s total fleet of vehicles, are currently in the ‘Poor/Replace’ category, as determined by the assessment of a combined set of factors including age, vehicle mileage, maintenance costs, and engine hours.

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

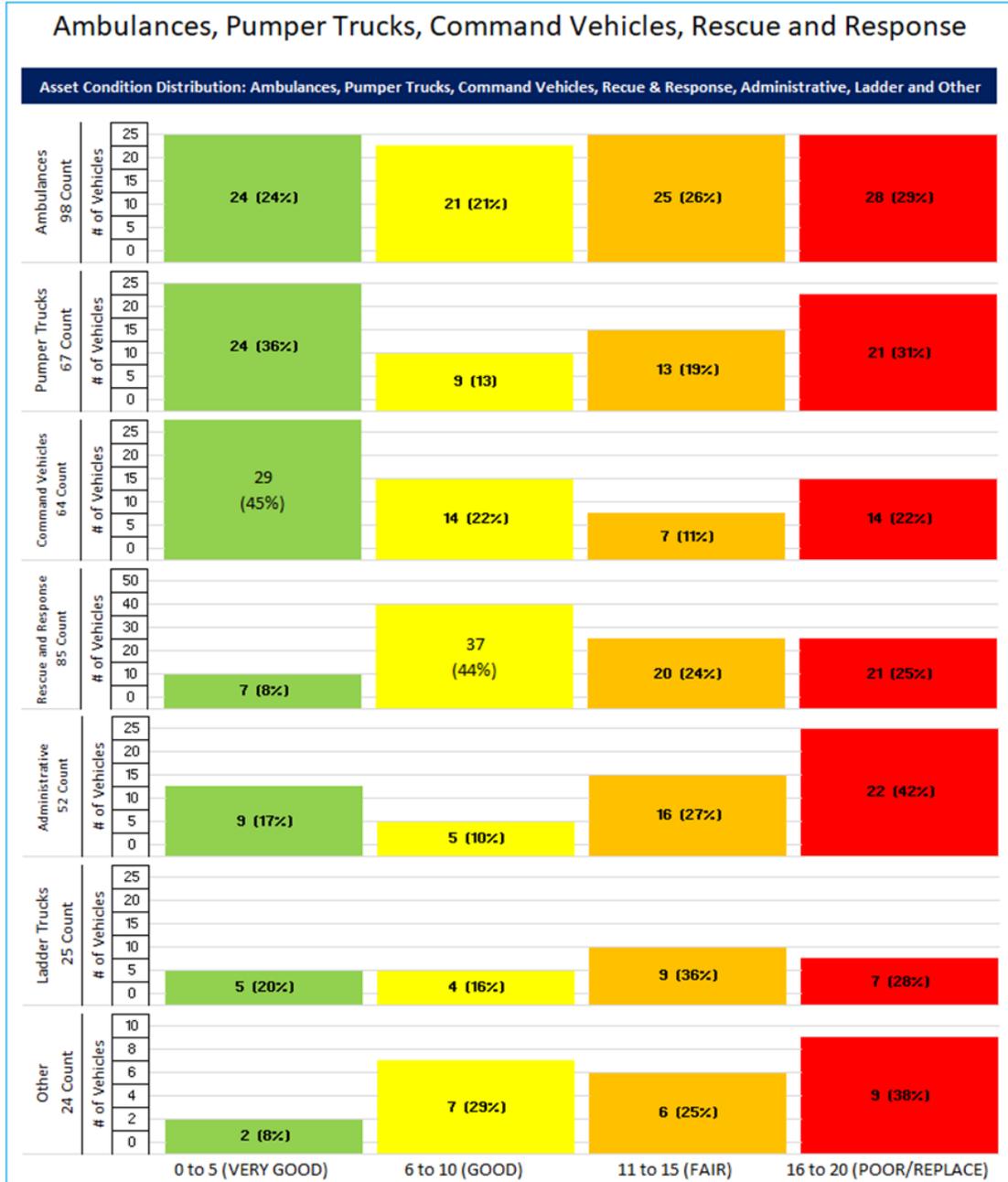
In the table below (*Figure 8*), the user can see data within FEMS at an even more granular level, by vehicle type, such as ambulances, command vehicles, ladder trucks, pumper trucks, etc. The data reflects not only the number of vehicles of each type, but also the average vehicle age by type, the overall maintenance costs by type of vehicle, as well as the total mileage by type of vehicle.

Figure 8: FEMS Fleet Data



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 being replaced, and thereby directly addressing the District’s most critical deferred capital maintenance needs.

Figure 9: FEMS Fleet Condition



The enhanced analytics tools allow users to drill down even further to review data around a specific vehicle type, such as pumper trucks (pictured to the right). From the graphic above, the data shows that there are 67 pumper trucks with an average age of approximately 8.6 years and maintenance costs approaching \$9 million, the highest of all of the vehicle types. The data further shows that there are 21 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 31% 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 vehicle age, useful remaining life of the vehicle, the total maintenance costs to date, engine hours and total mileage (when last serviced).

Figure 10: Pumper Trucks Data

Serial Number (VIN)	Make	Model	Vehicle Age	Useful Life	Total Maint. Costs	Engine Hours	Total Miles
1F9EC28T08CST2005	SEAGRAVE	PUMPER	12	10	283,077	11,624	30,674
1F9EG28T04CST2133	SEAGRAVE	TB40DA	15	10	246,244	19,992	147,316
1F9EG28T16CST2113	SEAGRAVE	TB40DA	15	10	213,887	10,281	92,195
1F9EG28T24CST2134	SEAGRAVE	TB40DA	15	10	230,039	70,706	57,484
1F9EG28T26CST2119	SEAGRAVE	TB40DA	15	10	252,136	14,000	113,471
1F9EG28T44CST2135	SEAGRAVE	TB40DA	15	10	289,764	22,039	13,562
1F9EG28T64CST2136	SEAGRAVE	TB40DA	15	10	311,848	21,292	162,219
1F9EG28T74CST2131	SEAGRAVE	TB40DA	15	10	209,201	18,357	99,707
1F9EG28T94CST2132	SEAGRAVE	TB40DA	15	10	223,996	16,239	117,590
1F9EG28TX6CST2126	SEAGRAVE	TB40DA	15	10	323,172	17,361	99,468
1F9EU28TX2CST2114	SEAGRAVE	TB40DA	18	10	196,381	17,262	108,548
1F9EW28T48CST2001	SEAGRAVE	PUMPER	12	10	436,139	17,715	130,853
4P1BAHGF0FA014697	PIERCE	ARROW XT	6	10	111,845	8,816	71,647
4P1BAHGF7FA014695	PIERCE	ARROW XT	6	10	129,736	73,101	77,922
4P1BAHGF9FA014696	PIERCE	ARROW XT	6	10	57,945	44,497	45,811
4P1CA01D0EA014484	PIERCE	ARROW XT	6	10	91,768	70,706	68,476
4P1CA01E1BA011565	PIERCE	ARROW XT	9	10	157,613	12,255	90,920
4P1CA01E1BA011566	PIERCE	ARROW XT	9	10	126,636	14,569	97,768
4P1CA01E1BA011567	PIERCE	ARROW XT	9	10	301,129	8,578	83,271
4P1CA01E8BA011711	PIERCE	ARROW XT	9	10	173,538	11,091	13,271

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	1F9ELZ8T4Y1CST2098	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
Capitalized Cost	309,177		

Measure Values

	2018	2019	2020	2021	2022	2023	SUMMARY
Age	0	1	2	3	4	5	
Adjusted Age	0	1	2	3	4	5	
Rehabilitation Count	0	0	0	0	0	0	
LIFECYCLE							
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							
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							
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. However, it was understood that a greater level of detail on many of the assets would be obtained as condition assessments were performed on all assets that had not yet received them. 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 increase in assets cataloged in CARSS over the 2019 report is largely due to increased purchases of IT assets over the past year, as well as further refinement of databases containing IT and furniture assets.

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 breakout 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 almost assuredly the most comprehensive asset registry of any state or local government in the nation. This will allow Agency Directors, the Administration 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 OCFO has also added to CARSS those assets not directly owned by the District, but rather by its component units, such as the University of the District of Columbia and the Washington Convention and Sports Authority. 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, as well as the assets of its component units or related entities.

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

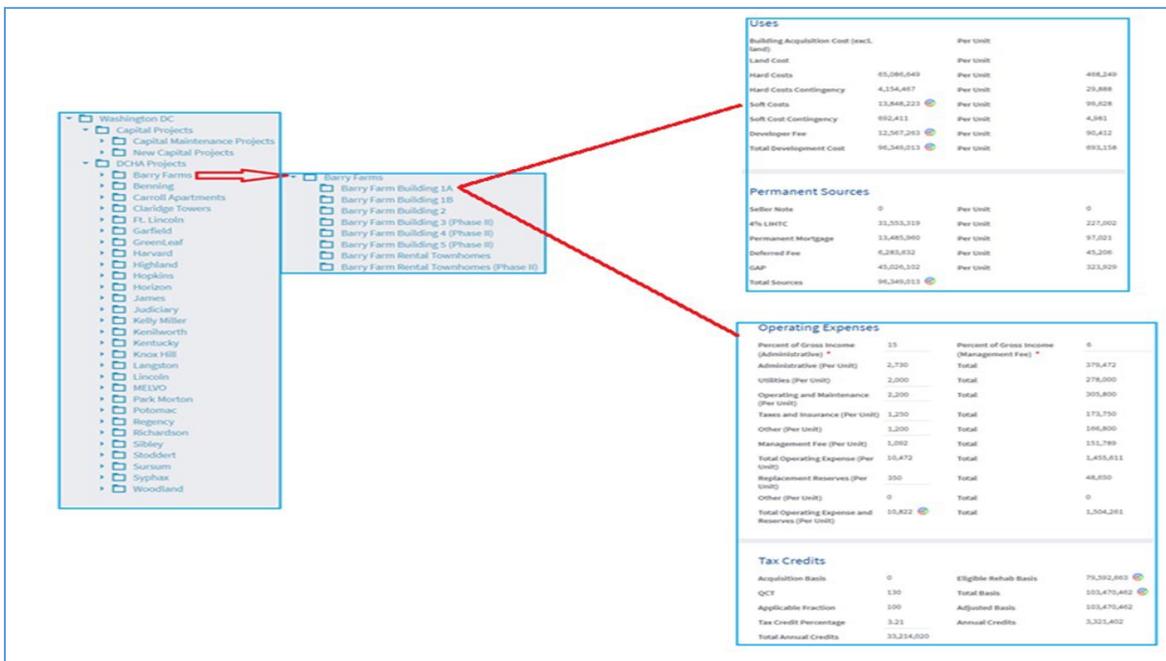
In fall of 2020, the OCFO began working with the Office of Planning on an ambitious project to enhance inter-agency coordination of long-range infrastructure and facilities planning. This project, known as the Civic Infrastructure and Facilities Initiative (CIFI) is a multi-year effort to achieve a more 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.

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 their deferred maintenance and unmet capital needs. By utilizing CARSS, which is now widely accepted throughout the District, DCHA will have a more authoritative and accepted idea on their true funding needs than 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 1*) shows a representation of the DCHA asset tree as it currently exists in CARSS for the 41 public housing units that are going to be evaluated as part of the 2020 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 built 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.

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.

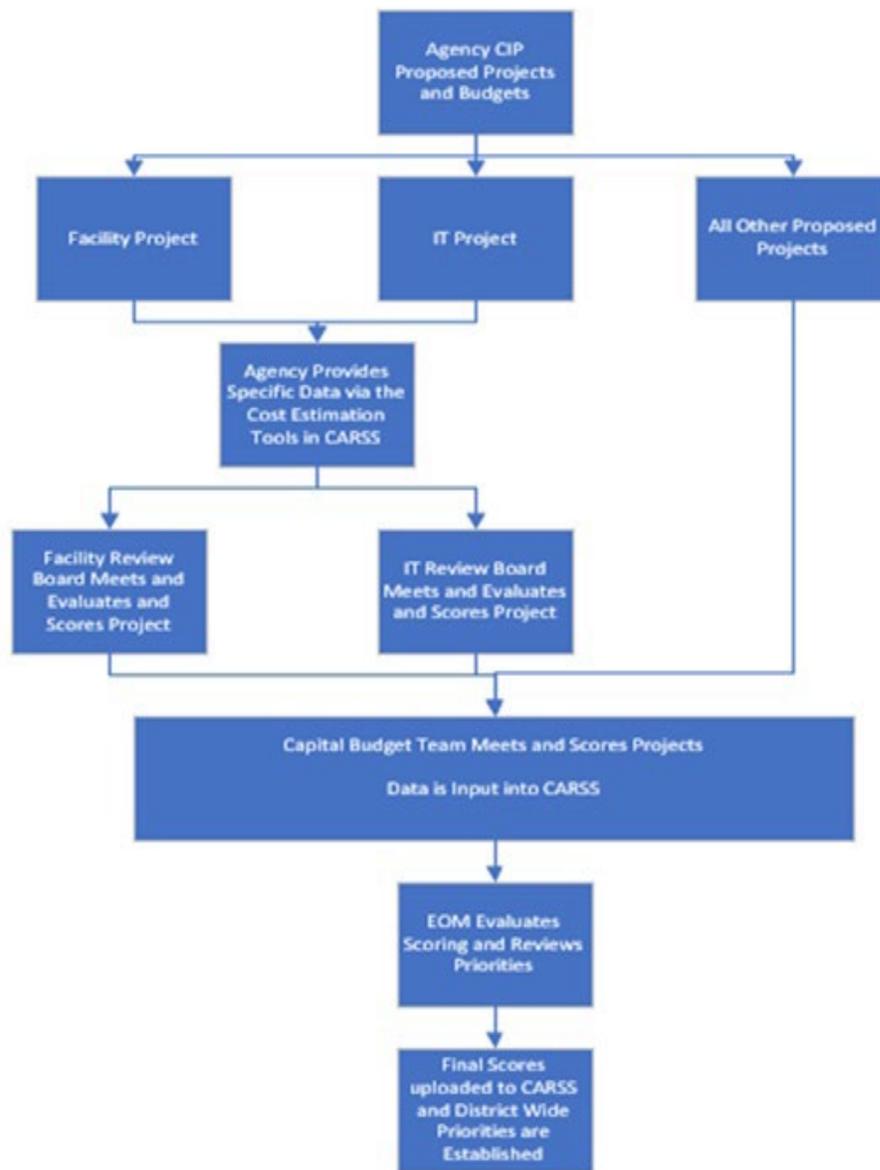
Capital projects were then further reviewed to identify if they should be considered as either 'pooled' projects, or potential public-private partnership (P3) opportunities. Pooled projects are used where there are known capital investments of a specific type (roofs, electrical systems, HVACs, etc.) 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.



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	<ul style="list-style-type: none"> * Education * 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.	<ul style="list-style-type: none"> * 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.	<ul style="list-style-type: none"> * 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	<ul style="list-style-type: none"> * 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.	<ul style="list-style-type: none"> * Libraries * Recreation Centers 	If the project provides some form of economic growth toward the middle class- X = bonus					0
	Enhance DC government services	<ul style="list-style-type: none"> * 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	<ul style="list-style-type: none"> * 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

Ranking Criteria for Proposed Capital Project Budgets – Continued

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

Appendix C

Overview of How Capital Projects Were Prioritized

Overview of How Capital Projects Were Prioritized

Once sufficient details outlining the nature and structure of needed projects and their budgets existed, the next task was to determine an objective approach to prioritize the 304 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 304 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.

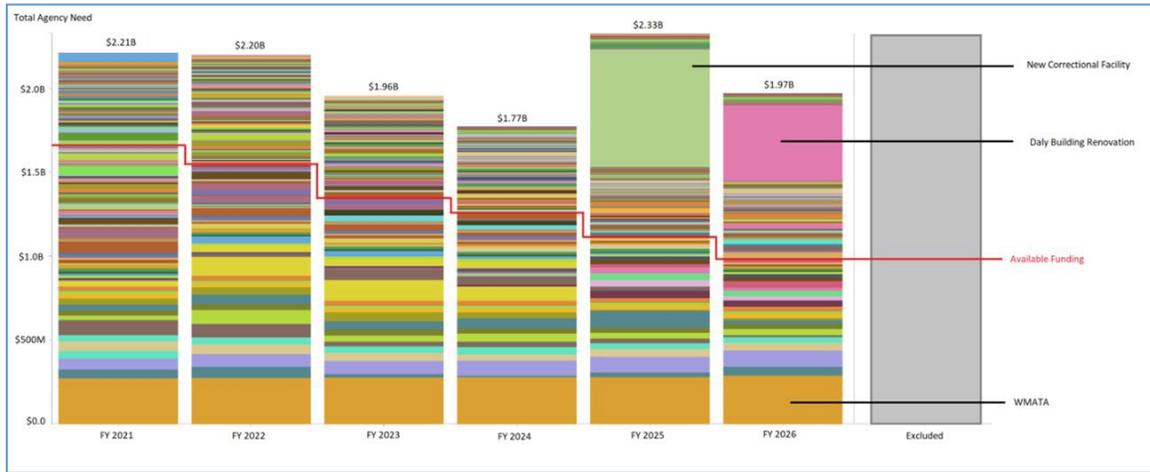
Using the standard system of scoring projects that was established (see Appendix B), the Capital Budget Team (CBT) and other subject matter experts spent time over several weeks to individually score each of the capital projects. The scores of individual projects were reviewed several times to assess 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 304. 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.

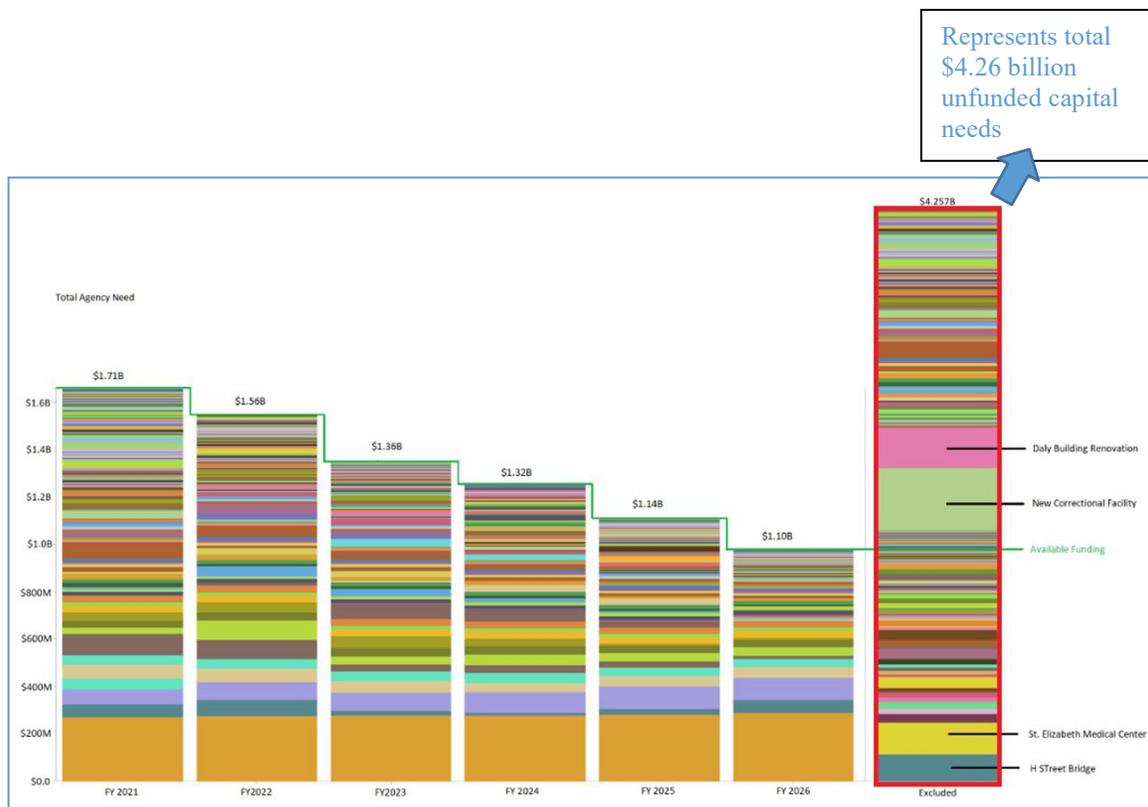
The following screen shot of the visual leveler shows all the capital project requests from the various agencies as part of the FY 2021 – FY 2026 CIP budget formulation process, relative to the amount of funding available, represented by the red lines.



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.



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 151 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

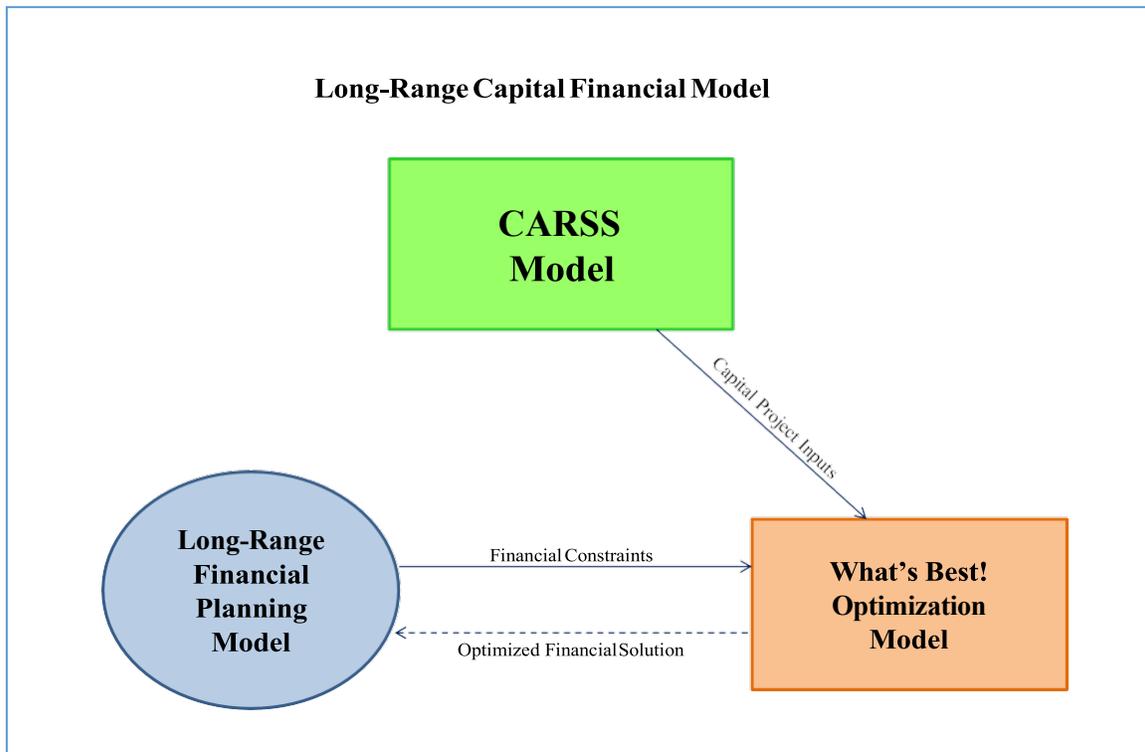
Description of Long-Range Capital Financial Plan Model

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
- Lindo What’s Best! (“WB!”) – a linear optimization model, which works as an add-in to Microsoft Excel.



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 WB! linear 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

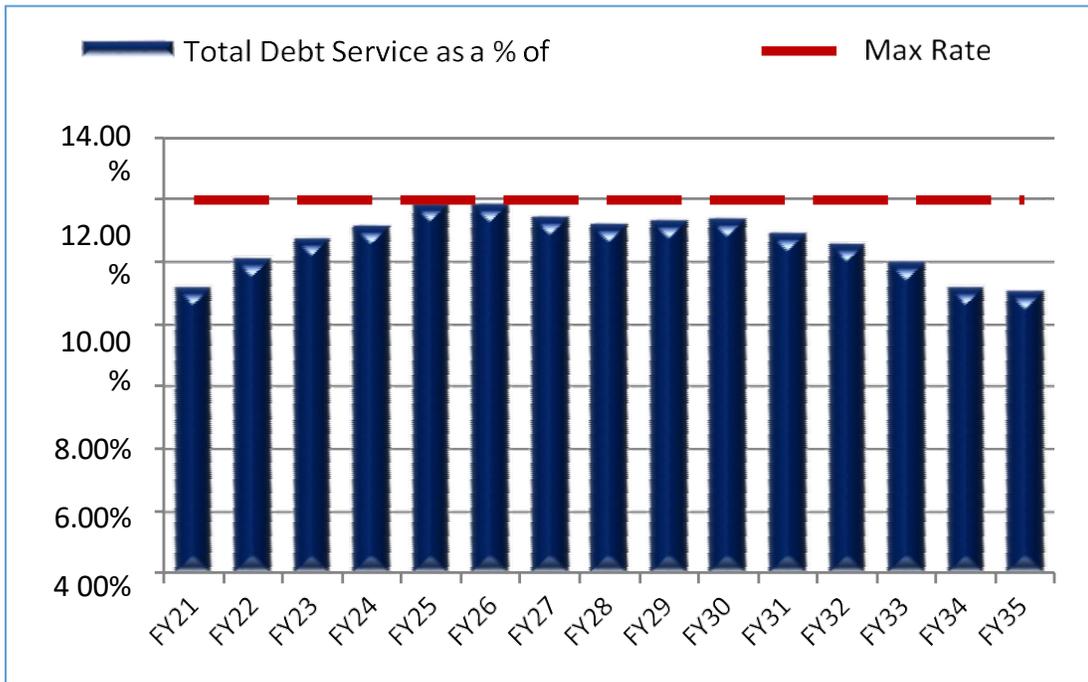
soon as possible. The financing information from the WB! linear optimization model is then exported back into the Long-Range Financial Planning Model in order to present a complete long-term capital financing plan for the District over the forecasted 15-year period.

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 decrease during the four year financial plan period, as is reflected in the September 30, 2020, revenue forecast from the OCFO, before then being projected to rebound and 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. No additional new capital projects:

As the model factors all of the many variables in solving for the best solution to fund the backlog of unfunded capital needs, it assumes that no new capital projects, outside of those that were part of the FY 2021-2026 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 2035) by exporting sizing results calculated in DBC Finance, a bond modeling software program;
- Utilize linear optimization software 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 2035; 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 macros and linear WB! linear optimization software. 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 2021-2026 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 linear optimization in conjunction with the District's systems takes what would be an iterative process and turns it into a problem with one explicit answer. It accomplishes this by simultaneously contemplating all potential solutions when the model is run, and then only returns the absolute best solution to the user of the model (defined as the lowest cost of financing the unfunded projects). 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. Secondly, 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.

Appendix E

Non-Traditional Funding Approaches

(Public-Private Partnerships)

Non-Traditional Funding Approaches

As the District continually looks for ways to effectively fund its deferred maintenance backlog and fund new capital projects to support continued growth, all while remaining within its statutory debt limits, it has begun to explore alternative funding methods, where appropriate, such as public-private partnerships or P3s. This type of alternative funding method, amongst others, potentially open up additional private sources of funding that could supplement the District's more traditional tools for funding infrastructure, such as debt financing, paygo and federal grants or loans. While P3s have their own benefits and potential drawbacks, the fact that the District has a detailed data warehouse and an extremely thorough knowledge of all of its assets and their conditions, makes it possible to better assess which assets might be good candidates for P3s or other alternative funding methods, as well as being able to perform a more detailed comparison against more traditional public sector funding methods, along with more precise cost-benefit analyses of various funding methods.

Public-Private Partnerships (P3s)

While there is no singular definition of a public-private partnership (P3), the World Bank generally defines a P3 as, *“A long-term contract between a private party and a government entity, for providing a public asset or service, in which the private party bears significant risk and management responsibility, and remuneration is linked to performance.”*

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) over the last several years. During that time, certain capital projects were identified as high priorities for the District, including 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. 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.

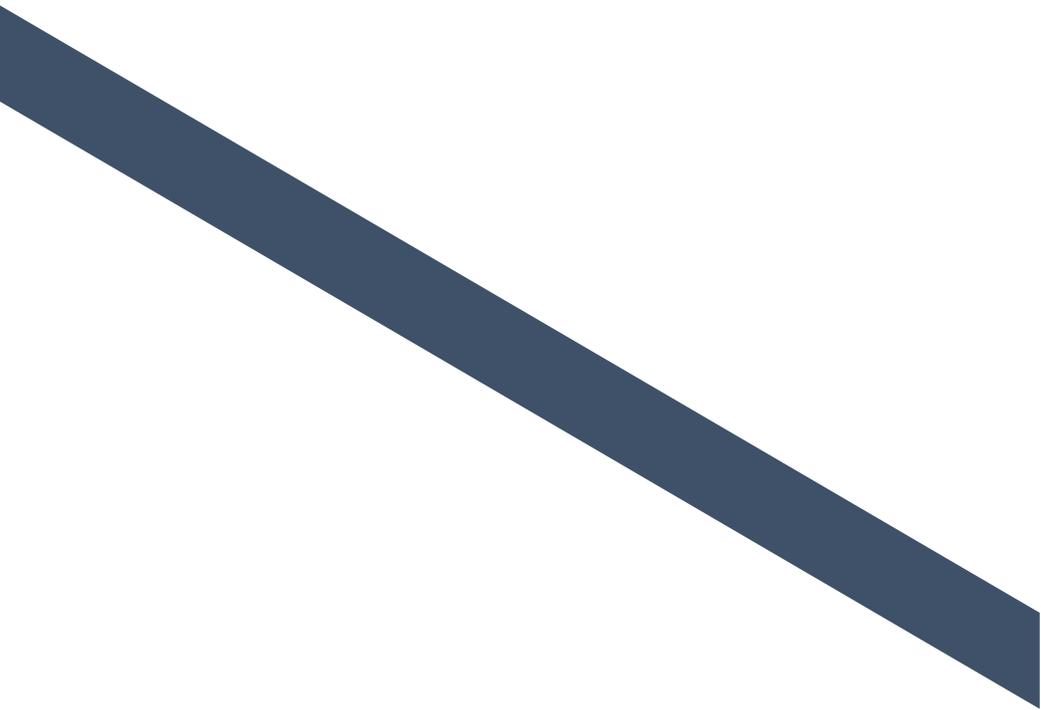
List of Potential Public-Private Partnership (P3) Projects in the District

Based on available information as of FY 2021 capital budget formulation, the following table shows a list of potential projects, as identified by the Office of Public Private Partnerships (OP3), for which that office is actively seeking to structure and finance as P3 projects. The long-range capital financial plan currently assumes that the potential P3 projects listed in the following chart are funded as part of the District's regular capital budget process utilizing traditional public finance methods, such as debt or paygo. The District's overall capital funding gap may be further reduced if some, or all, of these projects are ultimately structured as P3s that prove to be a more cost-effective method of procuring those projects. More information on the projects listed in the following table can be found at <http://op3.dc.gov/pipeline>.

Project	Agency(s)
<i>In Procurement</i>	
Digital Kiosks	DPR, MPD, OCTO
DC Smart Street Lighting	DDOT, OCTO
Henry J. Daly Building	DGS, MPD
<i>Under Consideration</i>	
West Virginia Avenue Public Works Campus	DPW, DGS
Corrections Center	DOC, DGS
Library Facilities	DCPL
Police Facilities	MPD, DGS
Fire and Emergency Medical Facilities	FEMS, DGS
Parks and Recreation Facilities	DPR, DGS
Educational Facilities	DCPS, DGS, DME
Waste Management / Recycling Center	DOEE, DPW, DGS
Solar and Microgrid Projects	DOEE, DGS

All P3s involve a basic trade-off between a transfer of risk (risk of construction, risk of management, etc.) by the private party versus control (control of day-to-day operations of the facility, control of the revenue stream from the facility, etc.) by the government entity. There are several advantages and challenges related to P3s that government entities need to address when considering their use. These include, but are not limited to, the following:

Advantages	Challenges
Accelerated project delivery compared to pay-as-you-go approach	Restricted control over day-to-day operations of the facility
Fixed-price contract where private partner is at risk for any cost overruns	Ongoing costs of monitoring the contract over a long period of time
Access to more innovative, and cost-effective methods of design and operation of the facility	More expensive cost of borrowing for private partner versus traditional public borrowing
Account for full life cycle costs of operating and maintaining a facility	Often less transparency and accountability in the contract with private partner versus traditional public sector approach
Ability to hold private partner to specific performance standards in a contract or otherwise withhold payment	A mismatch in technical expertise on the side of the private partner can lead to overpayment by the government entity



**GOVERNMENT OF THE
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