ISSUED OCTOBER 2023

District of Columbia

LONG-RANGE CAPITAL FINANCIAL PLAN REPORT

Appendices

Produced by the Office of the Chief Financial Officer

GOVERNMENT OF THE DISTRICT OF COLUMBIA

Appendix A

Approach to Developing the Capital Asset Replacement Scheduling System (CARSS) & Highlights of the FY 2024-2029 Analysis

Approach to Developing CARSS

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

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

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

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

Recap of the District's Implementation of CARSS

Proof of Concept:

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

[1] Government Finance Officers Association, Best Practice: Asset Maintenance and Replacement, approved by the GFOA Executive Board, March 2010, and updated October 2017. Retrieved from: https://www.gfoa.org/materials/capital-asset-management

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

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

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

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

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

Figure 1

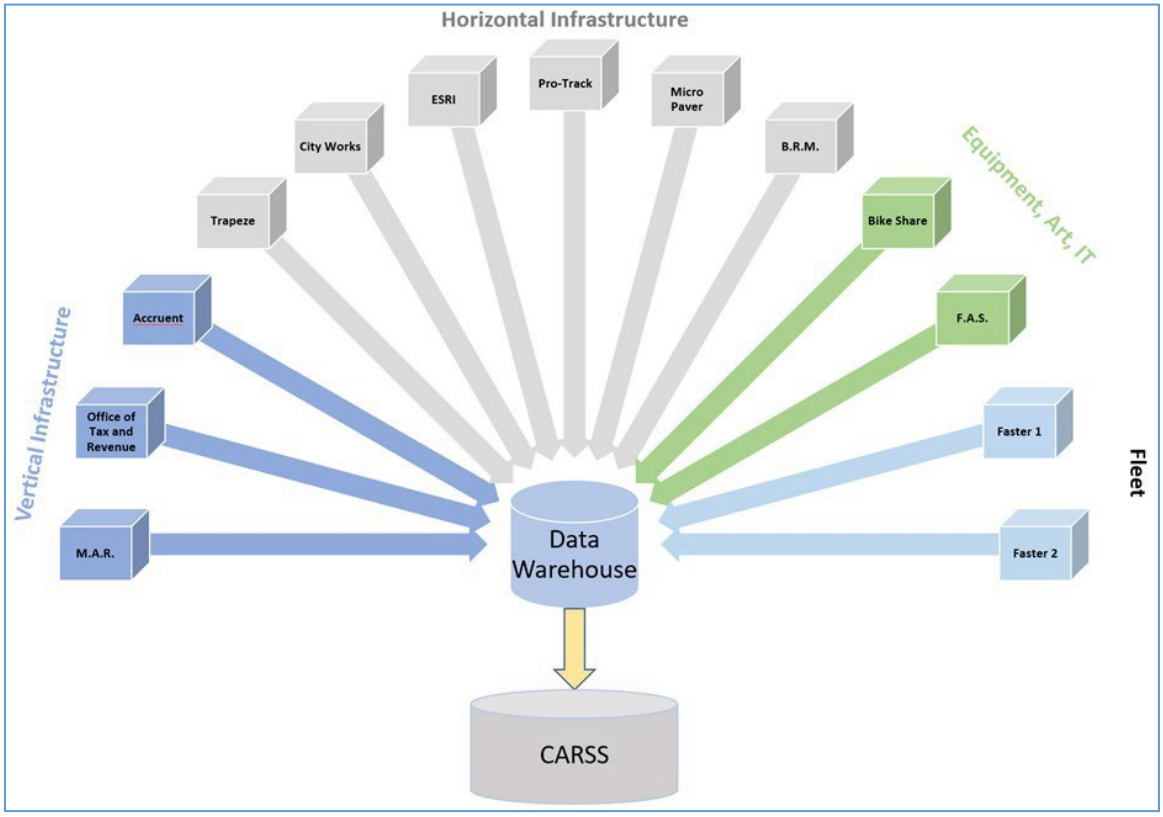
Asset Class	Asset Type	Asset Attributes
Horizontal Infrastructure	• Streets • Sidewalks • Alleys • Bridges	Length, Width, Age, Useful Life, Remaining Life, Current Condition, Name, Brick, Cement, Gravel, Asphalt.
Vertical Infrastructure	• General Support Facilities • School Facilities • Parks, Playgrounds,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

CARSS Full Implementation

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

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

Figure 2



The bottom-up approach has been used for all horizontal infrastructure and facilities, including building system components in the FY 2024-FY 2029 CIP.

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

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

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

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

For the FY 2024-2029 capital budget formulation process period covered by this report, detailed, granular-level data was compiled for all District-owned assets in CARSS. This has given the District the ability to build its capital budget using a "bottom up" approach for all its assets, with the exception of equipment or fleet, which are not typically replaced at a component level. This approach synthesized the much greater level of detailed data now available on each of the District's assets into capital projects that correspond directly to the calculated need as determined in CARSS. This approach was used for all ongoing capital maintenance projects, as well as for all new capital projects for horizontal and vertical infrastructure. This approach was based on a scoring and ranking process for each new capital project to provide a reasonable estimate of all new capital project's needs. These estimates for new capital projects, as well as the detailed data for ongoing capital maintenance of existing assets represent all known capital needs of each agency. Those capital projects were then compared to the projects that actually received funding as part of the FY 2024-2029 CIP. The unfunded projects represent the extent of the District's capital infrastructure funding gap, as seen in the table below.

Figure 3: Infrastructure Funding Gap

Total Unfunded Capital Needs During the 6-Year CIP Period

(in $ Millions)

Fiscal Year	FY24	FY25	FY26	FY27	FY28	FY29	6-Year Total
Unfunded Capital Maintenance Projects	$266.4	$270.7	$224.5	$187.9	$168.1	$284.7	**$1,402.4**
Unfunded New Capital Projects	$355.3	$337.7	$414.3	$493.7	$375.2	$192.4	**$2,168.5**
Total Unfunded Capital Needs	**$621.7**	**$608.5**	**$638.7**	**$681.6**	**$543.3**	**$477.1**	**$3,570.9**

This more granular approach to asset data is only possible because of the comprehensive asset inventory that the District has built over the last several years. The table below *(Figure 4)* reflects all the District's assets, by category (horizontal infrastructure, facilities, etc.,) that are captured in CARSS and their value as reflected in the 2022 Comprehensive Annual Financial Report.

Figure 4: Asset Inventory

Assets and Their Value in CARSS

	Number of Assets *	Percentage of Total Asset Classification	FY 2022 CAFR Book Value of Asset Type ($000) *	% of Assets Captured
Horizontal Infrastructure				
Ramps	564	100%	3,984,019	100.0%
Service Roads	124	100%		
Streets (blockkey)	36,262	100%		
Sidewalks (blockkey)	47,184	100%		
Trails	90	100%		
Alleys (blockkey)	9,578	100%		
Bridges	371	100%	244,441	100.0%
Bikeshare Terminals/Racks	290	100%	14,154	100.0%
Street Car Rail (Track Segments)	41	100%	226,299	100.0%
Total	**94,504**	**100.0%**	**$ 4,468,913**	**100.0%**
Facilities				
Buildings	642	100%	8,660,741	100.0%
Building Components	187,584	100%		
Amenities (Pools, courts, Playgrounds etc)	568	100%		
Total	**188,794**	**100.0%**	**$ 8,660,741**	**100.0%**
Equipment and IT				
Fleet	4,729	100%	1,695,167	100.0%
Boats/Ships	27	100%		
Leased Equipment	TBD	100%		
Aircraft	2	100%		
Circulator Buses	72	100%		
Street Cars	6	100%		
Street Car System Equipment	143	100%		
Equipment (>$5K)	10,785	100%		
IT and Furniture	11,872	100%		
Total	**27,636**	**100.0%**	**$ 1,695,167**	**100.0%**
Land				
Land (count by parcel)	**4,214**	**100%**	**$ 966,846**	**100.0%**
Grand Total **	**315,148**	**100.00%**	**$ 15,791,667**	**100.00%**

** Does not include construction in progress*

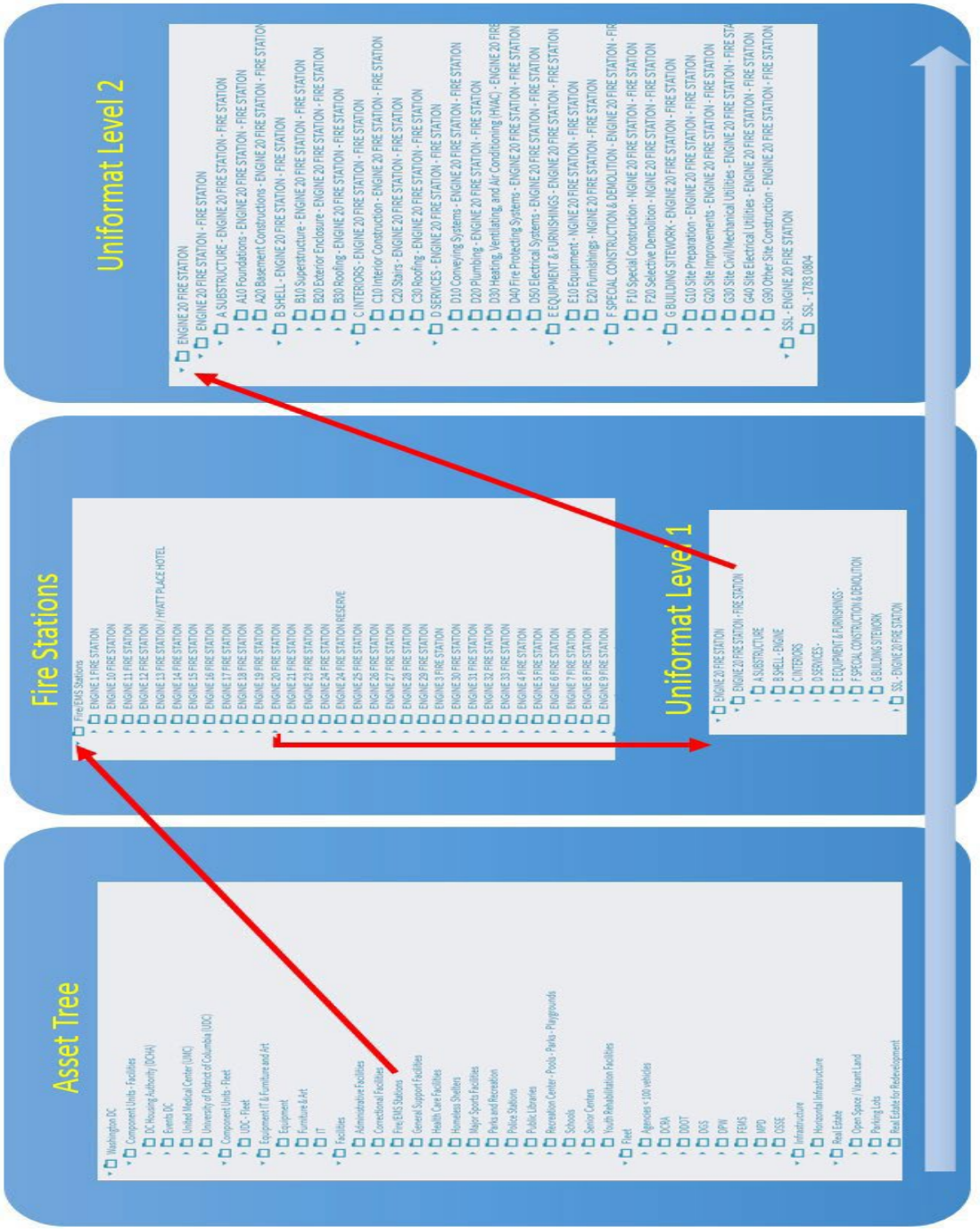
*** Does not include assets from the District's component units - UDC, DCHA, UMC, and Events DC*

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

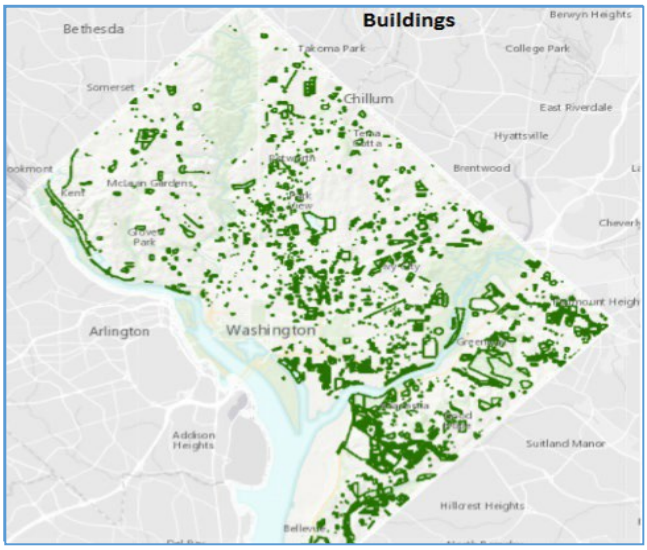
**** Right to use Leased EquipmentLeased Equipment

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

Figure 5: Asset Tree

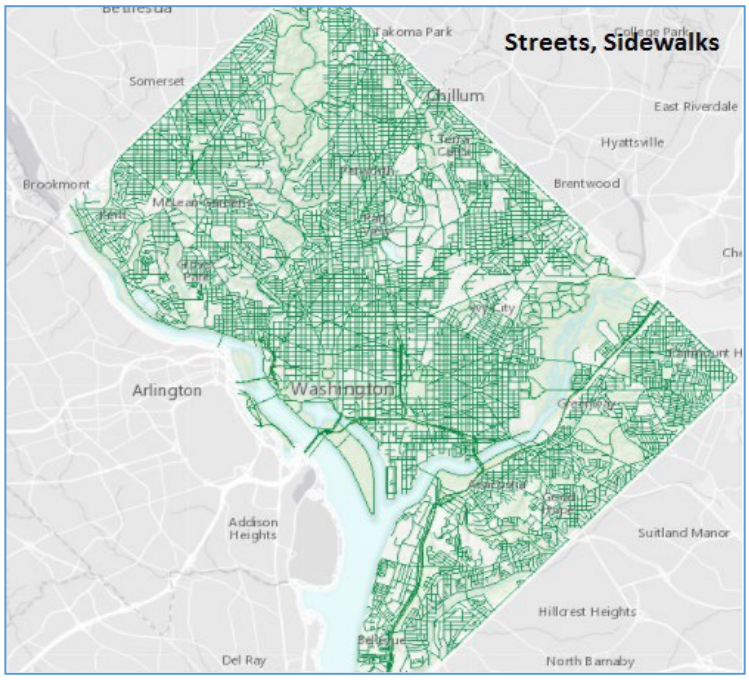


GIS Capability



Information on the more than 640 municipally owned buildings within the District has been captured in CARSS and displayed in the related GIS system (see image, left). However, while data might have existed on the type, location and assessed value of a particular building, information on the current condition of the building, and its sub-systems, might have been missing or not up to date. DGS and its contractor have been performing facility condition assessments (FCAs) on all District- owned buildings, working towards a goal of assessing each of them at least once every 3 to 5 years.

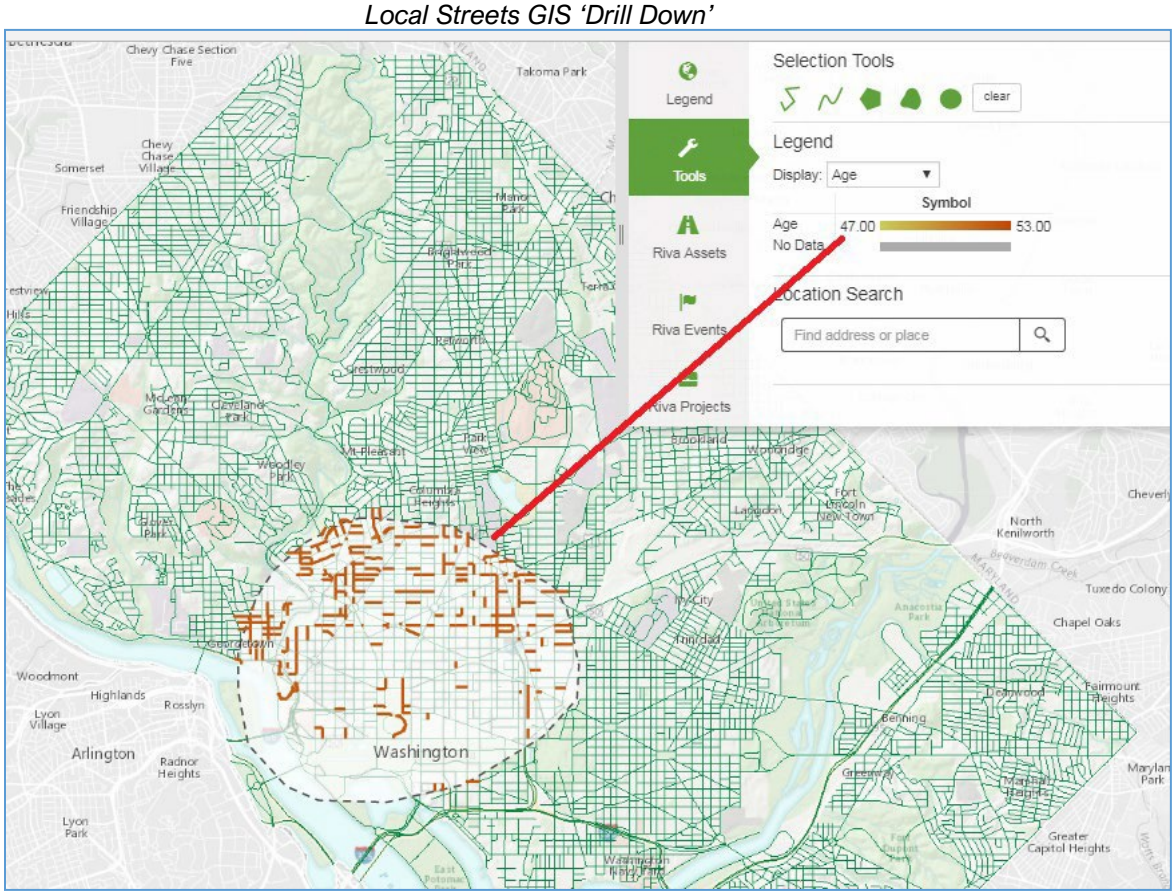
As an example, during fiscal years 2022 and 2023, DGS and its contractor completed 164 FCAs on approximately 16 million square feet of District-owned facilities. To date, approximately 75% of District facilities have been assessed at least once. The information from the FCAs is uploaded into the CARSS database, allowing for more accurate calculations of costs for repair and maintenance of facilities and their sub-components, such as roofs, HVAC, etc., thereby facilitating a more data-driven approach to building the capital budget for DGS. The additional building components/systems can be seen in CARSS and the current inventory now approaches 190,000 asset data points.



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

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

Local Streets GIS 'Drill Down'



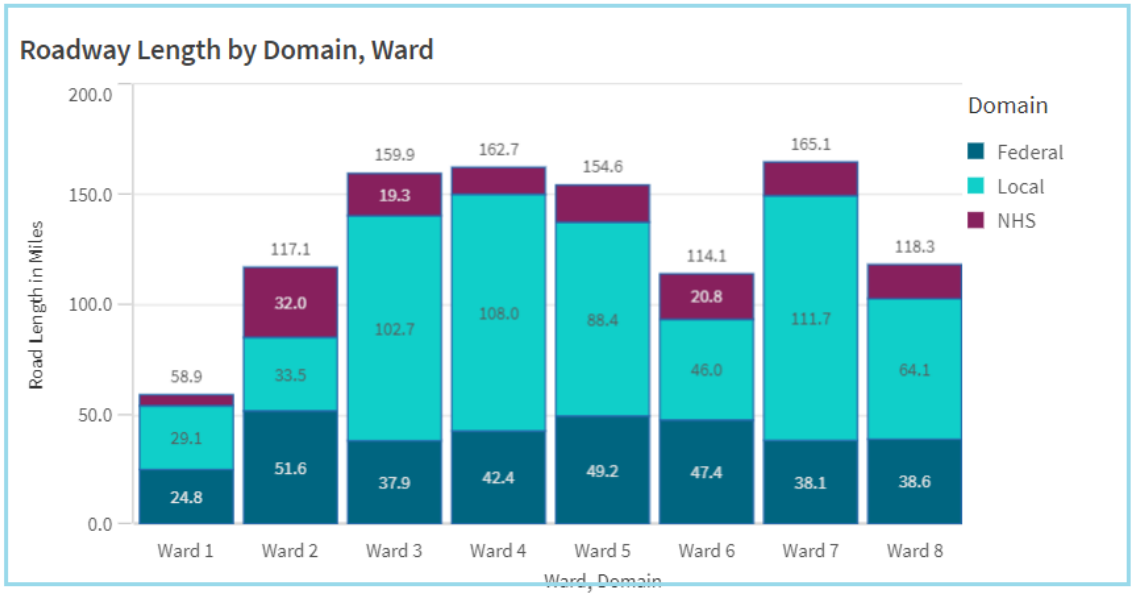
Enhanced Analytical Capabilities

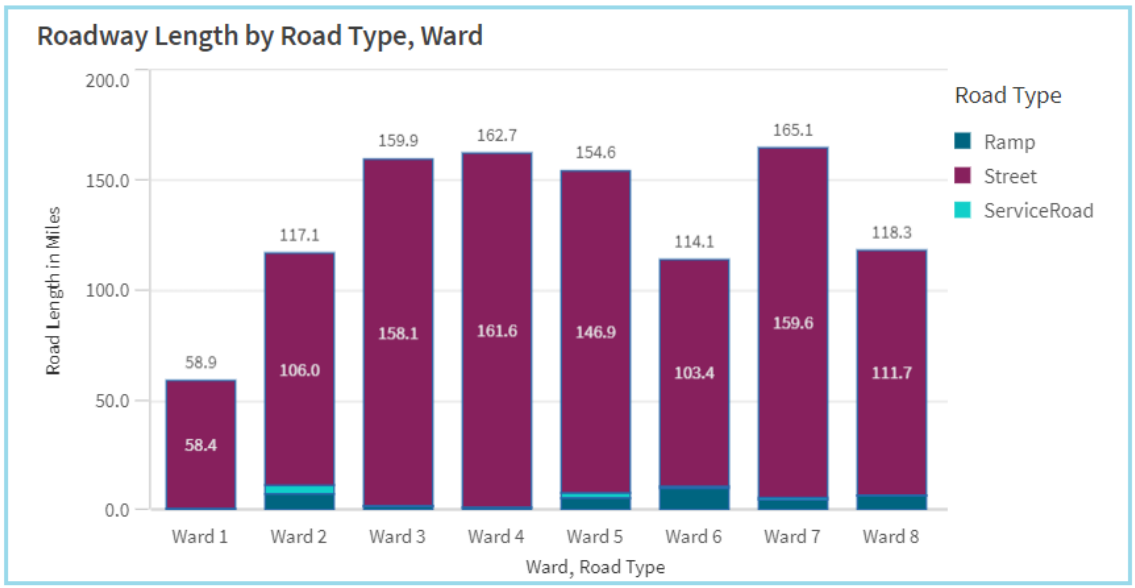
CARSS data has been enhanced to allow more user-friendly analysis and the capability to "drill down" on any asset type to get specific information on individual assets.

Local Roads Condition - Drill Down

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

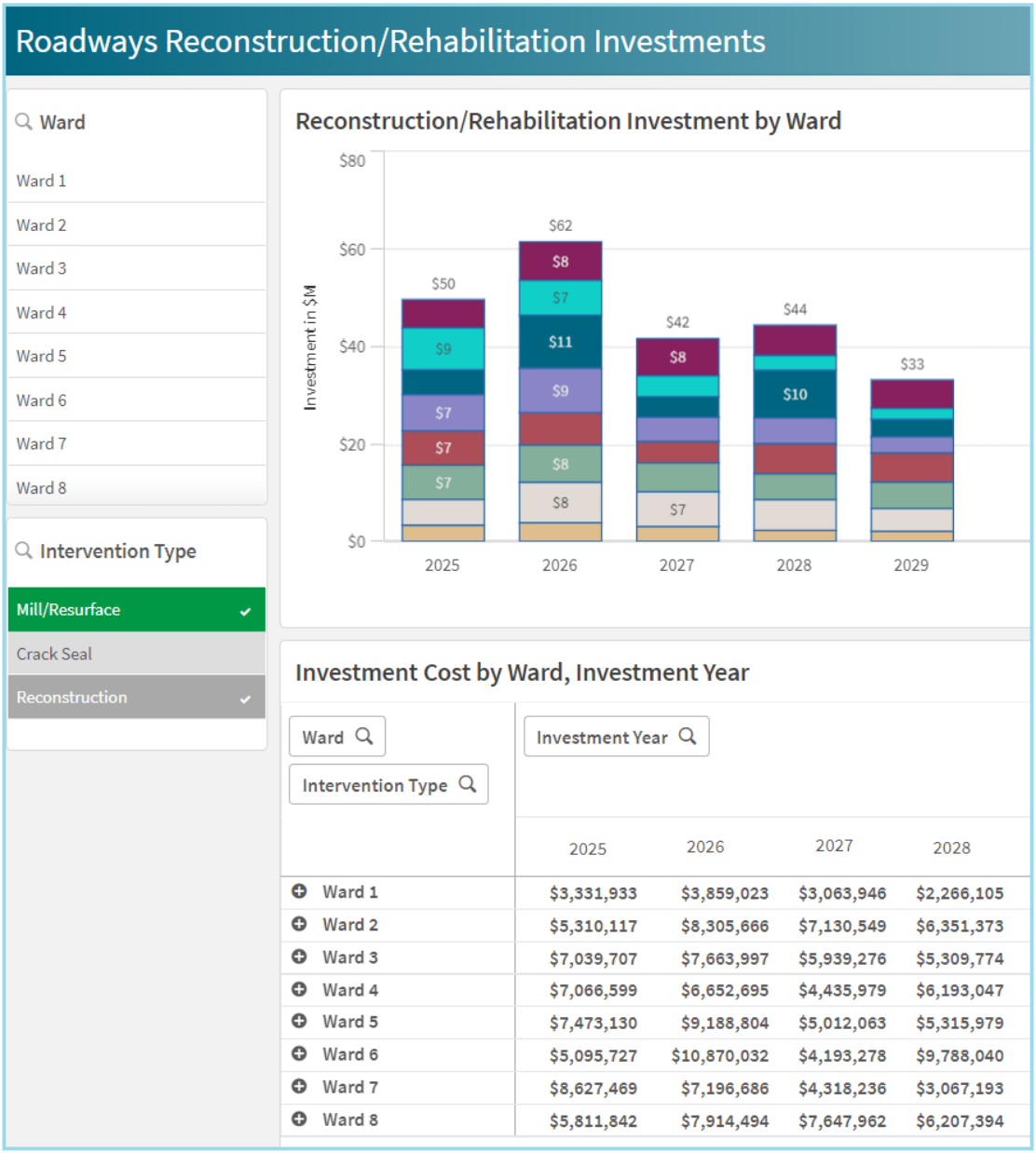
Figure 6: Local Roads – Mileage per Ward





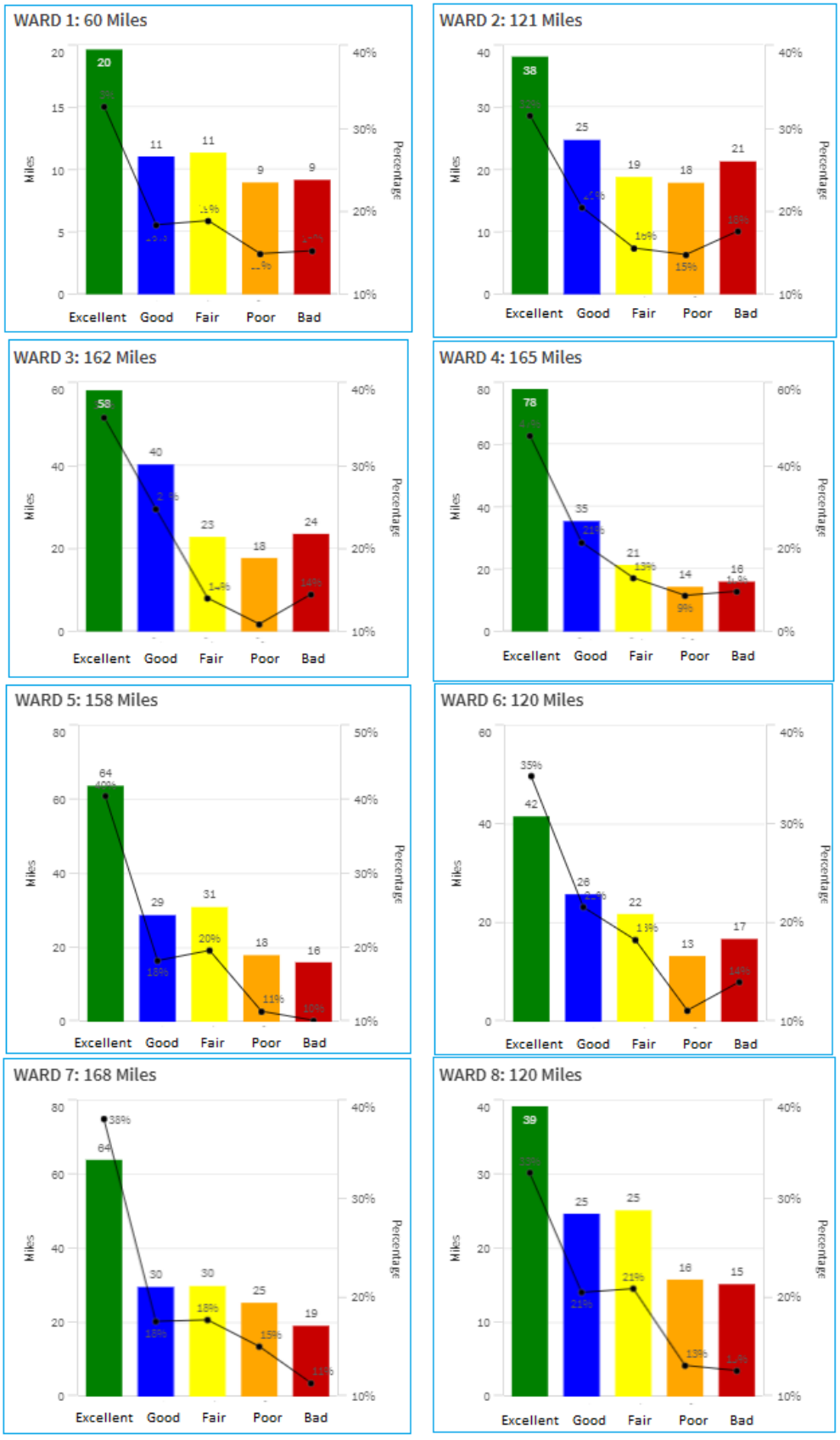
To further highlight the CARSS data and the value of enhanced analytics, *Figure 7* provides summary level details on the condition of various road types. This kind of data is critical in determining the costs and needed budget for maintaining roads across the District.

Figure 7: Road Surface Details & Replacement Costs



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

Figure 8: Local Roads Condition - by Ward



Drilling down further into the data will enable the user to ultimately see the specific information around any given block of roadway in the District. Individual asset information on roadway blocks is presented with a level of detail similar to the individual asset data for vehicles shown in *Figure 9* on page A-13.

Fleet "Drill Down"

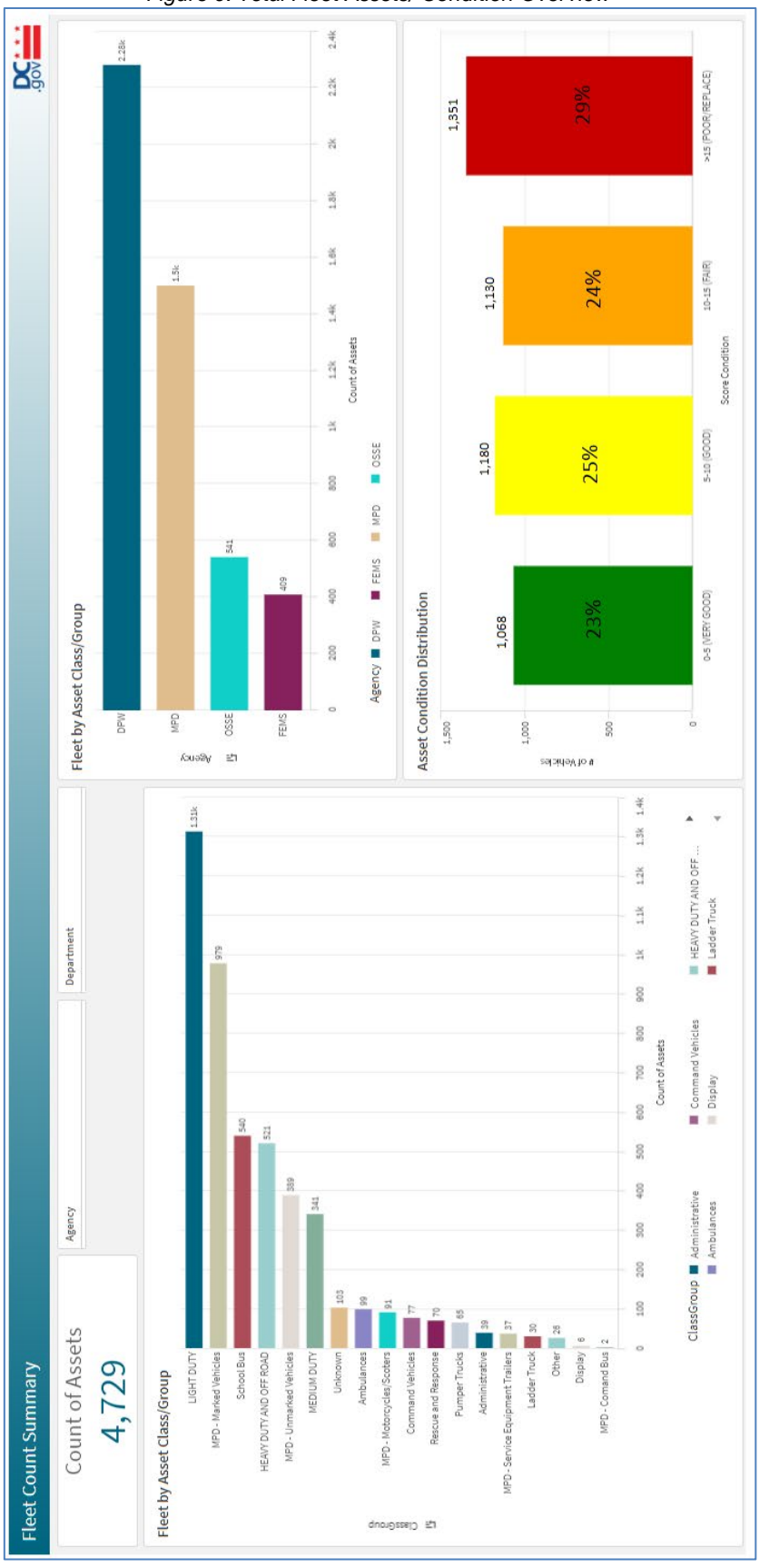
The District of Columbia maintains a fleet of 4,729 vehicles with a 6-year replacement cost of roughly $500 Million. The average maintenance costs amount to several hundred thousand dollars per year. It is advantageous to have a comprehensive, data-driven vehicle replacement strategy. A proactive lifecycle management approach for an entire fleet is achievable by tracking and analyzing the status of all vehicles. A vehicle replacement process is key to success and can be broken down into 2 essential steps:

1) Developing a feasible strategy
    a) Establishing an age or mileage criteria
    b) Defining a maintenance and repair cost threshold
    c) Defining lifecycle management
    d) Disposing of old fleet assets
2) Communicating the value effectively to stakeholders

The communication of information to decision makers is a critical part of creating a vehicle replacement plan. When viewing all 4,729 fleet assets through CARSS and our enhanced analytics tools, it becomes quickly apparent that the District's rolling stock, or fleet, is procured and owned across multiple agencies; of which the key agencies are MPD, DPW, OSSE, FEMS and DDOT. The chart below *(Figure 9)* shows the current vehicle count for each of the major fleet owning agencies.

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

Figure 9: Total Fleet Assets/ Condition Overview

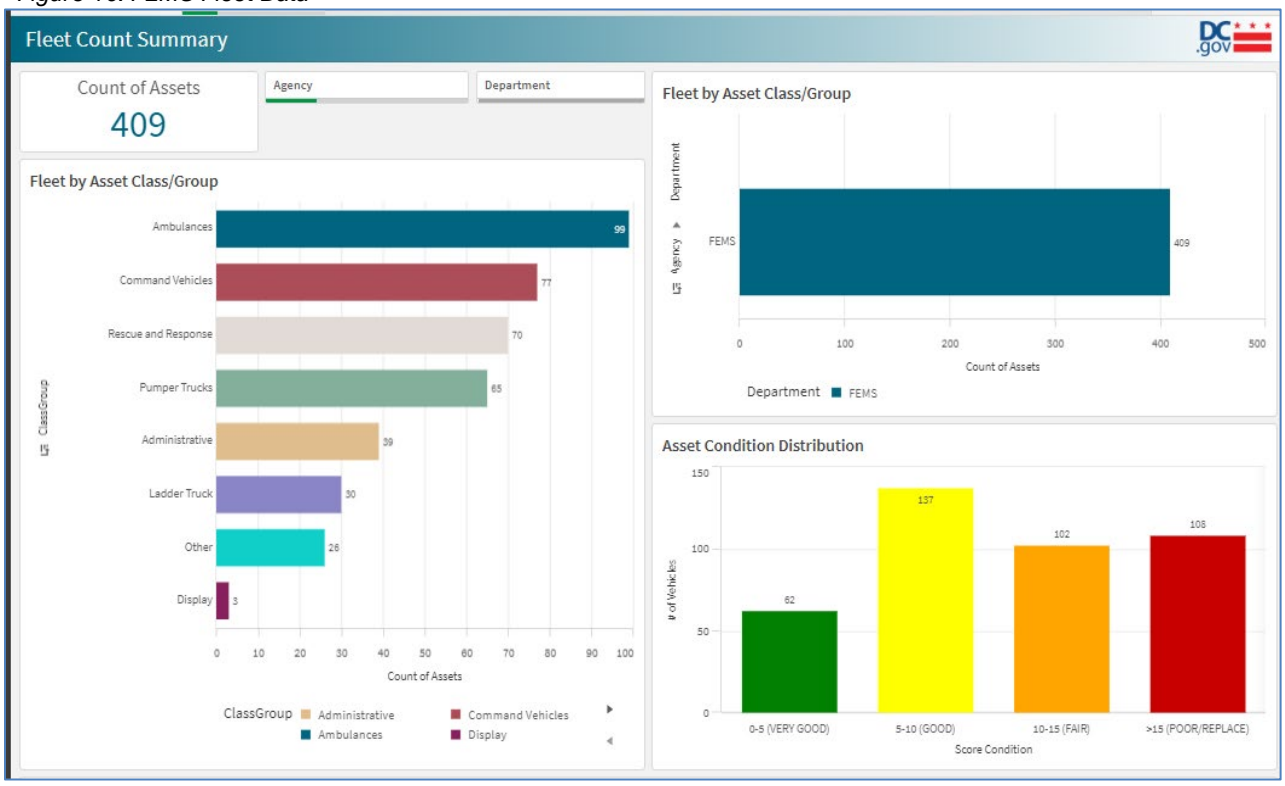


As the chart above shows 1,351 vehicles, or approximately 29% of the District's total fleet of vehicles, are currently in the '*Poor/Replace*' category, as determined by the assessment of a combined set of factors including age, vehicle mileage, maintenance costs, and engine hours.

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

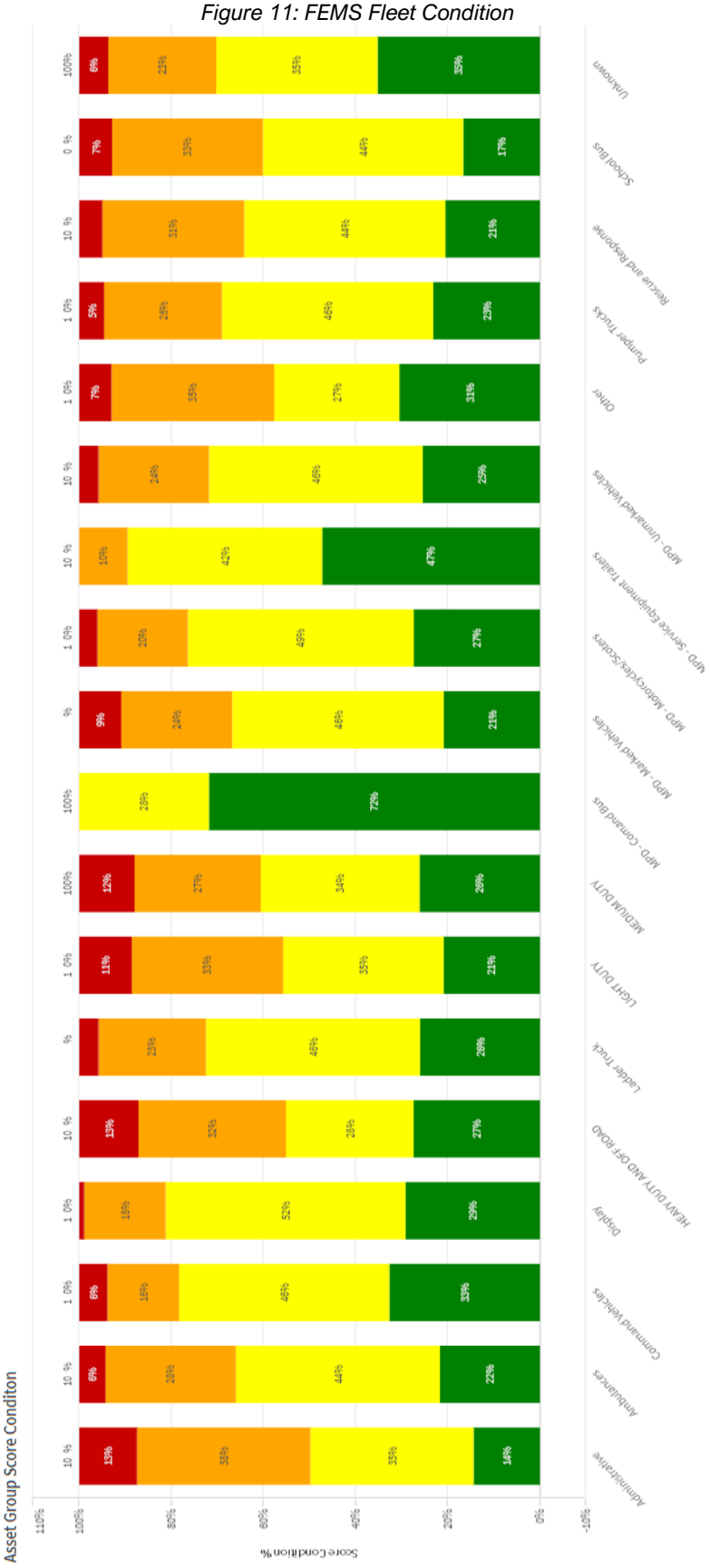
In *Figure 10*, the user can see data within FEMS at an even more granular level, by vehicle type, such as ambulances, command vehicles, ladder trucks, pumper trucks, etc. The data reflect not only the number of vehicles of each type, but also the average vehicle age by type, the overall maintenance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

Figure 10: FEMS Fleet Data



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

Figure 11: FEMS Fleet Condition

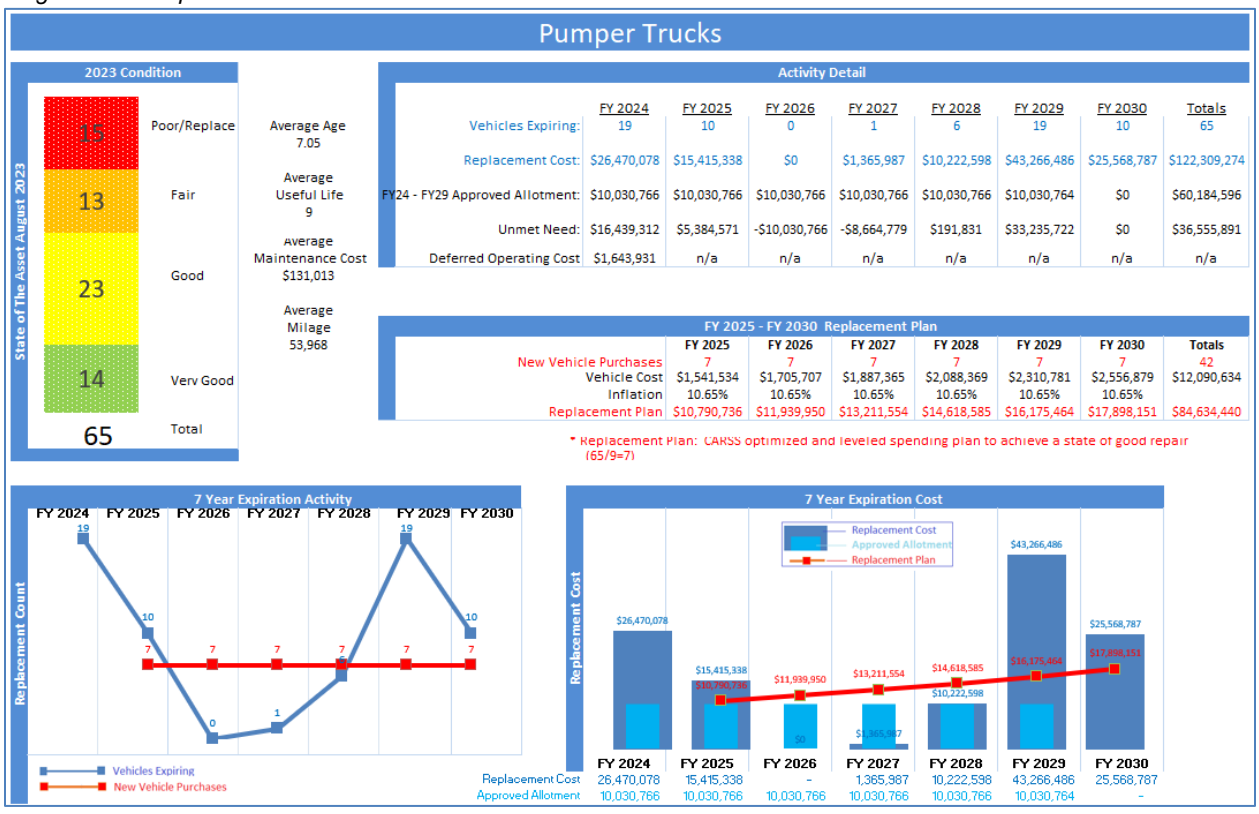


The enhanced analytics tools allow users to drill down even further to review data around a specific vehicle type, such as pumper trucks (pictured to the right). From the graphic below, the data shows that there are 65 pumper trucks with an average age of approximately 9 years and average maintenance costs approaching $131,013 per vehicle, the highest of all the vehicle types. The data further shows that there are 15 pumper trucks that are ranked in the poor/replace category based on various criteria that are measured, such as vehicle age, mileage, engine hours, etc.

This represents roughly 26% of the pumper truck fleet that needs to be replaced during the current CIP period. This more data-driven approach to analyzing which vehicles need to be replaced and when is used by FEMS in proposing their capital needs as part of the Mayor's overall proposed CIP.

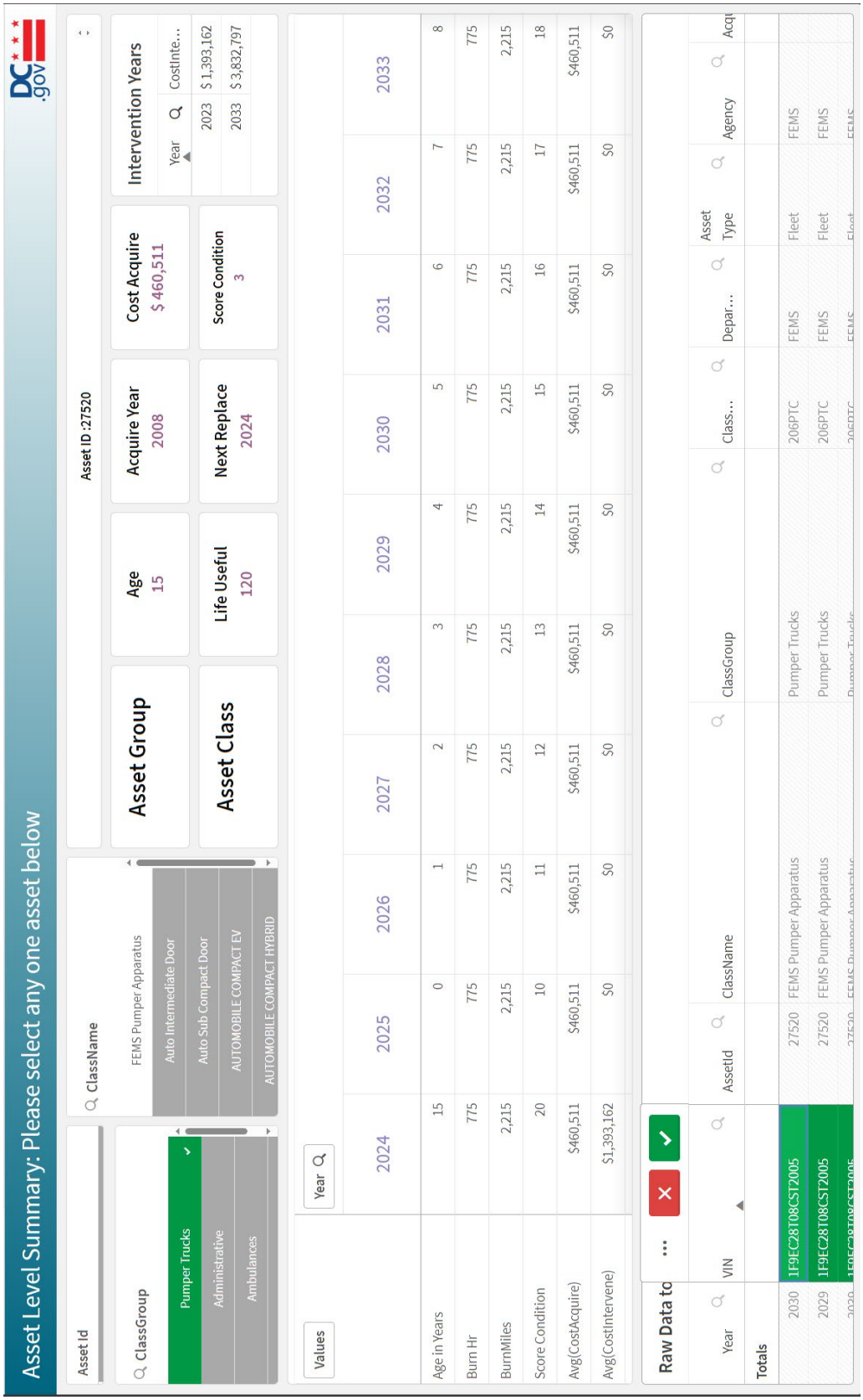
The chart below *(Figure 12)* is a representation of additional detail obtained by looking specifically at the pumper trucks fleet. Data in the table is at an individual vehicle level and reflects additional data regarding make, model and age of the vehicle, the total maintenance costs to date, and total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

Figure 12: Pumper Trucks Data



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

Figure 13: Individual Asset Data



Enhancements to CARSS

Substantial progress has been made in further enhancing and refining CARSS over the last several years, both in the number of assets included in the system, as well as in the quality of data on the individual assets inventoried. As was noted in last year's report, the District has already captured 100% of all District-owned assets in CARSS, as opposed to only 14% of assets that were inventoried in the system when the first report was released in 2016. At that time, it was understood that a greater level of detail on many of the assets would be obtained as condition assessments were performed. As more data points become available for many of the assets, and these components and sub-systems are captured and tracked in CARSS, the total number of assets in the system continues to increase. For example, the 2019 report showed a total asset count in CARSS of roughly 100,000 assets. As CARSS has been further refined over the past several years, and the quality of data has improved due to ongoing condition assessments, the asset count has now risen to over 315,000 assets. The asset count remained relatively flat as compared to the 2022 report due to the delay in obtaining enhanced facility condition assessments, however that is expected to change as condition assessments are received from the vendor hired by DGS to perform this work.

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

In addition to those assets directly owned by the District, the assets of certain component units, such as the University of the District of Columbia, have also been added to CARSS. In addition, the OCFO completed in 2022 a large-scale project to add the assets of the District of Columbia Housing Authority (DCHA), which is a separate legal entity, to CARSS as well. This project is discussed in more detail later in this appendix. While the assets of these component units are separately maintained and funded by those entities, and not from the District's general fund, their addition will allow for a more complete picture of the overall health of all of the District's assets.

Development of New Software Platform to Support CARSS

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

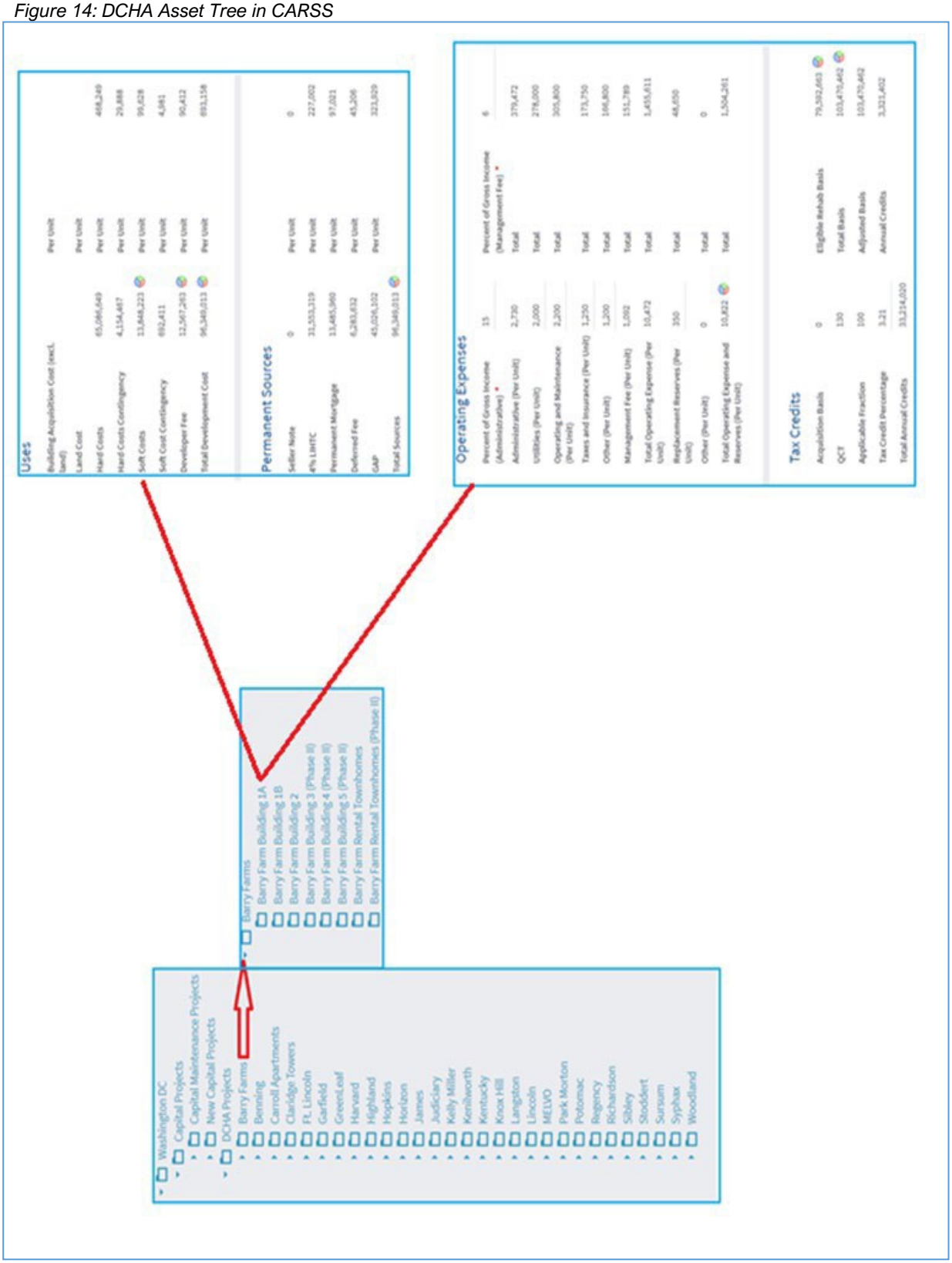
Expanded Use of CARSS with the District of Columbia Housing Authority (DCHA)

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

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

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

Figure 14: DCHA Asset Tree in CARSS



Appendix B

Methodology for
Classifying and Scoring Capital Projects

Methodology for Classifying and Scoring Capital Projects

Project Classification

After all agencies of the District of Columbia formally submitted their capital projects, and the Capital Budget Team (CBT) reviewed and adjusted them, the total number of capital projects with requested budget needs stood at 358. This set of projects went through several progressive actions to better refine and assess the total capital needs of the District.

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

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

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

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

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

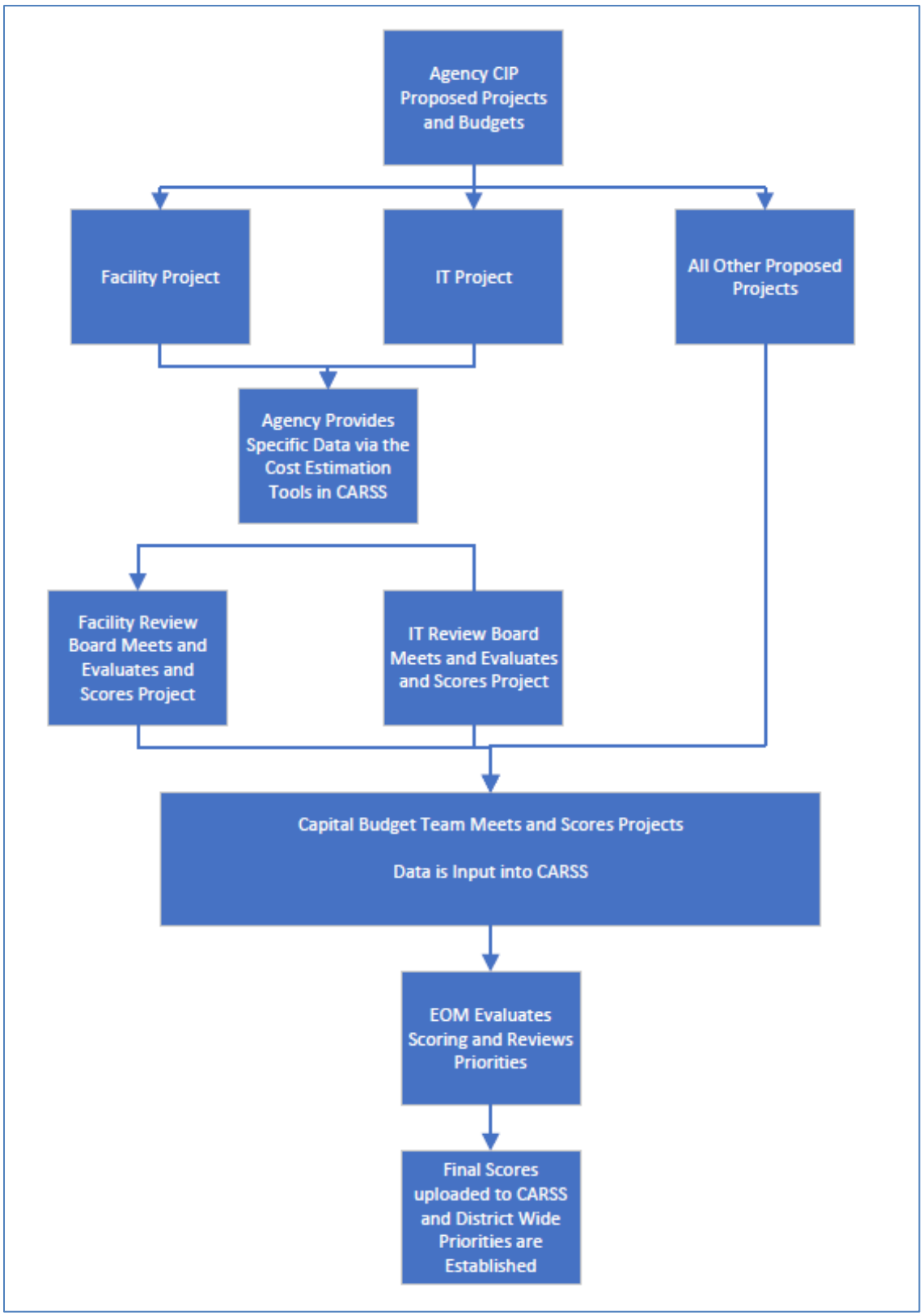
The Mayor's Office of Public Private Partnerships reviewed all projects for their potential as a P3 opportunity. They scored the opportunities on a scale of "0 to 4" where zero reflects no opportunity for the project to be structured as a P3, and "4" representing a very high probability of a P3 opportunity.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

Project Scoring

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

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

Figure 1



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

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

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

The weighting factors are then automatically applied to the CBT given score in the CARSS application. There is also a set of 12 additional sub-elements that are key priorities. Any project that meets one of those receives a bonus of 5 additional points. The scores from the facility and IT boards are added, as is the 'project importance' score by the Mayor's budget team. The scores in each section are then totaled to determine the overall project score. The scoring 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 charts.

Table 1

Ranking Criteria for Proposed Capital Project Enhancement Budgets
FY 2021 - FY 2026

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

Table 2

Ranking Criteria for Proposed Capital Project Budgets – Continued

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

Appendix C

Overview of
How Capital Projects Were Prioritized

Overview of How Capital Projects Were Prioritized

Once sufficient details outlining the nature and structure of needed projects and their budgets existed, the next task was to determine an objective approach to prioritize the 358 proposed capital projects, since there was likely no possibility that all 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 358 projects, to ensure that a project to repair an HVAC system in a school was scored on a level playing field with a new accounting system, as an example.

Using the standard system of scoring projects that was established (see Appendix B), the Capital Budget Team (CBT) and other subject matter experts spent time over several weeks to individually score each of the capital projects. The scores of individual projects were reviewed several times to assess consistency and a genuine sense of logic, and to ensure they were as objective as possible. The criteria and the scores were then applied to the CARSS model, which created a project ranking from 1 to 358. 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 assigned scores as the proxy for risk at a project level. The logic is that the higher the score assigned (or 'level of importance'), the greater the risk to the District for not funding that capital project.

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

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

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

The following screen shot of the visual leveler shows all the capital project requests from the various agencies as part of the FY 2024 – FY 2029 CIP budget formulation process, relative to the amount of funding available, represented by the red lines.

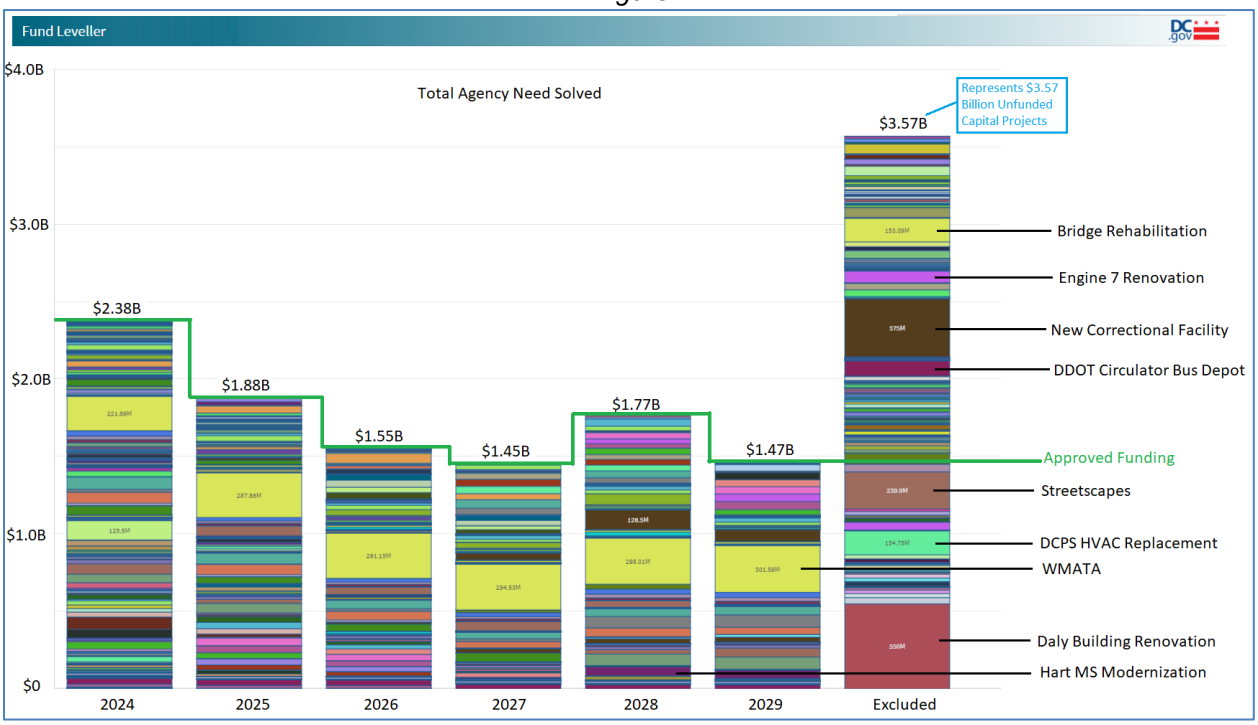
Figure 1

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

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

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

Figure 2



After utilizing CARSS to optimize project priorities for the CIP period, capital projects that did not have a sufficiently high priority, as well as those that had to be deferred were placed in the "excluded" column on the far right of the chart. This data was then extracted and used to determine the identified gaps in budget needs year-by-year. The Capital Budget Team then conducted another detailed review and scrubbing of the remaining, unfunded, or underfunded capital projects, along with identifying which of these remaining projects had a high potential to be structured as a P3. This resulted in a remaining total of 175 capital projects with verified budget needs that reflected true unfunded capital projects of the District. This set of projects, which spanned across all four areas of categorization (i.e., facilities, horizontal infrastructure, fleet, as well as IT and other), defines, at this point in time, our best estimate of the total unfunded capital needs of the District, and the financing challenge that needs to be addressed outside of the current CIP period.

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

Appendix D

Description of the Long-Range Capital Financial Plan Model

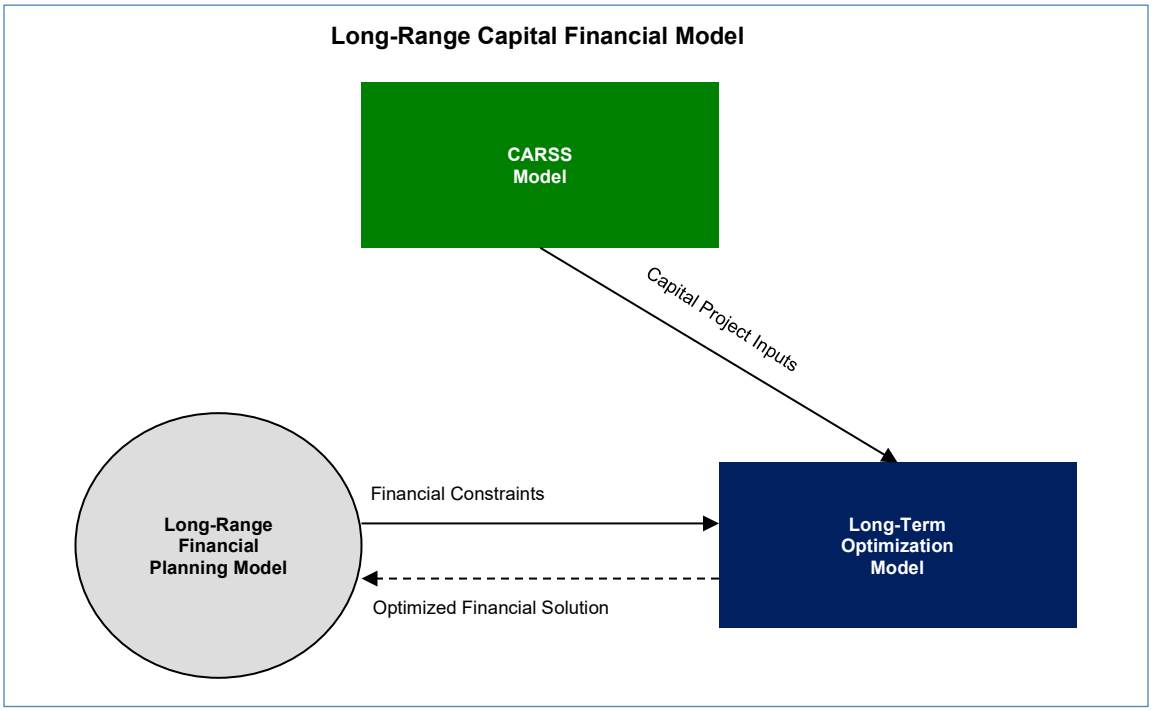
Description of the Long-Range Capital Financial Plan Model

The OCFO engaged the services of an external financial advisor, PFM Advisors LLC ("PFM") to develop a long-range financial planning model. The model is instrumental 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. This modeling effort will assist the District in identifying financial strategies to fund the identified capital needs gap in the earliest year possible given various constraints, such as the amount of paygo or additional federal funding available over various periods.

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

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

Figure 1



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

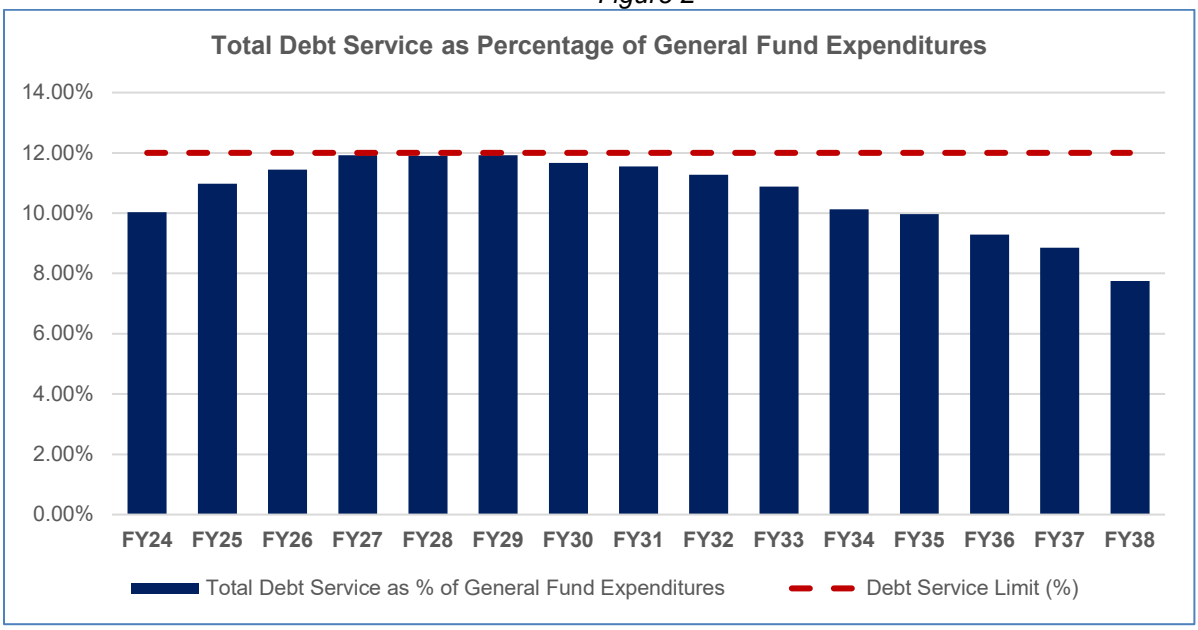
Model Assumptions

The long-range capital financial model makes several assumptions in analyzing funding solutions for the backlog of unfunded capital needs. These include the estimated borrowing costs for future debt issuances and the level of future funding from other non-debt sources for capital projects. It also reflects the District's projections of General Fund expenditures during the four-year financial plan period, as is reflected in the September 30, 2023, revenue forecast from the OCFO, before then being projected to grow at 3% in the out years of the CIP and into the future. In addition to those assumptions, there are three key assumptions in the model, which drive how the model optimizes various funding solutions. These include:

1. Optimization of debt issuances:

   The model is structured to maximize the amount of debt issued in each fiscal year immediately outside of the current CIP period, while remaining within statutory debt limits, until paygo amounts have increased significantly, and thereafter lowering the amount of debt issued annually to achieve a more balanced overall mix of funding to meet the District's capital needs. This also provides substantial borrowing capacity after 2029 to fund future new capital projects.

Figure 2



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

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

3. No additional new capital projects:

   As the model factors all of the many variables in solving for the best solution to fund the backlog of unfunded capital needs, it assumes that no new capital projects, outside of those that were part of the FY 2024-2029 capital needs assessment, are added to the list of capital projects in future years prior to existing unfunded needs being met, unless they are completely funded from additional paygo, federal funds, or other additional resources from private sources.

Results of Modeling Efforts

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

- Alter individual assumptions within internal and external source categories and drive source projections, with specific focus on paygo funding levels.
- House all existing debt service (by series).
- Project the District's debt service through the end of its 15-year forecast period (FY 2038) by exporting sizing results calculated in DBC Finance, a bond modeling software program.
- Utilize VBA algorithms to maximize the amount, and optimize the structure, of future debt issuances to ensure that the District stays within its statutory debt limit.
- Summarize all projected debt and expenditure detail through FY 2038; and
- Calculate the projected ratio of debt to expenditures on an individual fiscal year basis throughout the entire financial planning period.

The engine of the model lies in the VBA algorithms. These tools allow the model to directly interface with other internal models to ensure the District maintains the flexibility to incorporate the most current source data and CARSS assumptions into each analysis. It also allows the District to optimize and project the maximum amount of debt that can be issued in each fiscal year (under the 12% cap), while simultaneously determining the earliest possible fully funded year of all unfunded capital projects. The District will also be able to quantify the amount of paygo needed to fund entire backlogs of unfunded capital needs over various time periods. Outputs of the Long-Range Capital Financial Model include two reports: a "Gap Report," which (based on the CARSS file) details and quantifies the current capital projects funding gap in each fiscal year using that year's sources of funds; and a "Funded Report" which lists the unfunded capital projects from the FY 2024-2029 CIP that receive funding, and in which years outside of the current CIP period and summarizes the allocation of sources based on fiscal year projections of debt service.

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

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