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TO: Baltimore City Council, Public Safety and Government Operations Committee
FROM: Berke Attila, Director, Department of General Services
DATE: December 28, 2022
CC: Nina Themelis and Sophia Gebrehiwot, Mayor's Office of Government Relations
RE: LO22-0029 Baltimore City Fire Department Apparatus Maintenance and Replacement

Briefing Memo – Fire Fleet Replacement Requirements and Scenarios

Summary

The Baltimore City Department of General Services (DGS) has worked with the Baltimore City Fire Department (BCFD) to identify parameters for the Fire Fleet replacement requirements. Based on an analysis of multiple options, DGS has established funding requirements and expected age progressions in each scenario to offer stakeholders insights into the costs and benefits of future replacement.

Vehicle Classes and Average Ages

DGS modeling includes reference to average ages by classification, based on current vehicle data. This includes three primary vehicle types – Medics, Engines, and Ladder trucks. The average ages of each can be compared with the Industry Standard life cycles to provide an overview of the BCFD Fleet:

Asset Type	Industry Standard Life Cycle	Average Age
Medic	6	6.3
Engine	10	8.5
Ladder	15	9.1

DGS recognizes that an increase to age across these vehicle classes would result in higher likelihood of breakdowns, greater need for corrective maintenance, and higher potential for service disruption.

Critical Assumption: Average Life of Asset by Class

DGS modeling includes an assumption that any replacement performed in accordance with a life cycle assumption necessarily requires a target of 50% - i.e., the average life of a vehicle in the class should be at half of the expected age.*

Asset Type	Industry Standard Life Cycle	Expected Age Target
Medic	6	3.0
Engine	10	5.0
Ladder	15	7.5

* Assumptions to asset class life cycle may be subject to further discussion, but DGS would not recommend alteration of the associated 50% target associated with any asset life cycle.

Critical Assumption: Reserve Replacement Requirements

DGS would also set a disclaimer that City agencies often establish significant vehicle reserves due to vehicle age and utilization requirement. Ultimately, vehicle reliability in emergency situations – whether through use front-line or reserve vehicles - is paramount. However, these reserves contribute to the replacement requirement for total vehicle counts. By function, reserves are often much older and less utilized than front-line assets; DGS would not differentiate between front-line and reserves in setting the above targets. With any potential changes to replacement scenarios, each reserve requirement should be reviewed based on ability for BCFD to meet vehicle availability targets.

Current Baseline: “2-4-8” Replacement

Historically, BCFD has identified a replacement request of two ladder trucks, four engines, and eight medics (“2-4-8”) on an annual basis, to support current operations. This current baseline is supported through a combination of financing (via the Master Lease) and grant dollars (AMOSS).

- Over a ten-year period, DGS has averaged replacement of two ladders, four engines, and seven medics per year, effectively just one Medic unit shy of the annual replacement request.
- Over the last two-year period, DGS has worked to increase BCFD procurements, ordering 13 Medics, five Engines, and three Ladders per year – and has done so without substantial increases to Master Lease funding.

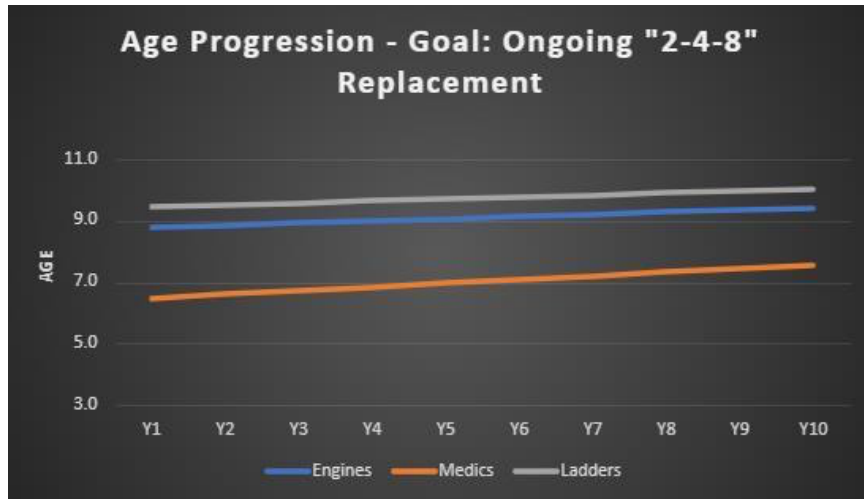
The 2-4-8 replacement schedule falls short of the annual requirement, if BCFD is to maintain the current count and cycle vehicles out based on our current life cycle assumptions.

Asset Type	BCFD Requirement Count	Current Life Cycle Assumption	Annualized Requirement (Rounded)	Current Replacement	Difference vs. Requirement
Medic	67	6	11	8	-3
Engine	55	10	6	4	-2
Ladder	30	12	3	2	-1

Funding Requirement: There would be no requirement to identify additional dollars to maintain this baseline.

Age Progression: Over a ten-year period, all three asset type groups would slowly age, with fewer replacements performed versus calculated annual replacement requirements.

- Medic age would increase from 6.3 years to 7.6 years on average;
- Engine age would increase from 8.5 years to 9.4 years on average; and
- Ladder age would increase from 9.1 years to 10.0 years on average.



Challenge of the Current Baseline and Status Quo

DGS would note that the above increase to age should be given appropriate context. In the current funding paradigm, BCFD's entire fleet of assets are approaching the expect asset life – meaning that in ten years, the *average* Medic unit would exceed expected life cycle, the *average* Engine would be at expected life cycle, and the *average* Ladder truck would be far into its expected life cycle. We should assume that in this scenario, current operational and maintenance challenges would substantially increase and availability would become a serious challenge (well beyond any potential current issues).

Scenario: Industry Standard Life Cycle

An alternative replacement scenario would use industry the life cycle standard and an age target of 50% of the life expectancy for each asset type (this over time would produce a modeled 100% replacement for all assets within life cycle).

Based on the number of vehicles Fire currently assigns for total requirements, this replacement schedule would moderately increase asset replacement, if BCFD is to maintain the current count and cycle vehicles out based on industry standards.

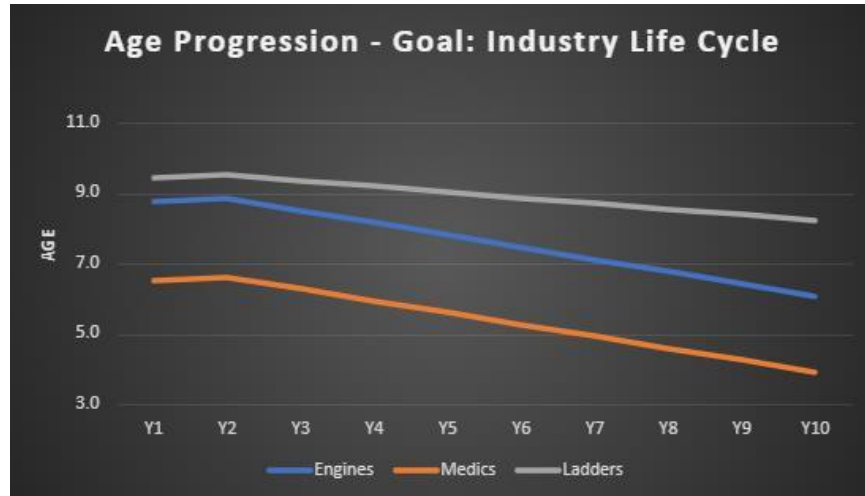
Asset Type	BCFD Requirement Count	Industry Standard Life Cycle	Annualized Requirement (Rounded)	Replacement per Year	Difference vs. Requirement
Medic	67	6	11	15	+4
Engine	55	10	6	7	+1
Ladder	30	15	2	4	+2

Funding Requirement: Funding for this scenario would require \$19.5 million in year one (repeated in out years and grown in accordance with inflation). This represents a \$7.5 million increase above baseline annualized funding of \$12 million, or a 62.5% increase driven by greater replacement across all three asset types. This level of funding may be decreased after average age meets the 50% target in out years;

additionally, the spare ratio could be decreased in this scenario given much improved reliability across the fleet, and allow for decreases to the capital replacement funding requirement over time.

Age Progression: Over a ten-year period, DGS would expect the average asset life to move towards 50% of the life cycle value for each vehicle class.

- Medic age would improve from 6.3 years to 3.9 years on average;
- Engine age would improve from 8.5 years to 6.1 years on average; and
- Ladder age would improve from 9.1 years to 8.2 years on average.



Scenario: Fire Department Proposed Life Cycle

A third replacement scenario would use age standards as identified by the Fire Department, and hold constant the assumed age target of 50% of the life expectancy for each asset type (this over time would produce a modeled 100% replacement for all assets within life cycle).

Based on the number of vehicles Fire currently assigns for total requirements, this replacement schedule would **greatly** increase asset replacement, if BCFD are to maintain the current count and cycle vehicles out based on the BCFD proposed life cycle.

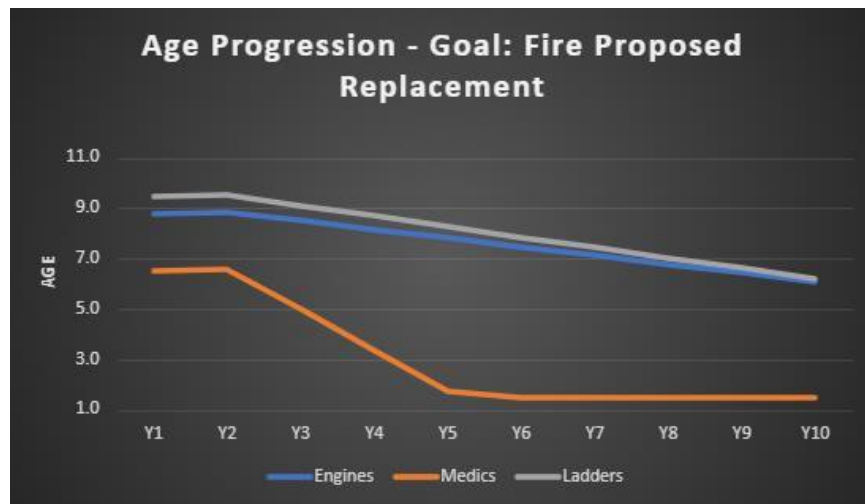
Asset Type	BCFD Requirement Count	BCFD Proposed Life Cycle	Annualized Requirement (Rounded)	Replacement per Year	Difference vs. Requirement
Medic	67	3	11	22	+11
Engine	55	10	5	7	+2
Ladder	30	10	3	4	+1

Funding Requirement: Funding for this scenario would require \$27.0 million in year one (repeated in out years and grown in accordance with inflation). This represents a \$15.0 million increase above baseline annualized funding of \$12 million, or a 125% increase, driven by the substantial increase in Medic

replacements due to the shortened life expectancy. The spare ratio could be decreased in this scenario given much improved reliability across the fleet, and allow for decreases to the capital replacement funding requirement over time.

Age Progression: Over a ten-year period, DGS projects that average Medic and Ladder truck ages to both decrease by significant amounts, and each class would set replacement earlier than industry life cycle targets; Engines would approach the industry life cycle target similar to the prior scenario.

- Engine age would improve from 8.5 years to 6.1 years on average;
- Medic age would improve from 6.3 years to 1.5 years on average; and
- Ladder age would improve from 9.1 years to 6.2 years on average.



Summary Table: Replacement Scenarios

Scenario	Replacement vs. Annualized Requirement	Increase or Reduction to Age (10 Year Change)	Annualized Added Funding Commitment (Above Baseline)
“2-4-8” Replacement	-6 vehicles	+1 Years	\$-
Industry Standard Life Cycle	+7 vehicles	-2 Years	\$7.5M
Fire Department Proposed Life Cycle	+14 vehicles	-3 Years	\$15M

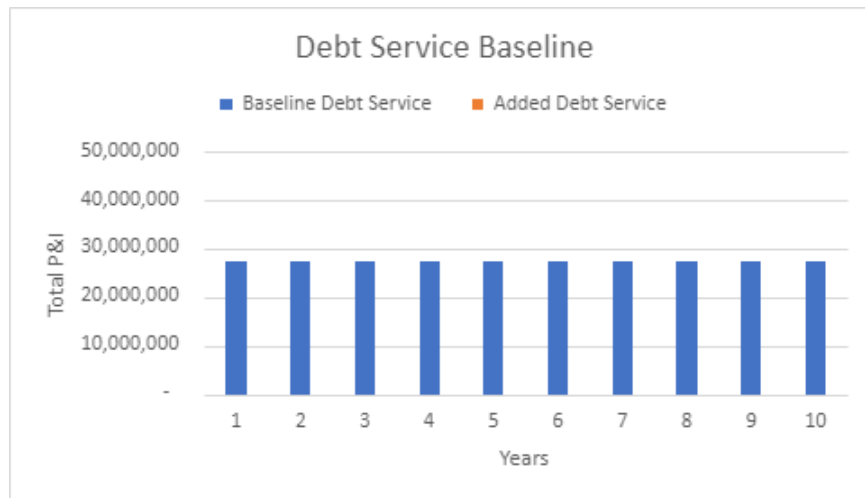
Funding: Master Lease Financing Mechanism

Within two of the three above scenarios, there would be need to increase funding to perform asset replacement, beyond current baseline. The financing mechanism available through the Master Lease (subject to citywide affordability considerations) provides a means for gradual introduction of principal and interest payments as opposed to more immediate and complete PAYGO capital contributions.

DGS would recognize this mechanism, however, would create ongoing debt service payment requirements and extend the time necessary to finance these vehicles based on each financing tranche. The following charts provide an illustration of the debt service principal and interest payment requirements under the baseline, Industry Standard, and BCFD Proposed Scenarios, with funding above current baseline identified in each chart below in orange.

Scenario 1: Baseline for debt service borrowing over 10 years

- *Note: the current citywide vehicle debt service is projected at \$27M for FY24; subsequent principal and interest payments will increase over 10 years due to significant inflationary pressure and manufacturing costs even though the “basket” of goods does not change. This debt service amount will be held constant for purposes of illustrating present value over time in comparison with added debt service from each scenario.*



Scenario 2: Industry Standard Replacement and Projected Debt Service Requirements



Scenario 3: BCFD Proposed Replacement and Projected Debt Service Requirements

