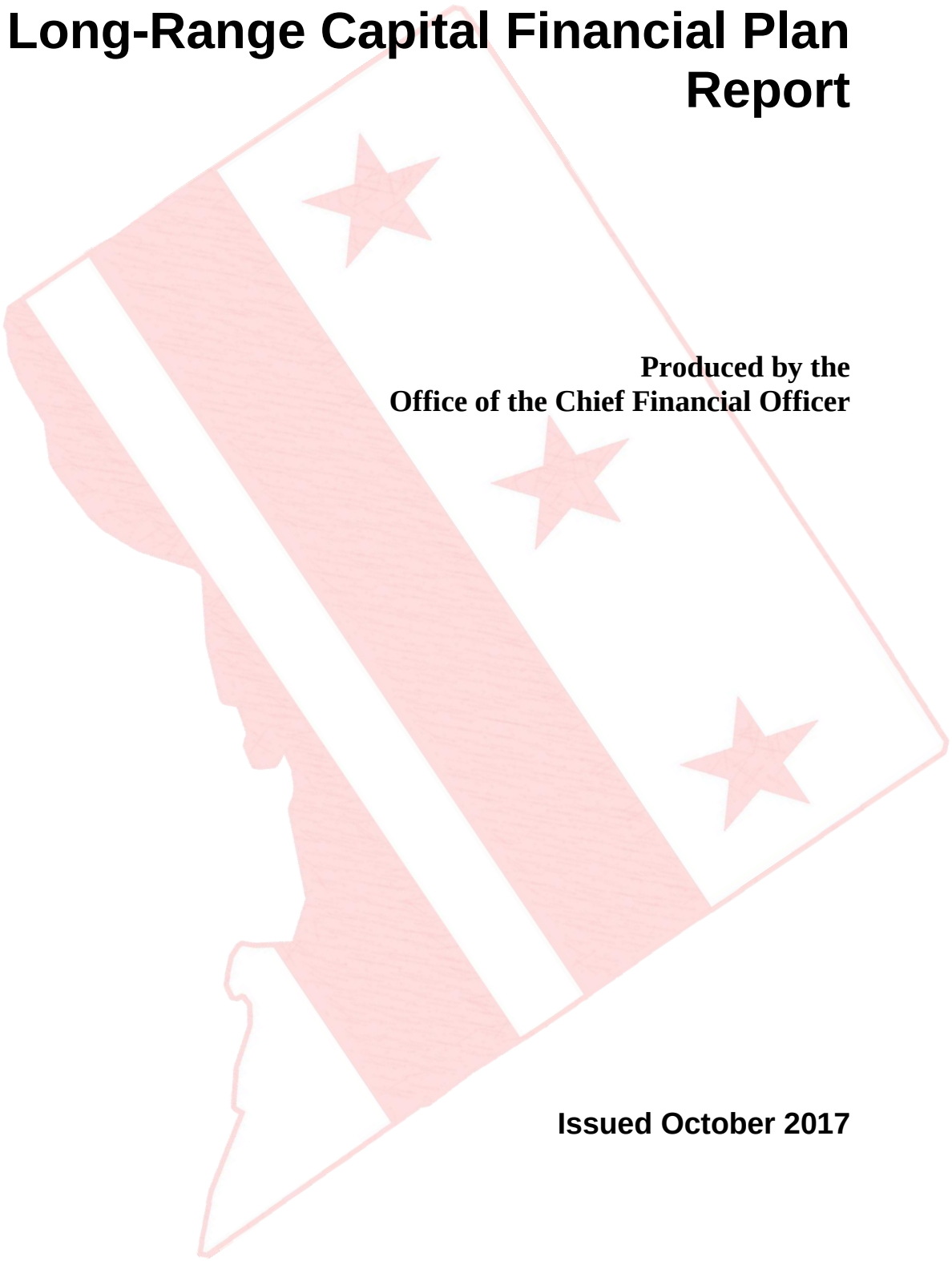
Government of the
District of Columbia

District of Columbia Long-Range Capital Financial Plan Report



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District of Columbia: Long-Range Capital Financial Plan Report

Executive Summary

As part of the Fiscal Year (FY) 2015 Budget Support Act, the Council of the District of Columbia included a requirement for the Office of the Chief Financial Officer (OCFO) to develop and report on a replacement schedule for capital assets in October of each year. As a result, the OCFO developed a long-range capital financial plan for the District that includes capital asset replacement needs beyond the normal six-year capital planning period. This report is intended to assist the Mayor, Council, agency directors, other policymakers and the public in understanding the size of the District's capital infrastructure funding gap, and how this funding gap might be addressed over time using new long-range financial planning tools developed for capital planning. This report serves as an update on the progress of the long-range capital financial plan since the prior report issued in October 2016.

Infrastructure Financing Gaps

In March of 2017 the American Society of Civil Engineers (ASCE) published its 2017 Infrastructure Report Card: A Comprehensive Assessment of America's Infrastructure, which grades the current state of the nation's infrastructure. While some progress has been made towards greater investment in the nation's infrastructure since the group's last report four years earlier, it has not been adequate to address the years of chronic underinvestment. In fact, much like in 2013, the nation's infrastructure earned an overall grade of D+ on an "A to F" scale. The District of Columbia, like the rest of the nation, faces the same challenges in maintaining its critical infrastructure. In 2016, the ASCE issued its Report Card for D.C.'s Infrastructure. The report concluded that while the District earned a slightly higher overall grade (C-) than the nation at large, the District's infrastructure was also in need of greater investment in basic maintenance, as well as increased innovation, to bring the critical infrastructure of the nation's capital to a state of good repair.

Public infrastructure is a critical responsibility of governments at all levels. Whether it is new facilities to meet the needs of the residents or maintaining current assets such as roads, streets, 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 plans to fund $6.7 billion in capital projects, with approximately $5 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 effective balance between funding its on-going operations (programs and services) versus capital assets.

The District remains in a far better position than most other cities and states due to prudent financial management practices over the last twenty years, which have resulted in fully funded pensions, strong reserves and strong credit ratings that afford it access to low-cost financing. Strong local and regional economic growth has also provided additional financial capacity over time, as tax and fee revenues grew. Finally, a significant portion of past borrowing will be refinanced in the coming years providing additional capacity to fund capital needs, however these additional funds will have to compete with other priorities of the District.

The infrastructure needs of the District, which serves as a city, state, county and school district, are substantial. To determine the District's total capital needs, a comprehensive review of all governmental agencies' capital and asset maintenance requirements was completed, with each project scored and ranked to ensure that the highest priority projects were funded. These needs were analyzed using the Capital Asset Replacement Scheduling System (CARSS). 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. Since the 2016 Long-Range Capital Financial Plan Report (the "2016 Report"), the amount of assets inventoried in CARSS has increased from 14% to 96% of all District assets. In addition, facility condition assessments have been either completed or are in progress on all assets captured in CARSS. ***Arguably, CARSS is the most comprehensive and detailed capital asset management system of any city or state in the country, which is critical in assessing the funding needs related to quality infrastructure maintenance. The reader is encouraged to review a more detailed discussion of the development of the asset management system in Appendix A.***

The District has also developed a separate long-range financial forecasting model, which can determine the optimal project funding within financial constraints, including debt capacity, pay-as-you-go (paygo) or cash funding, as well as federal or other grant funding. Projects were also analyzed to determine where the private sector may assist in addressing future infrastructure challenges through public-private partnerships, or P3s. Separate modeling tools were developed to determine the long-term capital funding needs of the Washington Metropolitan Area Transit Authority (Metro), which will require District support, as well as regional funding solutions.

As previously discussed, the District is able to fund approximately $6.7 billion of its capital needs through 2023. During that same time period, there is approximately $4.2 billion in capital projects that exceed the District's financial capacity. Slightly less than half of this gap is related to infrastructure maintenance, or re-investment in currently owned assets. This does not include the District's share of the estimated future capital funding for Metro of approximately $2.3 billion over the next decade, as well as an estimated $1 billion to $1.5 billion in P3 projects that may be addressed through private sector assistance. The funding gap for Metro will likely require a regional, dedicated funding source, which is discussed in more detail in the report and in *Appendix B.* Additionally, a list of capital projects that could possibly be structured and financed as P3s, as well as a discussion of potential advantages and challenges of P3s, is outlined in *Appendix C.*

Table 1 below summarizes the primary capital funding needs gap, which averages approximately $700 million per year, or roughly eight percent (8%) of the District's General Fund.

Table 1.

(in $ millions)

Fiscal Year	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	6 Year Total
Unfunded Capital Maintenance Projects	218.0	358.4	414.1	438.8	256.0	269.7	$1,954.9
Unfunded New Projects	252.3	375.0	742.5	547.0	258.4	99.3	$2,274.4
Total Unfunded Capital Needs	**$470.2**	**$733.4**	**$1,156.6**	**$985.8**	**$514.4**	**$369.0**	**$4,229.4**

The 2016 Report suggested that paygo be increased by $325 million annually over then current funding levels, beginning in FY 2019, and continued into the future. This would have resulted in all unfunded capital maintenance and new capital projects being funded by FY 2026. Subsequently,

legislation was approved in FY 2017 to increase the amount of paygo provided to support the capital program needs as part of the FY 2018 Budget Support Act *(see the "Paygo Funding" section of this report for more details)*. Under the new law, the amount of additional funding contributed to paygo would rise more gradually and would be eventually capped at the amount of annual depreciation, as can be seen in *Table 2*. Over the fifteen-year period studied in this report that would result in average transfers to paygo of $315 million annually. The District's current financial plan, which extends through FY 2021, includes the impact of the increased paygo levels of this new legislation.

Table 2.

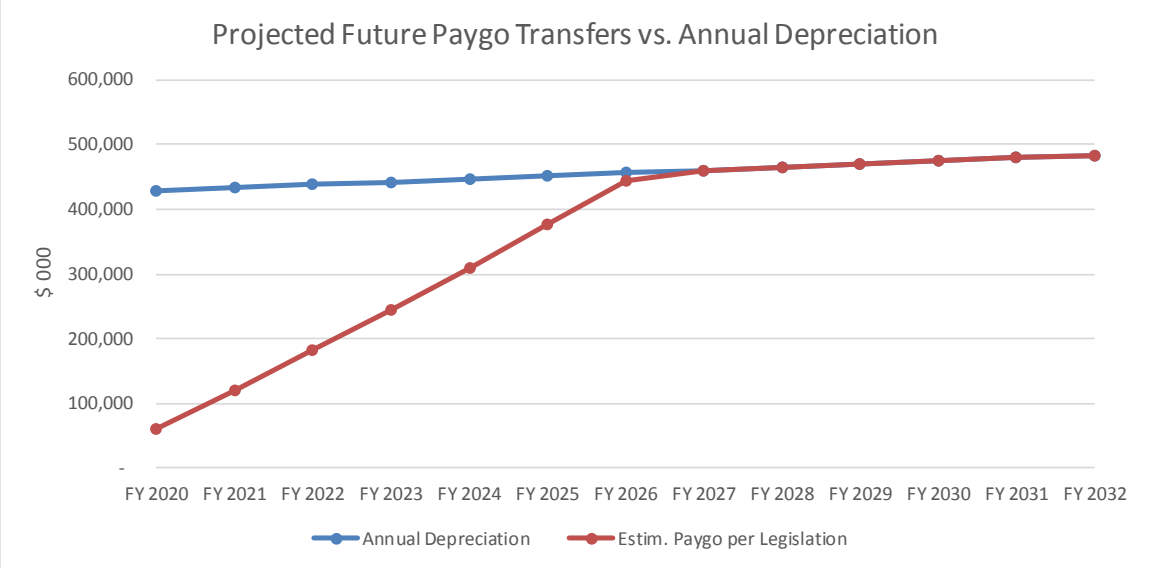
Projected Local Funds Revenue Transfers to CIP - Based on New BSA Provision

($ in Millions)

Fiscal Year	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Projected Transfer Amounts	$60.0	$53.4	$103.9	$120.3	$181.5	$244.5	$309.0	$375.9	$444.7	$460.6	$465.2	$469.9	$474.6	$479.3	$484.1

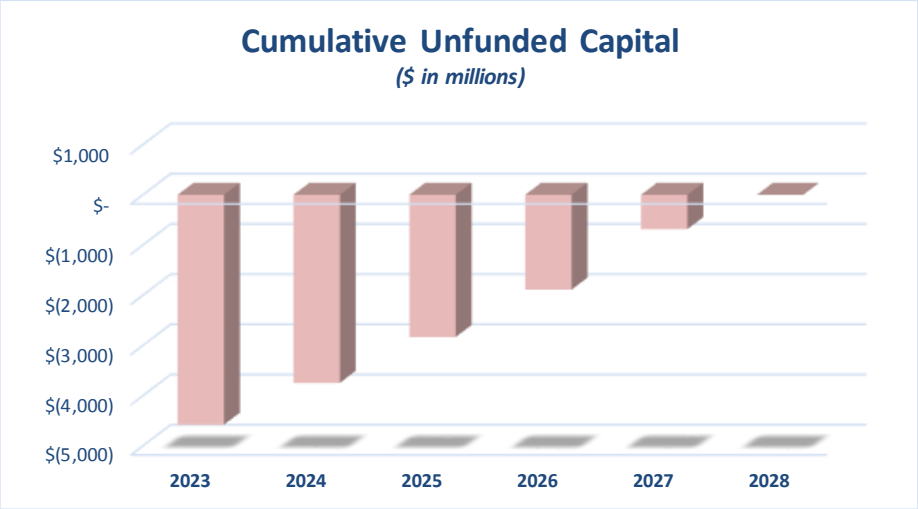
Figure 1 below illustrates the prescribed increases in paygo (shown above in *Table 2*) compared to annual depreciation, which is forecast to grow at one percent (1%) annually.

Figure 1.



The increased paygo levels per the legislation, coupled with additional debt capacity as existing debt is retired, as well as a growing economy, would enable the District to fund all identified and unmet capital needs by FY 2028, as can be seen in *Figure 2*. The amount of unfunded capital needs currently identified would remain outstanding through FY 2023, since the current six-year CIP is at full capacity. Beginning in FY 2024, assuming no new capital projects are added to the CIP until all identified unfunded capital needs are met, the District could begin paying down those unfunded capital needs fairly rapidly.

Figure 2.



It is important to note that the estimated increases in paygo from local funds shown in *Table 2* represent significant portions of the projected local funds revenue growth of the District. In fact, current projections would have nearly fifty percent (50%) of projected revenue growth in FY 2021 going to the CIP as paygo, increasing to nearly one hundred percent (100%) of projected revenue growth by FY 2023. If the formula in the law remains in place, and revenues do not grow faster than are currently projected, then starting in FY 2024, other expenditures would need to be reprioritized or additional funding sources implemented, to fund the prescribed paygo amounts. In fact, with revenues in the "out years" (FY 2024 - 2032) only assumed to grow at 2.5% per year, an additional 2% of annual revenue growth is required in order to meet the prescribed additional paygo funding for capital. Said another way, revenues would need to increase, on average, about 4.5% per year during the "out years" in order to avoid having an impact on programs, while still being able to fully fund paygo per the legislation.

Allocating this level of additional paygo funding is not without challenges, since capital funding competes with needed programmatic funding for priorities such as affordable housing, homelessness, and growth in day-to-day services for residents. 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.

This long-range capital financing plan provides information to begin policy discussions regarding long-term capital needs and the strategies that can address these needs. Over time, as all assets are inventoried and condition assessments are completed, the costs of repair versus replacement will be refined, however the larger policy discussions of funding priorities will not change. Over the next few years, the District, Maryland and Virginia, will need to address funding for Metro, which serves as an important economic engine for the Washington Metropolitan region. Public-private partnerships will need to be prudently pursued for those projects which are most cost-effective. 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 to fully address the needed infrastructure, including maintenance of existing District assets. This would place the District in an enviable position compared to other cities and states in addressing long-term infrastructure needs that are a challenge throughout the country.

District of Columbia: Long-Range Capital Financial Plan Report

Introduction

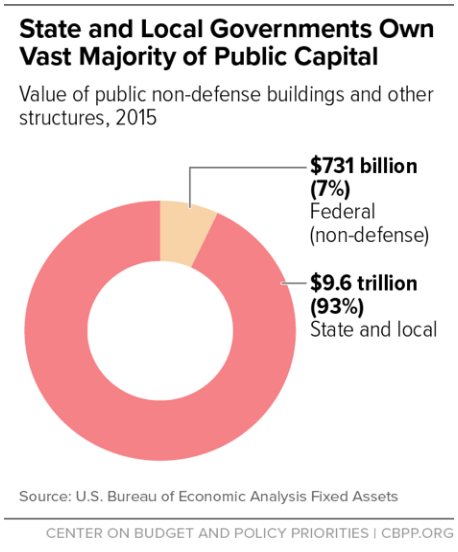
As part of the Fiscal Year (FY) 2015 Budget Support Act, the Council of the District of Columbia (Council) included a requirement for the Office of the Chief Financial Officer (OCFO) to develop and report on a replacement schedule for capital assets in October of each year. This report meets this requirement 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

The purpose of this report is 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 present potential funding solutions through the development of a long-range capital financial plan. In addition, the development of a long-range capital financial plan will also allow, for the first time, 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 those decisions, so that capital budgeting decisions can be better informed and justified.

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 recent report from the Center on Budget and Policy Priorities, which analyzed data from the U.S. Bureau of Economic Analysis, showed that as of 2015, state and local governments owned $9.6 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 decrease. The report further makes the argument that while state and local governments may be waiting on federal infrastructure spending to help offset their decreased levels of spending, in the current political environment the federal government may be a less than reliable partner in this endeavor, *"States may be awaiting a promised federal plan to invest more in roads, bridges and other public infrastructure. More federal help would be welcome, but*



states should take the lead in this area because the type and amount of assistance they'd receive under any new federal initiative remain unclear. Notably, President Trump's infrastructure proposal seems to omit many important areas of need. The plan in the President's proposed 2018 budget consists of tax credits to private-sector investors, which would boost investment in projects that will generate revenue like tolls or user fees (such as new roads and bridges) but leave out maintenance of existing roads, bridges, and water lines, and construction of public schools and many public transit projects."[1]

In addition, a recent report from Moody's Investors Service states that, *"State and local governments, facing pressure to spend more on pensions, public education and other priorities apparently more pressing than infrastructure, have been curtailing investment in a broad range of capital assets. highways and streets. A rough proxy for the rate of infrastructure investment is the ratio of capital spending to depreciation, the basis on which state and local government infrastructure investment has tracked steadily downward for more than a decade, including in such key categories as sewer systems and highways and streets. In addition to these crucial categories, this ratio has declined since 2009 in nearly every category compiled by the Bureau of Economic Analysis, including education, public safety and water systems. Putting off investment in these types of assets is often an easy, politically uncontroversial way to balance budgets and fund other more visible or immediately noticeable priorities."*[2]

In fact, the American Society of Civil Engineers (ASCE), which recently released its 2017 Infrastructure Report Card graded the current state of the nation's infrastructure as D+ (or poor) due to many of these very practices. With limited resources and other competing priorities such as growing pension and retiree healthcare liabilities, many state and local governments have chosen the path of least resistance and decided to defer needed infrastructure investments. Over the long term, the lack of investment in infrastructure by federal, state and local governments threatens to harm both the local and national economies. The Moody's report further states that,

"Over time, we expect that the deferral of such fixed investment will lead to poor asset quality (the average age of state and local government fixed assets in 2016 was almost three years older than it was in 2009) and require even greater investment in the future – a form of "soft" debt that will compete with pension liabilities and other governmental mandates for funding."[2]

Fortunately, the District does not face the large pension and retiree health care liabilities facing many other state and local governments, but the District mirrors the experience of other jurisdictions in its deferral of necessary investment in capital infrastructure in favor of other competing priorities. In 2016, the ASCE released a separate infrastructure report card focusing solely on the infrastructure of the District, and while our 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 the needed investments to keep pace with the demand for new infrastructure brought on by continued population growth, with the need to direct limited resources to critical programs.

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[1] Center on Budget and Policy Priorities, Policy Futures: *It's Time for States to Invest in Infrastructure*, August 10, 2017.
[2] Moody's Investors Service, Sector Comment: *State and Local Government Delays in Capital Expenditures Push Costs into the Future*, October 5, 2017.

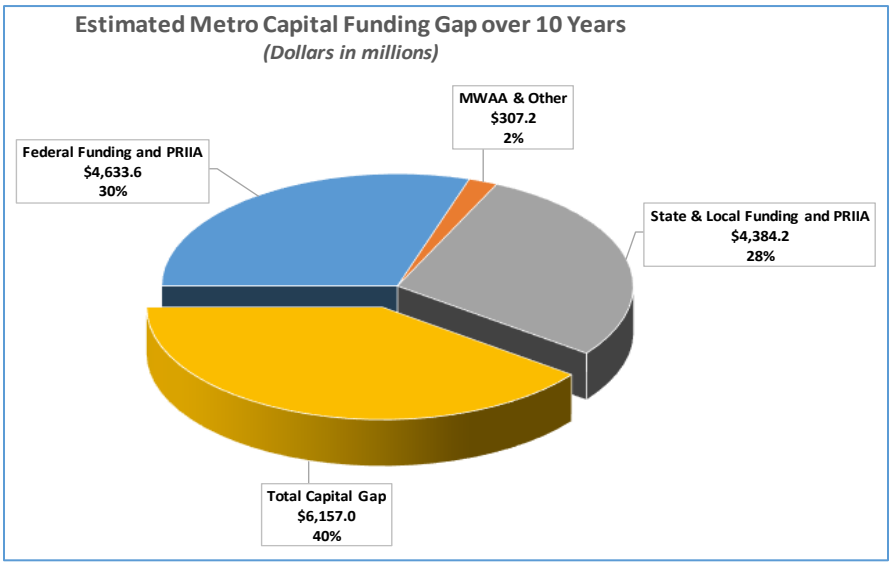
Estimate of Capital Funding Gap

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; 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-$15 billion over the next decade. For the District, the issue is less one of affordability, but more the period of time over which these capital needs will be funded.

Washington Metropolitan Area Transit Authority (Metro)

As part of this capital needs assessment, it was critical to estimate Metro's potential future funding needs and their potential impact on the District. Over the course of roughly eighteen months, 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 has been shared with, and thoroughly vetted by, all of the other jurisdictions in the Metro compact through the Metropolitan Washington Council of Governments (or "MWCOG"), as well as with various other stakeholders throughout the region. This analysis, which informed the report issued by Metro's General Manager in April of this year, identified a backlog of critical capital needs of approximately $15.5 billion to return the system to a state of good repair (or "SGR") over the next decade. This amount does not include the estimated $1.3 billion projected operating shortfall over the same period.

The analysis assumes that current levels of federal funding for Metro remain constant into the future. This would include continued federal funding of the Passenger Rail Investment and Improvement Act of 2008 (PRIIA), which is due to expire after FY 2019. Federal PRIIA funding represents $150 million annually provided by the federal government, which is matched at $50 million each by the District, the State of Maryland and the Commonwealth of Virginia, for Metro capital projects. Further, the analysis assumes that the local jurisdictions in the Metro compact would increase their capital funding contributions to Metro by three percent (3%) annually over the FY 2017 base amount, which was agreed upon by the jurisdictions at various MWCOG meetings as being affordable. At these assumed funding levels, there would still remain a capital funding gap over the



next decade of approximately $6.2 billion. The District's share of this estimated shortfall would be approximately $2.3 billion over the ten-year period. The District would be unable to fund this shortfall from current resources without very significant impacts on other infrastructure priorities. For example, $2.3 billion is approximately the size of the locally-funded portion of the entire capital budget for the District Department of Transportation (DDOT) and DC Public Schools (DCPS) combined in the current six year CIP.

As part of our analysis, the OCFO identified several potential, region-wide funding solutions to address Metro's capital funding shortfall. After extensive consultations with various financial advisors and other capital markets participants, it was agreed upon by the various jurisdictions that the source of funding for Metro would need to be stable, cash (i.e. not debt funded), dedicated, and of sufficient credit quality to allow Metro to leverage those funds in the capital markets at reasonable borrowing costs. This led to an analysis by the OCFO of four potential regional funding solutions, including a possible regional dedicated sales tax, a property tax, a property tax within a half mile of Metro stations and a gas tax. 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 the capital funding gap to achieve a state of good repair within a decade.

Type of Regional Tax	Regional Tax Increase ($500M Level)
Sales Tax	0.78% on taxable sales
Property Tax (All Property)	6.2 cents per $100 of A.V.
Property Tax (within 1/2 mile of Metro)	33.3 cents per $100 of A.V.
Gas Tax	12.7% increase

Since then, the OCFO has conducted numerous other analyses on a wide variety of proposed funding alternatives in cooperation with MWCOG. While discussions amongst the jurisdictions continue, currently there does not exist a consensus amongst the various jurisdictions on a dedicated, long-term funding solution for Metro, and an agreement is not likely to materialize before Fall of 2018. Therefore, current discussions are focusing more on potential short-term solutions that could potentially address Metro's funding gap over the next few fiscal years, while the region continues to search for a dedicated, long-term solution to meet Metro's long-term capital and operating funding needs. For a summary of the complete analysis that the OCFO prepared on Metro's funding needs, please see *Appendix B*.

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, or other less-traditional means of financing, the OCFO held extensive discussions with the Mayor's Office of Public Private Partnerships (OP3). During that process, certain capital projects were identified as high priorities for the District, including a replacement of the Henry J. Daly building (which houses the headquarters of the Metropolitan Police Department), a new correctional facility, and a number of 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 $300 and $400 million each to replace. These types of projects provide

an excellent opportunity for public-private partnerships. Therefore, these projects (and others similarly identified) were removed from the long-range capital financial analysis since a P3 may bring financial resources outside the regular funding process. The capital projects that were removed from the final analysis conservatively represent approximately $1 billion to $1.5 billion in potential P3 projects that will be pursued by OP3 over the next several years, based on data available at the time of FY 2018 capital budget formulation. A list of these potential P3 projects, as well as a discussion of the advantages and challenges of P3s can be found in *Appendix C*.

Status Update on the Capital Asset Replacement Scheduling System (CARSS)

In order to determine long-term capital needs, particularly asset maintenance costs, the first step is to develop a quality inventory of the number, value and condition of existing assets. One year ago, when the 2016 Long-Range Capital Financial Plan Report (the "2016 Report") was published no such inventory existed. In fact, detailed "granular-level" data only existed for a small portion of total District assets. At that time, only 14% of District assets were captured in CARSS and had a full and detailed inventory and needs assessment. Over the past year an extensive campaign was undertaken to more fully build out the District's asset inventory, or registry, as well as to develop a comprehensive asset management planning system to gather and house detailed data on all District-owned assets. As of the publishing of this report, the OCFO estimates that the vast majority of District assets are currently captured in CARSS. In fact, it is estimated that ***more than 96% of all District assets are now inventoried in CARSS***. Another important step in the development of CARSS is having detailed condition assessments on all assets. Such condition assessments have already been completed for fleet assets, streets and sidewalks, as well as for many schools. The District Department of General Services (DGS) is currently in the process of completing facility condition assessments on all their assets. Improvements from last year have greatly enhanced the analysis, and future efforts will continue to improve CARSS. While some key asset categories still need to be added to the registry, such as bridges, the streetcar system, information technology and other key equipment to have a complete picture of all District-owned assets, the District now has the most comprehensive inventory of its assets that it has ever possessed. 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 beginning with the FY 2019-2024 CIP.

Over the coming months and years as the District continues to fully build out its asset registry, the OCFO will also look to add those assets not directly owned by the District, but rather by its component units, such as United Medical Center, the University of the District of Columbia, and the Washington Convention and Sports Authority, amongst others. Also, as part of a more ambitious project, the OCFO is working with the District's Office of Planning to try to develop the capability to integrate forecasts of future population and development trends throughout the District to better anticipate the location, and potential costs, of additional capital assets that will be needed to support future growth in the city. ***Arguably, CARSS is the most comprehensive and detailed capital asset management system of any city or state in the country, which is critical in assessing the funding needs related to quality infrastructure maintenance. The reader is encouraged to review a more detailed discussion of the development of the asset management system in Appendix A.***

During the FY 2018-2023 capital budget formulation process period that this report covers, the current level of detail on individual assets of the District did not exist. Therefore, in lieu of complete detailed information on all assets, a decision was made to utilize a "top down" or project-level approach, like that used in prior years. This approach was based on a scoring and ranking process for each capital project in order to provide a reasonable estimate of all capital needs including, ongoing capital maintenance projects. The capital needs requests of each agency

presented during the FY 2018-2023 budget formulation process were used as a proxy for more detailed, asset level information. These capital requests represented all known capital needs of each agency. Those capital projects were then compared against the projects that actually received funding as part of the FY 2018-2023 CIP. The unfunded projects represent the extent of the District's capital infrastructure funding gap.

Total Capital Funding Gap

After subtracting the District's share of Metro's estimated future capital needs to return the system to a state of good repair, as well as those capital projects identified by OP3 as likely to be structured and financed as public-private partnerships, the CARSS model determined that the total capital infrastructure needs of the District, as identified as part of the FY 2018-2023 CIP budget formulation, is approximately $10.9 billion. The District has identified approximately $6.7 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 2018-2023 capital budget for the highest-priority capital projects. This results in a remaining total capital infrastructure funding shortfall of approximately $4.2 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. Through the use of the District's long-range capital financial plan model, the OCFO estimates that these capital projects needs can be reasonably addressed within the next ten to twelve years, depending on the level of paygo funding, federal funds or other sources that the District commits to its CIP.

The following chart shows the annual estimated funding needed, beyond the current six-year CIP, broken into the two categories of capital projects: capital maintenance projects and new capital projects. The six-year funding gap for capital maintenance projects is approximately $1.95 billion, or about $326 million annually, and the six-year funding gap for new capital projects is about $2.3 billion, or approximately $370 million annually. Combined, the annual funding gap is approximately $700 million, which is equivalent to roughly eight percent (8%) of total General Fund expenditures.

(in $ millions)

Fiscal Year	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	6 Year Total
Unfunded Capital Maintenance Projects	218.0	358.4	414.1	438.8	256.0	269.7	$1,954.9
Unfunded New Projects	252.3	375.0	742.5	547.0	258.4	99.3	$2,274.4
Total Unfunded Capital Needs	**$470.2**	**$733.4**	**$1,156.6**	**$985.8**	**$514.4**	**$369.0**	**$4,229.4**

The $326 million average annual amount of unfunded capital maintenance projects approaches the total amount of annual depreciation of the District's capital assets, which is generally considered a good approximation of the continued level of investment needed to adequately maintain capital assets.

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 $2.2 billion in unfunded facilities projects includes approximately eight elementary schools, a middle school and a high school, totaling about $344 million. Similarly, approximately

$900 million of the nearly $1.6 billion shortfall in unfunded horizontal infrastructure relates to DDOT repair of local streets. The amounts shown for WMATA (Metro) represent the actual shortfall between the amounts shown in Metro's approved 6-year CIP and the amounts budgeted for Metro in the District's approved FY 2018-2023 CIP. This amount does not reflect the remaining approximately $2.3 billion funding gap related to Metro's state of good repair capital needs to be funded over the years outside their current CIP. 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.

Annual Capital Funding Gap by Asset Type

(in $ Millions)

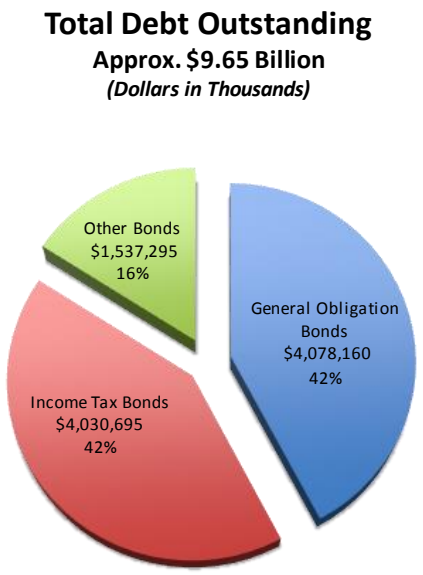
		FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	Total
IT Projects & Systems	Capital Maintenance Projects	19.2	10.8	4.5	3.8	3.8	20.9	$ 63.0
	New Capital Projects	21.7	19.9	91.7	9.4	9.3	7.7	$ 159.6
Total		$ 41.0	$ 30.6	$ 96.2	$ 13.1	$ 13.0	$ 28.6	$ 222.6
Equipment & Regulatory	Capital Maintenance Projects	32.7	28.1	24.1	24.1	26.1	34.1	$ 169.0
	New Capital Projects	3.7	0.6	0.6	0.6	0.6	0.6	$ 6.7
Total		$ 36.3	$ 28.7	$ 24.7	$ 24.7	$ 26.7	$ 34.7	$ 175.7
FLEET	Capital Maintenance Projects	15.7	16.0	4.6	4.3	3.5	4.8	$ 48.9
	New Capital Projects	1.1	0.5	0.5	0.5	0.5	0.5	$ 3.6
Total		$ 16.7	$ 16.5	$ 5.1	$ 4.8	$ 4.0	$ 5.3	$ 52.4
Horizontal Infrastructure								
DDOT	Capital Maintenance Projects	71.8	135.6	167.6	160.5	84.0	22.6	$ 642.1
	New Capital Projects	14.4	37.8	118.5	85.7	5.0	-	$ 261.4
	Sub Total	86.2	173.4	286.0	246.2	89.0	22.6	903.5
WMATA	Capital Maintenance Projects	-	77.6	149.6	204.5	105.7	116.9	654.3
	New Capital Projects	-	-	-	-	-	-	$ -
	Sub Total	-	77.6	149.6	204.5	105.7	116.9	$ 654.3
Total		$ 86.2	$ 251.0	$ 435.6	$ 450.7	$ 194.7	$ 139.5	$ 1,557.8
Facilities	Capital Maintenance Projects	79	90	64	42	33	70	$ 377.6
	New Capital Projects	211	316	531	451	243	91	$ 1,843.3
Total		$ 290.0	$ 406.5	$ 595.0	$ 492.5	$ 276.0	$ 160.9	$ 2,220.9
Grand Total		**$ 470.2**	**$ 733.4**	**$ 1,156.6**	**$ 985.8**	**$ 514.5**	**$ 369.0**	**$ 4,229.4**

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 revenues, 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. According to a 2016 issue brief, Support Cities: Protect Municipal Bonds from the National League of Cities,

"Municipal bonds are the primary way local and state governments finance infrastructure and have been for over a century. More than two thirds of U.S. public infrastructure projects are financed by municipal bonds."

Outstanding Debt



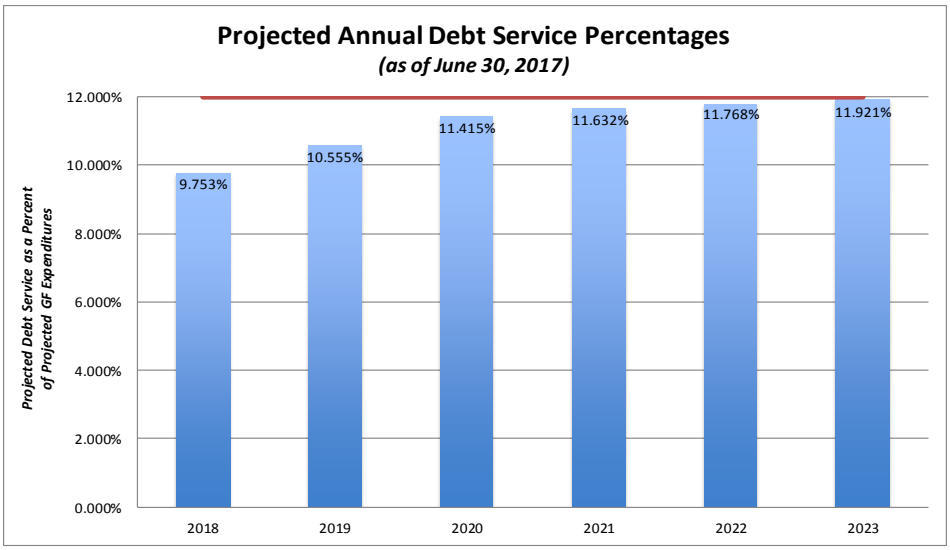
The District has utilized debt financing, primarily General Obligation (G.O.) bonds and Income Tax Secured Revenue (ITSB) bonds, as the primary sources of funds for capital infrastructure investments. As of September 30, 2017, the District has an estimated $8.1 billion of outstanding G.O. and ITSB bonds. This represents approximately 84% of all the District's tax-supported debt currently outstanding.

While G.O. and ITSB 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 the District's current capital improvement plan anticipates adding almost fifty-two percent (52%) more debt (approximately $5 billion) in additional G.O. or ITSB 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 strong credit ratings (Aa1/AA/AA from Moody's Investors Service, Standard and Poor's and Fitch Ratings, respectively) and a relatively low cost of borrowing.

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 chart illustrates the District's projected annual debt service percentages given the amount of debt projected to be issued to support the FY 2018-2023 CIP. It is important to note that the chart does not reflect the impact of future debt refinancings, that are likely to increase the District's borrowing capacity.



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. If the debt limit was raised or reserves reduced (for example to 2009 levels), the District's credit ratings would likely be reduced from the high 'AA' category to the single 'A' category, resulting in approximately 15% higher borrowing costs. In order to maintain the same level of debt service payments, the District would need to reduce the bond funded capital budget by roughly 15% (approximately $750 million), thereby causing even fewer capital projects to be funded and further increasing deferral of necessary capital maintenance.

New 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 amount of operating budget used for paygo funding in the current CIP, excluding the impact of the new legislation, is relatively small. The average amount of paygo strictly from the local operating budget over the six-year period is approximately $66.3 million per year. The General Fund paygo funding levels, over the same time period, average approximately $120 million, which includes dedicated taxes and/or special purpose revenues that are directed to specific capital needs, such as rights-of-way fees for DDOT.

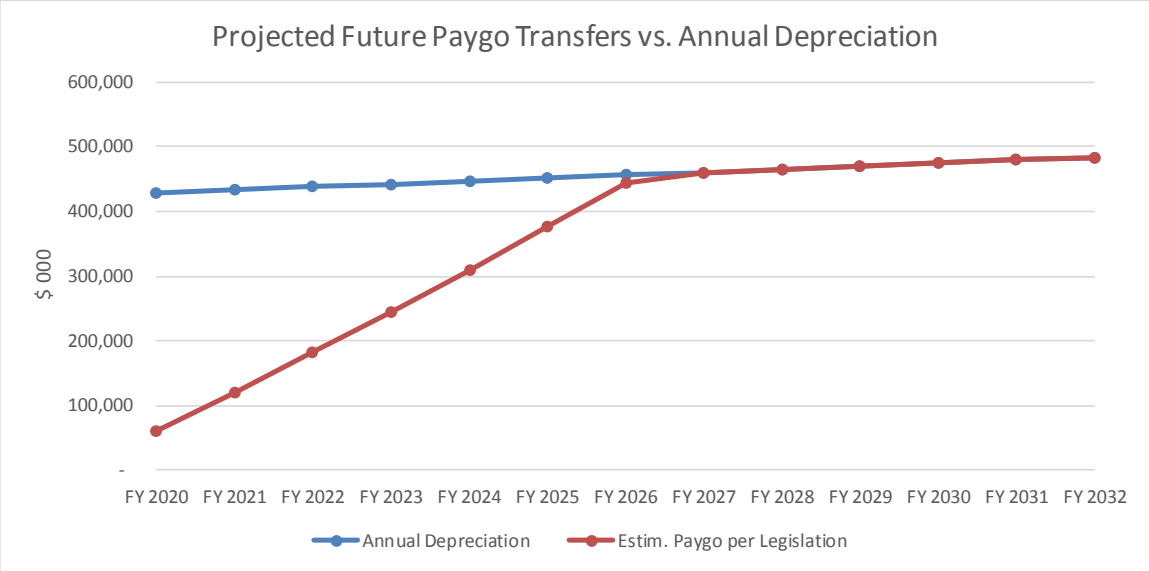
The Budget Support Act of FY 2018 included an amended provision for the use of paygo as part of the Capital Infrastructure Preservation and Improvement Fund. The new provision specifies that for FY 2020 the financial plan shall include a minimum local funds total transfer of paygo to the CIP of $58,950,000. 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 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). The following table reflects the projected amount of local funds revenue transfers to the CIP based on the new legislation, as of the September 2017 quarterly revenue estimates.

Projected Local Funds Revenue Transfers to CIP - Based on New BSA Provision

($ in Millions)

Fiscal Year	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Projected Transfer Amounts	$60.0	$53.4	$103.9	$120.3	$181.5	$244.5	$309.0	$375.9	$444.7	$460.6	$465.2	$469.9	$474.6	$479.3	$484.1

As shown in the chart below, under the new approved legislation future local funds transfers to the CIP for paygo would be roughly equivalent to total annual depreciation by 2027, at which point the calculation to determine future local funds transfers would be capped at the amount of annual depreciation, which is forecast to grow at 1% annually.



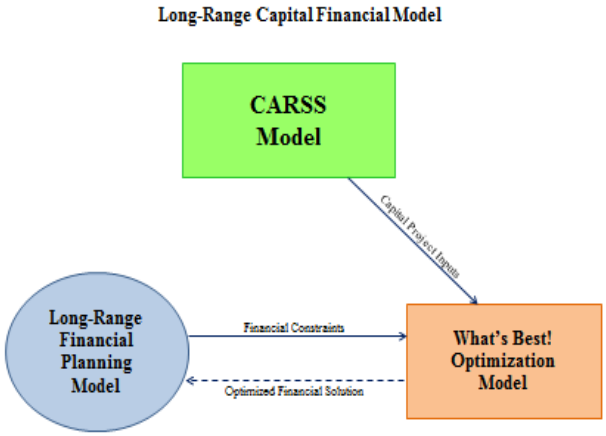
It is important to note that the estimated local funds revenue transfers shown above represent significant portions of the projected local funds revenue growth of the District. In fact, current projections would have nearly fifty percent (50%) of projected revenue growth in FY 2021 going to the CIP as paygo, increasing to nearly one hundred percent (100%) of projected revenue growth going to the CIP as paygo by FY 2023. If the formula in the law remains in place, and revenues do not grow faster than are currently projected, then starting in FY 2024, other expenditures would need to be reprioritized, or an additional funding source would be required, to fund the increased paygo amounts. In many ways, this is no different than the additional paygo funding levels that were suggested in the 2016 Report. The suggested approach in the 2016 report was to increase paygo by $325 million annually over current levels of funding, beginning in FY 2019, and continue at that level of funding into the future. Under the new law, the amount of additional funding contributed to paygo would rise more gradually and would be capped at an amount equal to annual depreciation. It would also fund paygo at a generally recognized level to maintain the District's existing assets from current resources, as was referenced by Moody's Investors Service earlier in this report.

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. To fully address ongoing maintenance needs, funding levels need to approach 3.6% of annual General Fund expenditures.

Approach to 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. In order 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 will assist 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 to the right. A more detailed description of the model, and its various components can be found in *Appendix D*.



CARSS was used to prioritize, score and rank all of 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 source assumptions, to solve for the optimal solution to finance the unfunded capital gap at the earliest possible date.

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.

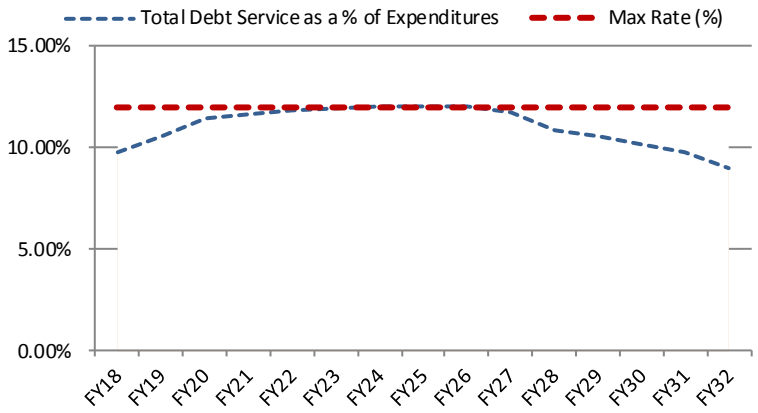
A detailed description of methodology used to classify and score the various capital projects, along with the scoring criteria used, can be found in *Appendix E*. In addition, a detailed description of how projects were prioritized in CARSS can be found in *Appendix F*.

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, the level of future funding from other non-debt sources for capital projects, and that General Fund expenditures of the District continue to grow at approximately 3% into the future through FY 2023, and only decline to 2.5% in years thereafter. 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. Maximization of debt issuances:

   The model is structured to always maximize the amount of debt issued in each fiscal year outside of the current CIP period, while remaining within statutory debt limits.



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:

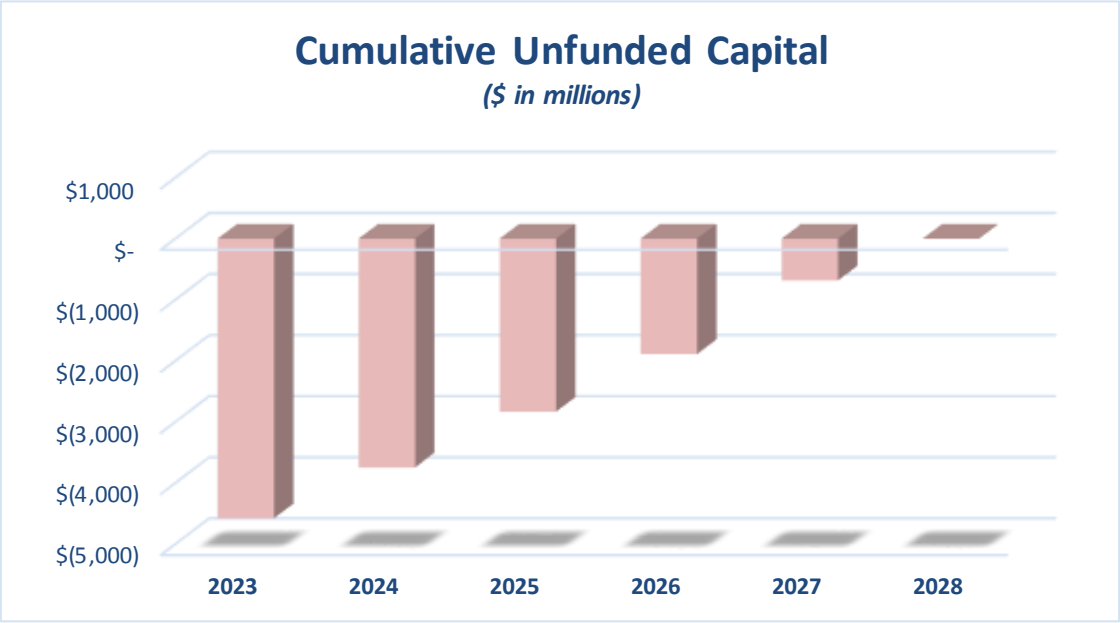
   As the model factors all of the many variables in solving for the best solution to fund the backlog of unfunded capital needs, it assumes that *no new capital projects, outside of those that were part of the FY 2018-2023 capital needs assessment, are added to the list of capital projects in future years prior to existing unfunded needs being met*, unless they are completely funded from additional paygo, federal funds, or other additional resources from private sources.

Funding Scenarios and Results

At the time the 2016 Report was published no defined plan existed on how to address the backlog of deferred capital maintenance and new needed capital projects that were identified in CARSS. Therefore, the 2016 Report presented four scenarios for consideration by elected officials as to how the costs of the unfunded projects could be addressed over time. Those scenarios included; (1) a

baseline scenario where current funding levels at the time were maintained, (2) a scenario where $100 million of additional paygo or federal funding was added above existing funding levels beginning in FY 2019, (3) a scenario where $200 million of additional paygo or federal funding was added above existing funding levels beginning in FY 2019, and (4) a scenario where $325 million of additional paygo or federal funding was added above existing funding levels beginning in FY 2019. The 2016 Report recommended scenario 4, or the additional $325 million of paygo or federal funding, because it allowed the District to catch up on its unfunded capital costs by FY 2026. As was mentioned previously, the District has taken a proactive approach to dealing with its capital maintenance backlog through legislative action in FY 2017, that created a paygo funding requirement. This new legal requirement is analyzed to determine its impact on addressing the capital funding gap.

Given these projected amounts of paygo funding for capital, as shown on page 10 of this report, as well as utilizing the District's bonding capacity, the long-range capital financial 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 2028. 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 $4.2 billion of capital needs not funded in the six-year CIP could be funded by 2028 with the paygo levels required in legislation and 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.



The chart above illustrates that unfunded capital needs, which remain in excess of $4.2 billion through FY 2023 since sufficient funding is not available in the current CIP, begin to be rapidly paid down starting in FY 2024. This is possible due to the greatly increased levels of paygo per the new legislation, as well as the District's increasing borrowing capacity outside of the current CIP period.

Summary and Conclusions

Quality infrastructure is critical to the quality of life and growth of the District's and the region's economy. In fact, the American Society of Civil Engineers states in their 2017 Infrastructure Report Card that, *"Infrastructure is the foundation that connects the nation's businesses, communities, and people, driving our economy, improving our quality of life, and ensuring our public health and safety. Now is the time to renew, modernize, and invest in our infrastructure to maintain our international competitiveness. The longer we wait, the more it will cost."*

Continuing to defer capital maintenance or build needed facilities will ultimately result in much higher costs in the long term, as assets must be replaced rather than repaired or necessary service levels are not met. The large amount of capital required to rebuild the District's schools is one example. Metro is another, highly visible example of the costs of deferred maintenance. Had the jurisdictions adequately funded the costs to maintain the capital infrastructure of Metro over the past twenty to thirty years, it would arguably cost much less than the estimated $15.5 billion just to return the system to a state of good repair. That is just the estimated cost, over the next decade, to make the system adequate, and does not include the costs of tackling certain major system repairs or expansion that could easily add another $10 billion to the total costs.

Nearly every local or state government, businesses and certainly the Federal government, has capital or infrastructure needs that exceed their short-term resources, with deferred maintenance projects the most common. As a result, needs must be prioritized and resources allocated accordingly. The District has gone a step further by identifying the unfunded capital projects, as well as recommended capital maintenance needs, in this long-range capital financial plan. The tool to inventory all assets, prioritize projects, and determine options to fund all needs over time provides an analysis that does not exist for many governmental entities. This analysis provides much-needed insight into options and strategies that can be considered in the coming years to ensure our residents live in a city with high quality infrastructure, whether it is Metro, schools, streets, buildings, fleet vehicles for public safety, or technology and equipment.

The District is in an enviable financial position. Through the prudent financial decisions of policymakers over the past 20 years, it has fully-funded pensions and retiree health care trusts, reserves that provide flexibility to deal with uncertain future events and bond ratings that provide very low borrowing costs to finance infrastructure needs. Many U.S. cities spend all or most of their growth in revenue merely funding severely underfunded pension liabilities, leaving little for programs or infrastructure. The District enjoys, and is forecast to continue to enjoy, economic growth that increases the tax base over time, providing the capacity to fund additional needs. Cities that are stagnant or decreasing in population and economic development do not enjoy such benefits.

This report demonstrates that not all capital projects, or recommended maintenance needs, can be funded in the District's six-year capital planning period. Although the District is able to fund $6.7 billion through FY 2023, approximately $4.2 billion in capital needs (slightly less than one-half related to maintenance), require funding in the future. This does not include approximately $2.3 billion for the District's share of estimated Metro needs and $1 billion to $1.5 billion in projects that can be addressed through public-private partnerships. Although these numbers are large, the growth of the District's tax base, and the capacity that occurs as previously-issued bonds are retired, coupled with additional funds that can be directed to paygo, as mandated in the new FY 2017 legislation, address the unfunded needs over a reasonable amount of time.

The amounts of local funds revenue transfers to paygo capital currently prescribed in the new law, coupled with the increased debt capacity that becomes available each year, allows for the entire

$4.2 billion gap to be funded by 2028, only five years beyond the normal six-year planning period. Once paygo funding reaches a level that equals annual depreciation, and is maintained at that level, ongoing maintenance and all identified, unfunded capital projects will be funded into the future. Lower levels of paygo funding for capital may also address the issues but require a longer period of time, during which time other unplanned capital needs may occur.

To put these funding needs in perspective, while the increase in paygo per the new legislation increases over time to a level equal to projected annual depreciation, a level until now not achieved by the District, the average actual paygo contribution over the long-range capital financial plan time period is roughly $315 million. That compares favorably to the $325 million of additional paygo that was recommended in the 2016 Report. This would still result in paygo funding that is approximately 3.6% of the total General Fund budget, or a little more than one year's expected annual growth of three percent (3%) in the revenue base of the District. Allocating this level of funding to capital is not without challenges, since it has to compete with needed program funding for priorities such as affordable housing, homelessness, and growth in day-to-day services for residents. However, properly maintained and improved equipment and facilities will, over time, result in lower life-cycle costs and ultimately more resources for programs.

This report provides information to begin policy discussions regarding the District's long-term capital needs and strategies to address these needs. Gradually, as all assets are inventoried the cost of repair versus replacement can be refined, but the bigger picture policy discussions of funding will not change. Over the next few years, the issues of dedicated funding for Metro to allow it to finance its large infrastructure needs also has to be addressed. Aggressive outreach for public-private partnerships should be pursued for prudent, cost-effective capital projects that lower the cost to the District. Finally, over the next several years, funding from federal sources, reallocation of District resources, and/or new revenue sources needs to be directed to paygo funding to fully address needed infrastructure, including proper maintenance of District assets. This path would place the District in an enviable position as compared with other cities and states in addressing its long-term capital infrastructure needs.

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Appendix A

Approach to Developing the Capital Asset Replacement Scheduling System (CARSS)

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. PowerPlan is assisting the District with building an asset management planning solution that delivers a comprehensive view of District's capital asset health, and provides the information and control needed to align asset strategy with the overall organizational goals of the District.

In developing CARSS, a critical first step is to create a centralized database, or asset register, 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 asset register will provide for the first time 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 is comprised of various members from critical agencies with expertise in capital planning, information technology and finance.

Phase 1: Recap of Where the District was Two Years Ago

Proof of Concept (version 1.0): 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 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

[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.

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.

Phase 2: Recap of Where the District was in 2016 and 2017

Development of a comprehensive "top down" 15-year capital financial plan (version 1.5):

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.

Asset Class	Classification Examples
Horizontal Infrastructure	• Streets • Sidewalks • Alleys • Bridges
Vertical Infrastructure	• General Support Facilities • School Facilities • Parks, Playgrounds, Athletic Fields • Public Libraries
Fleet	• School Buses • Fire & EMS vehicles • Police Vehicles • Passenger Vehicles
Information Technology	• Computer Hardware • Software Purchase • IT Development • Communication Equipment

Phase 3: Recap of Where the District is Going

Development of a Detailed "Bottom-up" Approach to Capital Budget (version 2.0):

While the top-down, capital projects based approach is being used in the near-term, simultaneously the development of a much more granular, asset-by-asset level needs assessment approach using data from the already existing databases in OSSE, Fire and Emergency Medical Services (FEMS), Department of General Services (DGS), Department of Parks and Recreation (DPR), DDOT and the Office of the Chief Technology Officer (OCTO) was initiated. 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.

Significant progress has been made in gathering detailed asset data from virtually all agencies in the District since the 2016 Report. At the time the 2016 Report was published, approximately 14% of total District assets were contained in CARSS. As is seen in the following chart, currently more than 96% of District-owned assets are now housed within CARSS. It is anticipated that over the next twelve months the remaining assets owned by the District will be brought into CARSS, along with many of the assets owned by component units of the District, such as the University of the District of Columbia (UDC), Washington Convention and Sports Authority (WCSA), and United Medical Center (UMC), amongst others. The following table *(Figure 1)* shows a breakdown of assets that are currently housed in CARSS, as well as which asset types still need to be populated into the system, including bridges, the streetcar system, equipment and information technology.

Figure 1: Asset Inventory

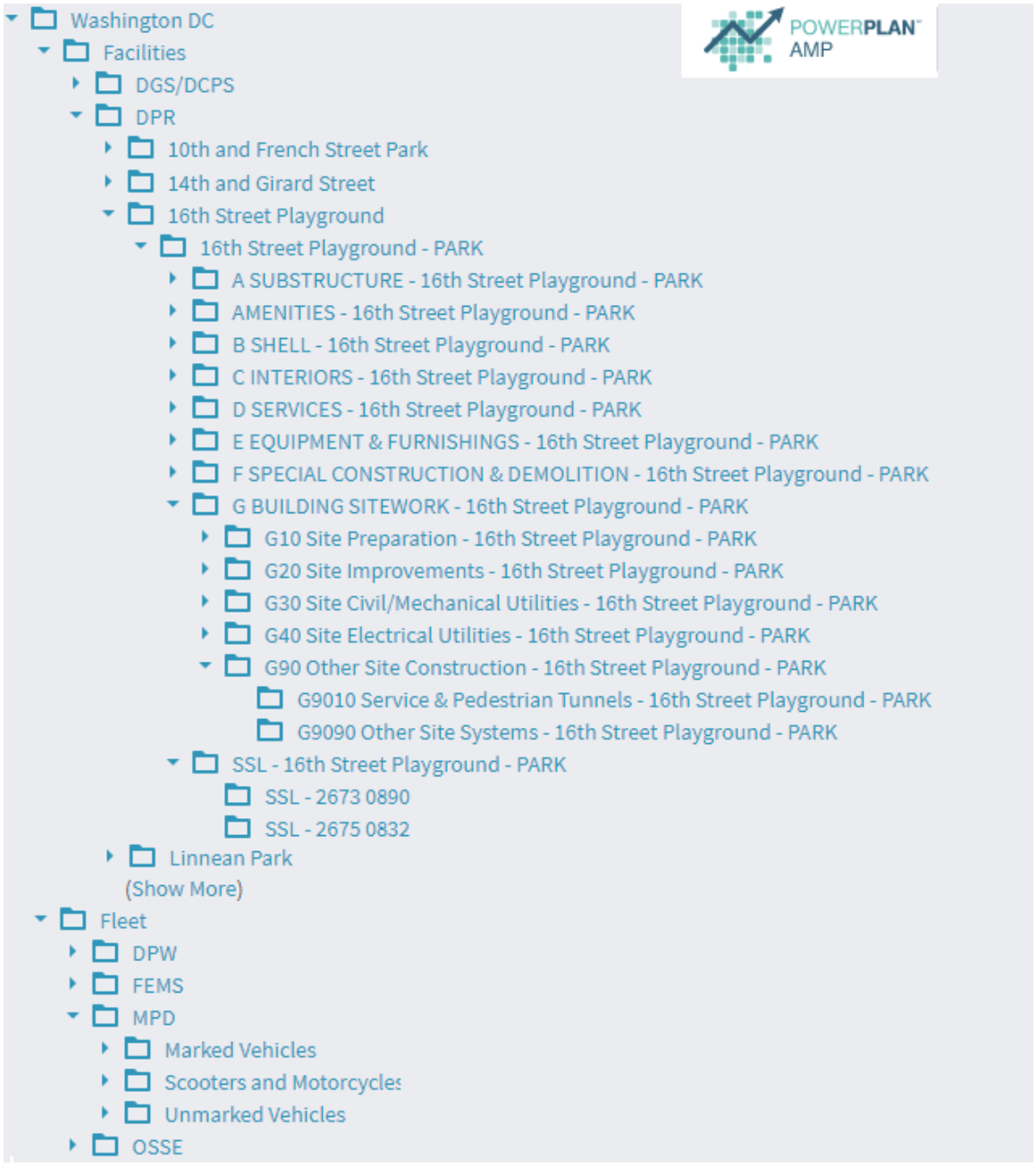
Inventory of Assets in CARSS

	Number of Assets*	% Total Asset Classification
Horizontal Infrastructure		
Ramps	564	100%
Service Roads	124	100%
Streets (segments)	13,537	100%
Sidewalks (linked to street segments)	26,936	100%
Alleys (Segments)	9,578	100%
Bridges	-	0%
StreetCar System	-	0%
Total	**50,739**	**99.6%**
Facilities		
Buildings	642	100%
Building Components	30,531	100%
Amenities (Pools, courts, Playgrounds etc)	569	100%
Total	**31,742**	**100.0%**
Equipment and I.T.		
Fleet	5,043	100%
Equipment (>$5K)	206	13.7%
I.T. and Other	-	0%
Total	**5,249**	**65.3%**
Land		
Land (count by parcel)	**4,153**	**100%**
Grand Total	**91,883**	**96.81%**

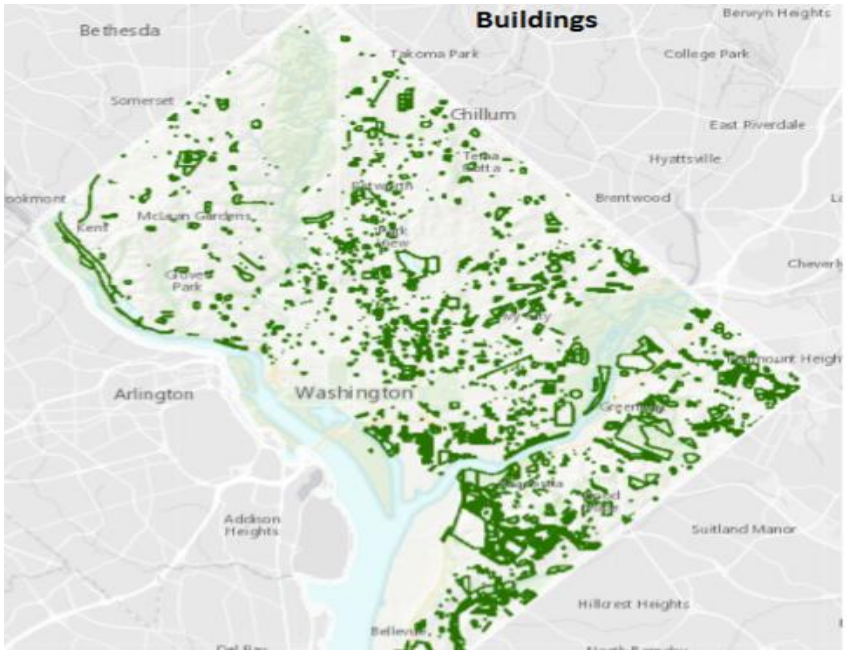
** Does not yet include assets from the District's component units - UDC, WCSA, Housing Finance, UMC, etc.*

This asset-by-asset approach is the ultimate goal of the CARSS project, whereby each major capital asset in the District will be cataloged in an asset register, along with its current condition and cost for repair or replacement. The screen shot below *(Figure 2)* shows a portion of the asset tree structure that is used in CARSS to organize the asset-level data from various agencies.

Figure 2: Asset Tree



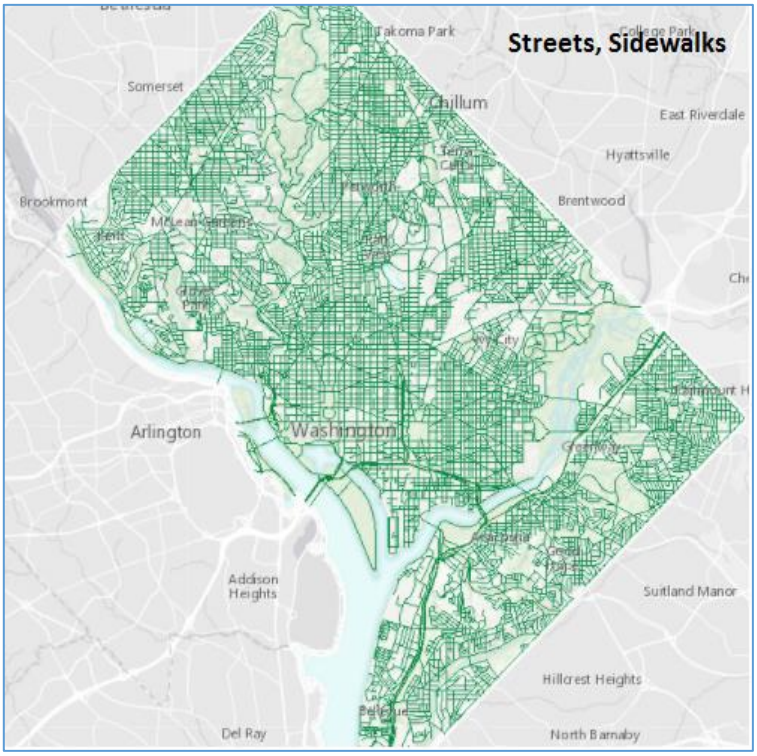
For some asset classes, such as fleet, tremendous amounts of data on individual assets currently exists, and was pulled into the centralized CARSS database from existing databases spread throughout various District agencies. For other asset classes, such as buildings, a high level of data also already existed, but there was information that needed to be updated. 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 not up to date. Subsequently, DGS and its contractor have committed to perform facility condition assessments (FCAs) on all District-owned buildings over the next twelve to eighteen months. The information from the FCAs will be 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. Finally, there are certain asset classes for which no database or registry currently exists for their assets, such as information technology and certain types of equipment. Addressing these shortfalls will require having to work extensively with the remaining agencies, such as OCTO, to first build their own internal databases of their assets, before establishing live connections to the CARSS database. Depending upon the existence of accurate records of assets, and the level of cooperation from agencies, the process of fully populating CARSS with "bottom-up" level data could take anywhere from six to twelve months. While complete "bottom-up" data on all assets did not exist at the time of FY 2018 capital budget formulation, enough data existed to create an asset-driven capital budgeting needs assessment for three asset types in four different agencies for the current FY 2018 to FY 2023 capital budget. This effort resulted in "bottom up" budgeting for both OSSE and FEMS fleet vehicle needs, DPR's facility needs, and DDOT's local streets and alleys infrastructure needs.



Enhanced Analytics Using Insights

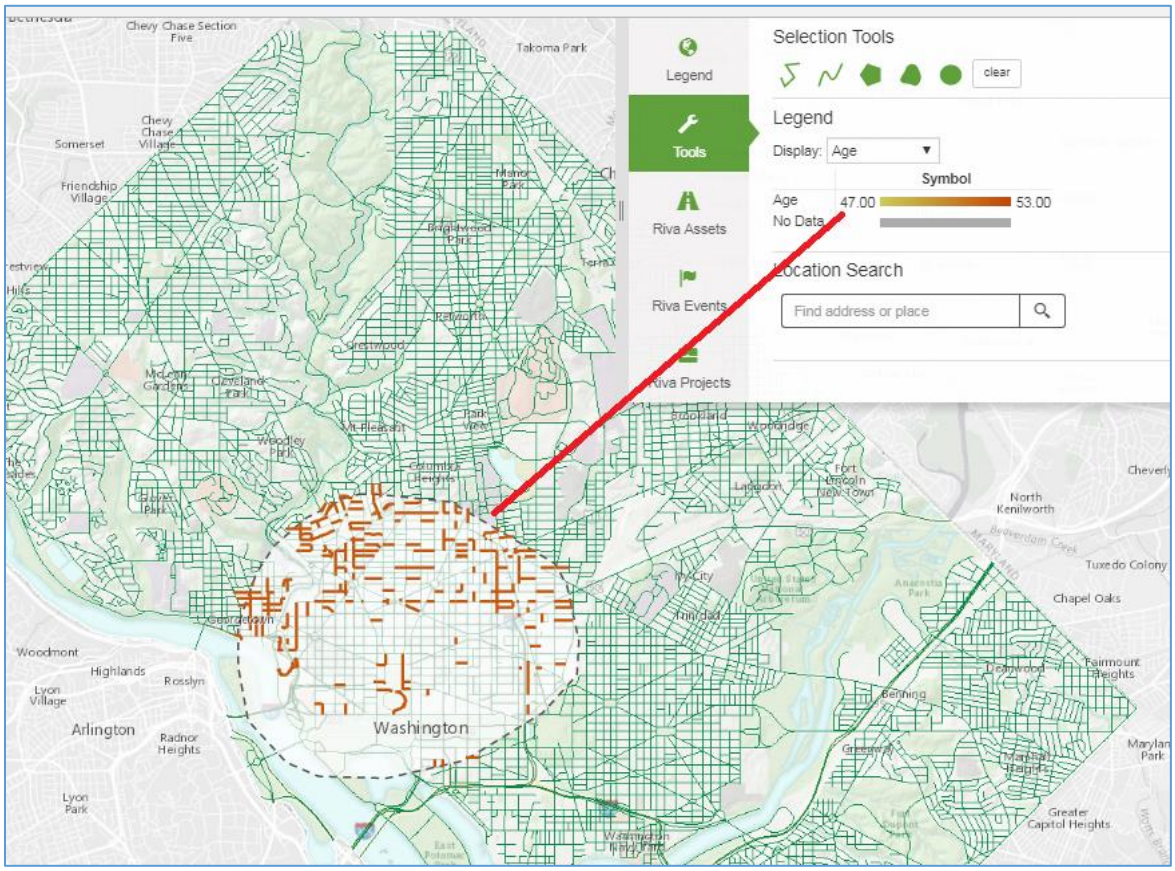
CARSS was enhanced this past year with a new analytical tool called Insights. Insights allows for the creation of easily defined, and user-friendly, analysis and "drill down" capability from any asset type down to specific information on individual assets.

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.



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 DDOT to now "drill down" on any portion of the map using Insights 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.



Fleet "Drill Down"

Currently, the asset type with the most detailed information on individual assets in CARSS, along with the greatest ability to "drill down" into the data using Insights is fleet. When viewing all fleet assets through CARSS and Insights, it becomes quickly apparent that the District's rolling stock, or fleet, is procured and owned by just four agencies; OSSE, FEMS, MPD and DPW. The CARSS database, pulling information from the databases of the various owner agencies, shows 5,105 fleet assets currently owned by the District *(see Figure 3)*. Further drilling down into the data using Insights the ability exists to produce user-friendly graphics showing not only the number of vehicles, but also the condition of the various fleet assets in each of the agencies, and the District as a whole.

Figure 3: Total Fleet Assets/ Condition Overview

Organization	Count	Age (Averag...	Maintenance Cost	Condition (Averag...	Events	Event Cost
POLICE DEPARTME...	1,628	3.99	$9.20M	7.56	963	$38.29M
DPW FLEET MANA...	2,534	6.85	$90.14M	11.23	1,284	$93.77M
FIRE & EMERGENC...	344	8.60	$19.41M	10.49	291	$113.15M
OSSE	599	5.66	$8.42M	10.09	169	$11.84M
Σ	5,105	6.28 Σ	$127.16M Σ	9.84 {}	2,707 {}	$257.04M

The data further reflects that over 1,100 vehicles in the District 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 4)*, 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 both the number of vehicles of each type, age, maintenance costs, conditions, etc., along with the condition of the overall FEMS fleet.

Figure 4: FEMS Fleet Data

Insights allows 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 56 pumper trucks with an average age approaching 11 years and a condition score (the higher the score, the worse the condition) of over 12.5, the poorest of all of the vehicle types. The data further shows that there are also 42 events, or needed replacements of these vehicles within the CIP period. Thus, only 14 of the 56 vehicles would remain in service in the current fleet if replacement was done on a more rigorous, data-driven basis.

The chart below provides the additional detail obtained by looking at pumper trucks in particular. Data in the table is at an individual vehicle level and reflects additional data regarding age, actual mileage (when last serviced), the total maintenance costs to date, and the vehicle condition. For example, the data reflects that 25 of the 56 pumper trucks are in the *'Poor/Replace'* category.

Figure 5: Pumper Trucks Data

Finally, Insights allows 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 6)* shows only a small sample of the data on this particular pumper truck that a user could access. The level of detailed data includes everything from the make and model of the vehicle, to the VIN number and the license plate number, as well as the remaining useful life, the estimated cost of replacement for this vehicle and when the replacement should occur.

Figure 6: 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	1FSEU28T4YCST2098	License Plate	GT4762
Make	SEAGRAVE	Model	TB40DD
Year	2,000	Organization	FIRE & EMERGENCY MEDICAL SERVICES (FEMS)
Class	7PFF	Class Description	FIRE UNIT, PUMPER

Lifecycle			
Useful Life	10	Current Age	17
Life Consumed (%)	170	Remaining Life	-7
Current Condition			

Inspection			
Inspection Date	10/16/2017	Rehabilitation Count (Initial)	0
Last Rehabilitation Date		Life Expectancy Hours	10,000
Life Expectancy Miles	150,000	Actual Reading Hours	0
Actual Reading Miles	97,478	Condition Factor	0
Inspected Condition Predictive Score	14.8		

Costing			
Replacement Cost ($)	788,648	Rehabilitation Cost ($)	
Inspection Cost ($)		Maintenance Cost	7,421
Repair Cost	144,202	Total Maintenance Costs	151,623
CapitilizedCost	309,177		

Measure Values

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

Appendix B

(Summary of the Metro Funding Needs Analysis)

Prepared by the District of Columbia OCFO

District of Columbia

Analysis of Metro's Long-Term Capital Funding Needs

Jeffrey S. DeWitt
Chief Financial Officer

District of Columbia

Overview

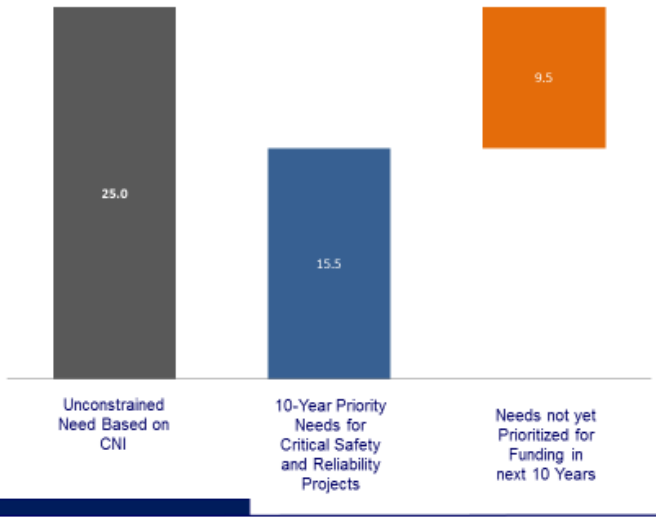
- Development of a reasonable basis to estimate the total WMATA funding gap
  - ✓ *Realistic State of Good Repairs (SGR) capital needs*
- The models initially developed for this analysis have been updated based on WMATA's Approved FY 2018 budget
- Potential impact of the Capital Needs Inventory (CNI) versus the CIP
- Need for additional contributions to fill the gap, and the impact on jurisdictions
- Determine the needed level of a dedicated funding source

District of Columbia

Determination of Capital Needs

10-Year Capital Needs, by Funding and Priority Status

(in $ billions)



Metro has $25B in capital needs over the next 10 years identified through a CNI process

- $15.5B is required for critical safety and reliability projects (State of Good Repair)
- Remaining $9.5B of capital projects has yet to be prioritized

3

District of Columbia

Items Required for SGR

WMATA 10-Year State of Good Repair (SGR) CIP Needs FY 2017-2026

Replacement, Rehab and Maintenance of Existing Assets Only

($ in millions)

Program and Project	10 Year SGR Need (Adjusted per the CNI)
Railcar Acquisition	1,707
Railcar Maintenance/Overhaul	850
Railcar Maintenance Facilities	744
Railcars	**$ 3,301**
Propulsion	1,842
Signals and Communications	1,194
Rail Systems	**$ 3,036**
Fixed Rail	812
Structures	1,217
Track Maintenance Equip	21
Track and Structures Rehabilitation	**$ 2,050**
Fare Collections	310
Parking Facilities	448
Platforms & Structures	485
Station Systems	351
Vertical Transportation	965
Stations and Passenger Facilities	**$ 2,559**

Program and Project	10 Year SGR Need (Adjusted per the CNI)
Bus Acquisition	800
Bus Maintenance/Overhaul	550
Bus Maintenance Facilities	1,010
Bus Passenger Facilities/Systems	63
Paratransit	148
Bus and Paratransit	**$ 2,572**
IT	1,287
MTPD	21
Support Equipment/Services	656
Business Support	**$ 1,964**
Total Need for 10 Year Period	**$ 15,482**

See handout for more detail on SGR CIP projects

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District of Columbia

Critical Capital Needs Beyond SGR

- Eight-car trains during peak periods (order of magnitude - $1.7 billion)

Project	FY 2020 Cost ($M)
220 Railcars*	756
140 Railcars	521
Traction power and related systems upgrade (3rd rail)	459
Storage and maintenance facilities	744
Total (excluding 220 railcars)	**$1,724**

**Already under contract and part of the CIP.*

- Core station improvements (order of magnitude - $1.25 billion)
- New blue line connections (order of magnitude - $2 billion plus)
- Red line "sleeving" (order of magnitude – TBD)
- Pocket tracks (order of magnitude - $500 million)
- Metro Bus improvements (order of magnitude - $1.3 billion)
- Other improvements (order of magnitude - $2 billion)

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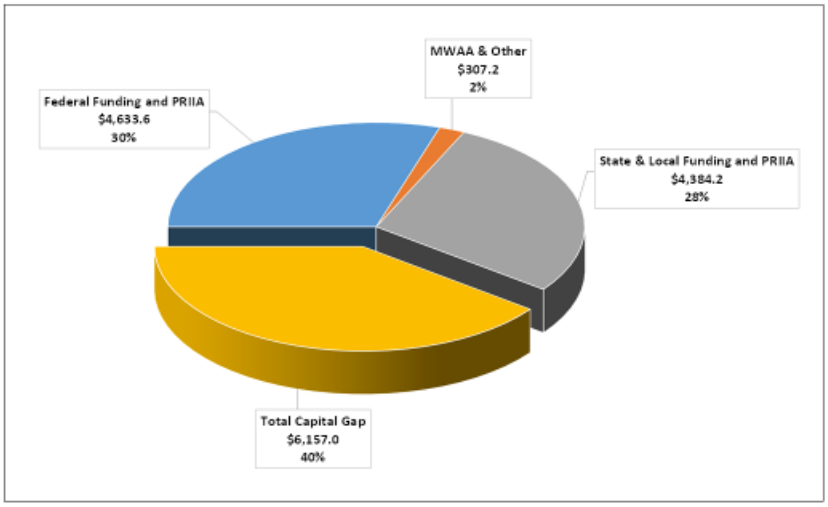
District of Columbia

Capital Budget Revenue & Funding Gap
(in $millions)



Total is approx. $15.5 Billion

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District of Columbia

Adequacy of $500M Additional Funding
(10-Year Capacity)

A regional consensus has been reached that a $500M per year dedicated funding source, that can be leveraged, is necessary to fund the $6.2B SGR capital gap plus other high priority capital needs.

(Dollars in millions)

	$500M[2]
Debt Financing Capacity[1]	$6,157
Pay-as-You GO Capacity for Other Critical Capital Needs beyond SGR	$2,743
Total Financing Capacity	**$8,900**

1. Based on estimated capital funding gap for $15.5 billion revised SGR CIP as identified by WMATA. Assumes debt funding of all annual capital gap amounts; 30-year amortization and 6% cost of borrowing.
2. Estimate of revenues from a dedicated funding source throughout the compact area escalated at 3% annually for growth. First year estimated to collect only 50% of revenues due to timing of implementation.

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District of Columbia

Debt Funding Calculations
($500M Option)

Fiscal Year	Capital Funding Gap[1]	Est. Debt Service to Cover Capital Gap[2]	Dedicated Tax Revenues[3]	Revenues Available to Fund Critical Capital Needs beyond SGR
2017	-	-	-	-
2018	-	-	-	-
2019	448,194	(32,561)	***250,000***	217,439
2020	510,985	(69,683)	***515,000***	445,317
2021	417,567	(100,019)	***530,450***	430,431
2022	166,738	(112,132)	***546,364***	434,231
2023	136,794	(122,070)	***562,754***	440,684
2024	1,467,690	(228,697)	***579,637***	350,941
2025	1,535,862	(340,275)	***597,026***	256,751
2026	1,473,169	(447,299)	***614,937***	167,638
Total	**$6,157,000**	**($1,452,737)**	**$4,196,168**	**$2,743,431**

Notes:
1. Estimate. Represents the annual capital funding gap for $15.5 billion revised SGR CIP as identified by WMATA.
2. Assumes debt funding of all annual capital gap amounts; 30-year amortization and 6% cost of borrowing.
3. Conservative estimate of revenues from a dedicated funding source throughout the compact area escalated at 3% annually for growth. First year estimated to collect only 50% of revenues due to timing of implementation.

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District of Columbia

2017 Capital Contributions vs Additional Required Contributions

Compact jurisdictions have agreed that 2017 capital funding levels can be sustained, escalated at 3% annually. The table below shows 2017 funding levels and member's shares of the additional $500M of required funding.

	2017 Current Contributions[1]		Additional Required Contributions[2]	Estimated Total Contributions[3]
New Dedicated Funding Source Amounts			**$500,000,000**	
District of Columbia (Regular CIP)	$70,400,000	35.7%	$178,500,000	$248,900,000
District of Columbia (PRIIA)	*$49,500,000*			$49,500,000
District of Columbia Subtotal	**$119,900,000**		**$178,500,000**	**$298,400,000**
Montgomery County	$32,300,000	16.4%	$82,000,000	$114,300,000
Prince George's County	$33,600,000	17.0%	$85,000,000	$118,600,000
State of Maryland (PRIIA)	*$49,500,000*			$49,500,000
Maryland Subtotal	**$115,400,000**	33.4%	**$167,000,000**	**$282,400,000**
County of Alexandria	$8,500,000	4.3%	$21,500,000	$30,000,000
County of Arlington	$15,800,000	7.9%	$39,500,000	$55,300,000
City of Fairfax	$500,000	0.3%	$1,500,000	$2,000,000
County of Fairfax	$27,800,000	14.0%	$70,000,000	$97,800,000
City of Falls Church	$600,000	0.3%	$1,500,000	$2,100,000
Loudoun County	$0	4.1%	$20,500,000	$20,500,000
Commonwealth of Virginia (PRIIA & Other)	*$49,700,000*			$49,500,000
Virginia Subtotal	**$102,900,000**	30.9%	**$154,500,000**	**$257,200,000**
Total	**$338,200,000**	100.0%	**$500,000,000**	**$838,000,000**

Notes:
1. Amounts per FY 2017 WMATA approved budget. Amounts are before additional contributions or debt, and also do not include prior year carryovers.
2. Percentages represent WMATA compact capital contribution shares as of 2020 when Loudoun County joins the compact. Amounts do not include local PRIIA match amounts.
3. Additional contributions are required beginning in FY 2019 in order to fund SGR capital needs identified by Metro.

Note: These additional contributions would have to grow at 3% annually

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District of Columbia

Summary of Issues

- Allows WMATA to reach a State of Good Repair in 10 years
  - ✓ *SGR total capital needs are estimated by WMATA at $15.6 Billion*
- Effort will require metro to execute approx. $1.5B CIP annually over 10 years
- Represents a capital funding gap of $6.2 Billion over 10 years
  - ✓ *Far exceeds reasonable capacity of the compact jurisdictions*
- A dedicated regional funding source is essential to achieve a State of Good Repair
  - ✓ A dedicated funding source collecting $500M annually, beginning in January 2019, can cover the capital funding gap and provide additional capacity for other critical non-SGR capital projects
- To achieve a substantial additional funding level of $500 million per year is difficult for all compact jurisdictions, therefore a regional solution is required

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Appendix C

(List of Potential P3 Projects)

Per the Office of Public Private Partnerships

List of Potential Public-Private Partnership (P3) Projects

Based on available information as of FY 2018 capital budget formulation, below is 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. While actual dollar values for these projects are not available at this time, the OCFO conservatively estimates that these projects represent between $1 billion and $1.5 billion in capital costs alone. More information on these projects can be found at http://op3.dc.gov/pipeline.

Project	Agency(s)
Street Light Modernization	DDOT, OCTO
Henry J. Daly Building	DGS, MPD
West Virginia Avenue Public Works Campus	DPW
Corrections Center	DOC, DGS
Lamond-Riggs Library	DCPL, DGS
Shepherd Park Library	DCPL, DGS
Police Facilities	MPD, DGS
Fire and Emergency Medical Facilities	FEMS, DGS
Parks and Recreation Facilities	DPR
Educational Facilities	DCPS
Waste Management/ Recycling Center	DOEE, DPW
Solar and Microgrid Projects	DOEE, DGS

While there is no singular definition for public-private partnerships (P3s), the World Bank generally defines them 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."* 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

Appendix D

Description of Long-Range Capital Financial Plan Model

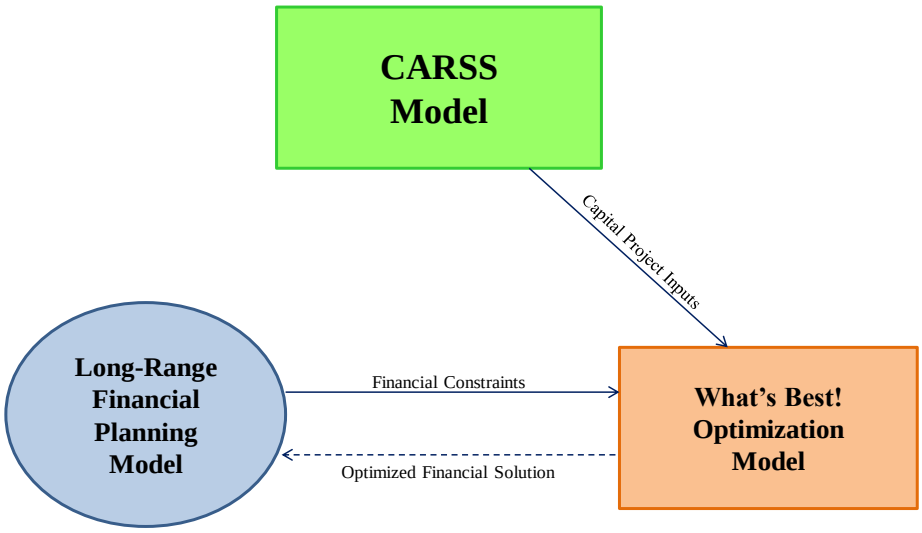
Description of Long-Range Capital Financial Plan Model

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.

Long-Range Capital Financial Model



The CARSS model extracts the capital project inputs from various District Agency files and prioritizes, scores and, based on specific District criteria, ranks them in comparison to all other projects across the District. Then, under capital budget constraints and with a specific priority ranking assigned to each project, it determines which projects can be funded in the Capital Improvement Plan (CIP) each year, and which projects will not receive funding (due to their lower priority ranking). The detailed list of unfunded capital projects is then imported into the 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 at

the earliest possible date. 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.

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 2032) 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 2032; 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 2017-2022 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.

Appendix E

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 508. 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, 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 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.

There are numerous examples in our region of this kind of asset failure due to lack of adequate 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 to that purpose.

Based on project types, categories and classifications, the CBT then established the expected useful life of assets that make up the project (pending building CARSS at a more detailed asset-by-asset level in the next phase), 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 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 reflect a degree of cost inflation.

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 have typically been 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 properly score projects as objectively as possible a mechanism was designed to assist with process. The tool provides a set of 19 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 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. The weighting factors are then automatically applied to the score in the CARSS application. There is also a set of 10 additional sub-elements that are key priorities. Any project that meets one of those receives a bonus of 5 additional points. The scores in each section are then totaled to determine the overall project score. The scoring is 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 chart.

Ranking Criteria for Proposed Capital Projects

Project Scoring (Score Each Numbered Element - light gray highlights)
Evaluate the proposed project on a scale of 1-5 for the extent to which it meets any defined element(s)?
Special Emphasis Projects (Mark any project that meets sub-element criteria - dark gray highlights)
Define these with an "X" in the element score - and 5 bonus points will be added

			Element Score	Weighted Factor	Total Element Score
Agency		**Total Cost**			
Project					
	Meets District Policy Priorities				
1	*Education*		0	3	0
		Middle School			0
		Library			0
		Pre-K Classrooms			0
2	*Community (Homelessness, Housing, Employment)*		0	3	0
3	*Health*		0	3	0
		Recreation Center			0
		Ambulances			0
4	*Public Safety*		0	3	0
		Crime Fighting Technology			0
5	*Transportation*		0	3	0
		Local Road Rehab			0
		Pedestrian, bike or Public Transit			0
		Environmental Remediation - Trees and Green Infrastructure			0
6	*Good Government*		0	3	0
		Smart City - DC Net, GIS			0
Priority SubTotal					**0**
	Cost-Benefit Factors				
1	*Readiness (catalyst project, implements Small Area Plan, etc.)*		0	5	0
2	*Impact on Operating Budget**		0	5	0
3	*Potential to Generate Revenue for the District*		0	5	0
4	*Potential for Private Economic Impact or Job Creation*		0	5	0
Cost Benefit SubTotal					**0**
	Project-Specific Impacts				
1	*Health and Safety Improvements*		0	7	0
2	*Federally Required Mandate*		0	5	0
3	*Extends Useful Life of Existing Asset*		0	5	0
4	*Close Out Existing Project*		0	5	0
5	*Project Importance*		0	7	0
6	*Critical Building System Improvement*		0	5	0
7	*Co-location of projects/facilities*		0	5	0
8	*Leverages External Public or Private Investments*		0	5	0
9	*PIF Evaluation Score (IT projects)*		0	0.25	0
Impact SubTotal					**0**
	Total Score				**0**

* if the project adds costs to the operating budget, then score 1; if no impact, then score 3; if savings then score 5

Appendix F

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 508 proposed capital projects, since there was likely no possibility that all of the capital needs could be funded in the current CIP. The CARSS model will ultimately analyze this at an asset-by-asset level by evaluating the relative risks to the District of deciding whether to fund certain capital projects.

One ranking mechanism that was considered was to establish District priorities by asset type, classification, or category. However, this approach does not allow for an objective comparison of different asset types against each other. For example, given scarce funding resources, how should the decision be made to objectively compare the relative importance of an emergency vehicle versus a school facility versus I.T. equipment? It was determined that a better approach would assess each project on a stand-alone basis, and its relative importance for funding versus the other 508 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.

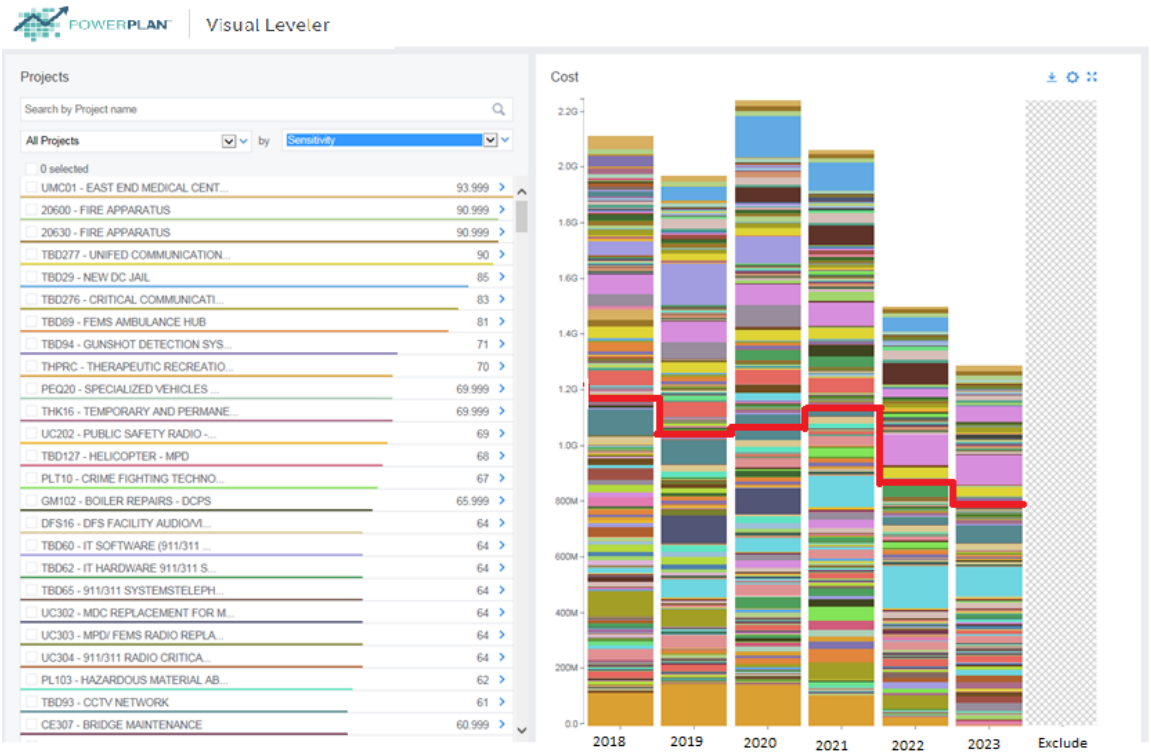
Using the standard system of scoring projects that was established, the Capital Budget Team (CBT) and other subject matter experts spent time over several weeks to individually score each of the capital projects. The scores of individual projects were reviewed several times to assess consistency and 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 508. 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 the CBT and other subject matter experts, 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 agencies.

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.

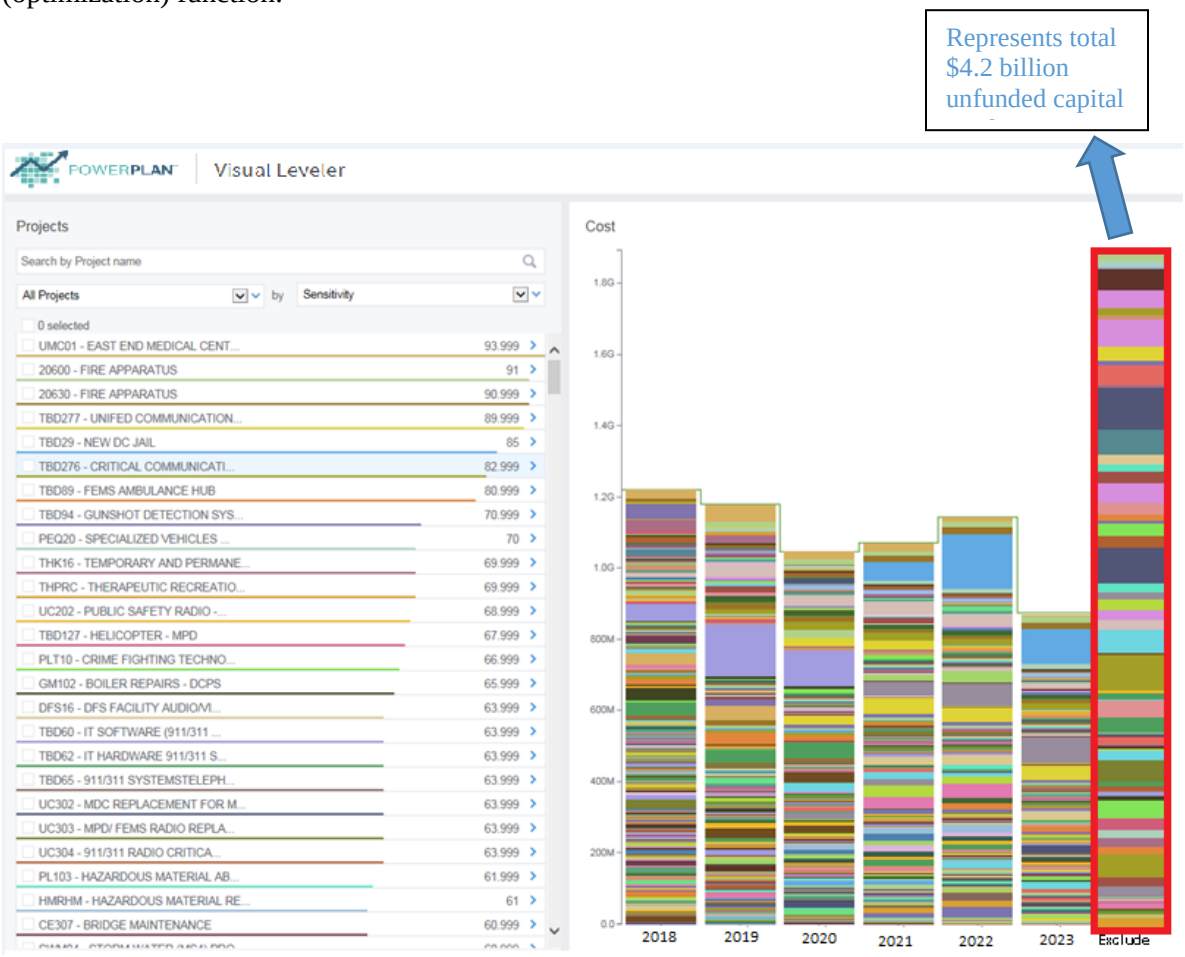
The following screen shot of the visual leveler shows all of the capital project requests from the various agencies as part of the FY 2018 – FY 2023 CIP budget formulation process, relative to the amount of funding available, represented by the red lines.



The visual leveler then enables users to maneuver 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. Users can propose and save different scenarios for further discussion and analysis.

In addition to allowing individual projects to be maneuvered, 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 ones 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 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 508 capital projects with verified budget needs that reflected true unfunded capital projects of the District. This set of projects 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.

It is important to remember that the capital projects that were removed from the set of 508 projects, because they were deemed to be highly likely to be structured as P3s, are still capital infrastructure needs of the District. Those capital needs will probably be financed 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 otherwise subject to the District's borrowing limitations.