

The General Retirement System of the City of Detroit

Annual Actuarial Valuation of Component II
June 30, 2022

DRAFT





January 5, 2023

Board of Trustees
The General Retirement System of the City of Detroit

Dear Board Members:

This report provides key results from the **Annual Actuarial Valuation** of the annuity and pension liabilities of the General Retirement System of the City of Detroit – Component II benefits. The date of the valuation was **June 30, 2022**.

In very general terms, Component II provides benefits for service rendered prior to July 1, 2014. The results provided herein relate solely to the Component II benefits. Benefits provided under Component I are the subject of a separate report.

The purpose of the valuation is to measure the funding progress and to calculate the fiscal year 2024 Actuarially Determined Employer Contribution (ADEC) of Component II. Fiscal year 2024 is the first year (post-bankruptcy) the employer will be required to make actuarially determined employer contributions in accordance with the plan document. **The Board has not yet adopted a Funding Policy. As requested, and in order to help the Board and Investment Committee understand how the amortization period and method in the draft policy might affect the computed employer contribution rate, we have included three sample Fiscal Year 2024 employer contribution calculations based on three different amortizations of the Unfunded Actuarial Accrued Liability (UAAL).** We favor a policy that uses a level dollar amortization method and a period of no more than 20 years.

The results of the valuation are not applicable for other purposes. In particular, the information provided in this report is not suitable for financial reporting in connection with GASB Statement No. 67. Such information is provided in a separate report. Information regarding potential benefit restoration as allowed for in the POA will also be provided in a separate report, at the Board's request.

The contribution amounts in this report include contribution amounts from sample funding policies. Users of this report should be aware that contributing these amounts does not guarantee benefit security.

This report was prepared at the request of the Board and is intended for use by the Retirement System and those designated or approved by the Board. This report may be provided to parties other than the System only in its entirety and only with the permission of the Board. GRS is not responsible for unauthorized use of this report.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as: plan experience differing from that anticipated by the economic and demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. Due to the limited scope of the actuary's assignment, the actuary did not perform an analysis of the potential range of such future measurements.

This report was prepared using our proprietary valuation model and related software which, in our professional judgment, has the capability to provide results that are consistent with the purposes of the valuation and has no material limitations or known weaknesses. We performed tests to ensure that the model reasonably represents that which is intended to be modeled.

This valuation was based upon records maintained and furnished by the Retirement System staff concerning active members, retirees and beneficiaries, and financial accounts as of the valuation date. Data was checked for year-to-year consistency, but was not audited by the actuary. We are not responsible for the completeness or accuracy of the data. Certain necessary data was not available in time to be considered in this report and, therefore, it was necessary for us to use approximations. Please see related discussion in the Comments section as well as the Data section of this report.

The assumptions used in the valuations concerning future experience are summarized in Section D of this report. Other than the prescribed assumed rate of return, this report reflects the actuarial assumptions as adopted by the Board and the Investment Committee based on the July 1, 2015 to June 30, 2020 experience study. The assumed rate of investment return was set to 6.75% in the POA and is, therefore, a "prescribed assumption set by another party" as discussed in Actuarial Standard of Practice No. 4. We have reviewed this assumption based on the System's asset allocation and have determined it does not significantly conflict with what, in our professional judgement, would be reasonable for purposes of the measurement being taken. In our judgement, all of the other actuarial assumptions used for the valuation are also reasonable for purposes of the measurement being taken.

This report has been prepared by actuaries who have substantial experience valuing public sector retirement systems. To the best of our knowledge, this report is complete and accurate and was made in accordance with standards of practice promulgated by the Actuarial Standards Board.

Jamal Adora, Judith A. Kermans, and James R. Sparks, are Members of the American Academy of Actuaries (MAAA), and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein. The actuaries signing the report are independent of the plan sponsor.

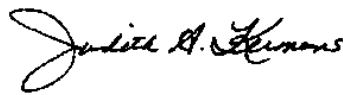


This report does not evaluate the plan sponsor's ability or willingness to make contributions to the Retirement System. Given the funded level of this plan, plan sponsor contributions are critical if further benefit reductions are to be avoided. Please note that the employer contributions set forth in the POA have (as contemplated by the POA at its outset) defunded the Plan since Bankruptcy and are expected to continue to defund the Plan through June 30, 2023, even if all assumptions are met.

Respectfully submitted,
Gabriel, Roeder, Smith & Company



Jamal Adora, ASA, EA, MAAA



Judith A. Kermans, EA, FCA, MAAA



James R. Sparks ASA, FCA, MAAA

JA/JAK/JRS:ah

DRAFT

Table of Contents

	<u>Page</u>
Section A	Valuation Results
	Executive Summary 1
	Liability by Division..... 2
	Valuation Results 3-11
	Comments 12-19
	Risks Measured 20-23
Section B	Fund Assets
	Statement of Plan Assets 24
	Market Value of Assets 25
	Allocation of Assets Used for Valuation..... 26
	Funding Value of Assets 27
Section C	Participant Data
	Reconciliation of Raw Data 28
	Reconciliation of Year-to-Year Data..... 29
	Data Approximations and Assumptions 30-31
	Summary of Member Data 32-35
	Retiree and Beneficiary Data Included in Valuation 36-37
Section D	Methods and Assumptions 38-46
Section E	Plan Provisions 47-49
Section F	Glossary 50-53
Section G	Draft Funding Policy 54-59

SECTION A

VALUATION RESULTS

DRAFT

Executive Summary

(\$ in Millions)

Valuation Date	June 30, 2022	June 30, 2021
Contributions for Fiscal Year Ending	June 30, 2024	June 30, 2023
Employer Contributions		
Actuarially Determined Employer Contribution*:	TBD^	N/A
POA Mandated:	N/A \$	48.3
Membership		
Number of:		
Active Members	1,850	2,185
Retirees and Beneficiaries	10,918	11,173
Inactive, Nonretired Members	2,633	2,645
Total	15,401	16,003
Assets		
Funding Value of Assets (FVA)	\$ 1,671.6	\$ 1,818.6
Market Value of Assets (MVA)	\$ 1,529.8	\$ 1,818.6
Return on Funding Value (net of all expenses)	2.58 %	N/A
Return on Market Value (net of all expenses)	(5.77)%	27.84 %
Actuarial Information (FVA)		
Actuarial Accrued Liability (AAL)	\$ 2,438.6	N/A
Unfunded Actuarial Accrued Liability: (AAL) - (FVA)	767.0	N/A
Funded Ratio: (FVA) / (AAL)	68.55 %	N/A
Actuarial Information (MVA)		
Actuarial Accrued Liability (AAL)	\$ 2,438.6	\$ 2,542.6
Unfunded Actuarial Accrued Liability: (AAL) - (MVA)	908.8	724.0
Funded Ratio: (MVA) / (AAL)	62.73 %	71.53 %

*Total employer contributions, including amounts paid by the employer but funded from other sources as required by POA, if any.

^To Be Determined for Final version of Valuation Report.

Fiscal year 2024 is the first year (post-bankruptcy) the employer will be required to make actuarially determined employer contributions in accordance with the plan document. **The Board has not yet adopted a Funding Policy. As requested, and in order to help the Board and Investment Committee understand how the amortization period and method in the draft policy might affect the computed employer contribution rate, we have included three sample Fiscal Year 2024 employer contribution calculations based on three different amortizations of the Unfunded Actuarial Accrued Liability (UAAL).**

Liability by Division

(\$ Thousands)

	General	D.O.T.	DWSD	Library	Totals
Accrued Pension Liabilities					
Retirees and beneficiaries	\$ 997,086	\$ 280,212	\$ 529,523	\$ 49,383	\$ 1,856,204
Inactive members future deferred pensions	112,120	29,617	65,672	5,169	212,578
Active members	106,168	38,098	23,342	15,823	183,431
Total accrued pension liabilities	\$ 1,215,374	\$ 347,927	\$ 618,537	\$ 70,375	\$ 2,252,213
Pension fund balance#	748,392	76,824	575,448	74,904	1,475,568
Unfunded accrued pension liabilities	\$ 466,982	\$ 271,103	\$ 43,089	\$ (4,529)	\$ 776,645
Accrued Annuity Liabilities					
Retirees and beneficiaries#	\$ 52,291	\$ 9,860	\$ 29,835	\$ 3,007	\$ 94,993
Members annuities & future refunds	49,966	19,127	14,937	7,365	91,395
Total accrued annuity liabilities	\$ 102,257	\$ 28,987	\$ 44,772	\$ 10,372	\$ 186,388
Annuity fund balances	28,051	17,394	3,460	5,373	54,278
Unfunded accrued annuity liabilities#	\$ 74,206	\$ 11,593	\$ 41,312	\$ 4,999	\$ 132,110
Totals					
Actuarial Accrued Liabilities	\$ 1,317,631	\$ 376,914	\$ 663,309	\$ 80,747	\$ 2,438,601
Market Value of Assets	776,443	94,218	578,908	80,277	1,529,846
Unfunded Actuarial Accrued Liabilities	\$ 541,188	\$ 282,696	\$ 84,401	\$ 470	\$ 908,755
Funded Ratio	58.9%	25.0%	87.3%	99.4%	62.7%

Totals may be off slightly due to rounding.

The pension fund balance includes a receivable of approximately \$95.7 million for future claw-back payments.
Liabilities are shown gross, before the annuity savings claw-back.



Valuation Results

Required contributions to the Plan through FY 2023 are provided in the POA. The schedule below details our understanding of the remaining contributions required by the POA.

Contribution Source (\$ Millions)								
Fiscal Year	For DWSD Liabilities		For Other Liabilities					Total
	DWSD Transfers		UTGO	State	DIA	Other	Transfers from DWSD	
2023	\$ 45.4	\$ (2.5)	\$ -	\$ -	\$ 0.4	\$ 2.5	\$ 2.5	\$ 48.3

We have assumed the contributions outlined above as called for in the POA (with adjustments) will not change. An estimate of the probability of those payments being made was outside the scope of this project, not required by Actuarial Standards, and, therefore, was not made.

In order to develop divisional valuation results in accordance with POA provisions, we allocated the above contributions to the various divisions as instructed by the Retirement System staff. This was done by allocating DWSD transfer amounts to the General City division and remaining DWSD contributions to the DWSD division; allocating \$2.5 million per year to the Library; and allocating remaining contributions to DOT and General in proportion to their unfunded liabilities as of June 30, 2022.

The chart below shows this allocation.

	(\$ Thousands)					
	General	D.O.T.	Gen. + D.O.T. Subtotal	Library	DWSD	Totals
Unfunded Liabilities (6/30/2022)	\$ 541,187	\$ 282,695	\$ 823,882	\$ 471	\$ 84,400	\$ 908,753
% of Subtotal	65.7%	34.3%	100.0%	N/A	N/A	
 FY 2023 Contributions	 \$ 237	 \$ 138	 \$ 375	 \$ 2,500	 \$ 45,400	 \$ 48,275
Transfers	2,500	-	2,500	-	(2,500)	-
FY 2023 UAAL Contributions	\$ 2,737	\$ 138	\$ 2,875	\$ 2,500	\$ 42,900	\$ 48,275

A different allocation procedure would produce different results.

Valuation Results (Continued)

Sample Actuarially Determined Employer Contributions (ADEC)

	(\$ Millions)				
	General City	D.O.T.	DWSD	Library	System Total
Actuarial Accrued Liability	\$ 1,317.6	\$ 376.9	\$ 663.3	\$ 80.7	\$ 2,438.6
Funding Value of Assets (FVA)	848.4	102.9	632.6	87.7	1,671.6
UAAL ¹ as of June 30, 2022	\$ 469.2	\$ 274.0	\$ 30.7	\$ (7.0)	\$ 767.0
Anticipated POA Contribution (EOY)	(2.7)	(0.1)	(42.9)	(2.5)	(48.3)
Anticipated Expenses ²	2.0	0.4	-	0.1	2.4
Interest at 6.75%	31.7	18.5	2.1	(0.5)	51.9
Projected UAAL as of June 30, 2023	\$ 500.2	\$ 292.7	\$ (10.1)	\$ (9.9)	\$ 773.0

Estimated Employer Contributions for FY 2024³

Sample: 20-Year Level Dollar

UAAL Contribution	\$ 46.3	\$ 27.1	\$ (0.9)	\$ (0.9)	\$ 71.6
\$0 Minimum UAAL Contribution	46.3	27.1	-	-	73.4
Administrative Expense Contribution ⁴	1.4	0.4	0.7	0.1	2.5
Total Contribution	\$ 47.7	\$ 27.5	\$ 0.7	\$ 0.1	\$ 75.9

Sample: 30-Year Level Principal (POA)

UAAL Contribution	\$ 50.4	\$ 29.5	\$ (1.0)	\$ (1.0)	\$ 77.9
\$0 Minimum UAAL Contribution	50.4	29.5	-	-	79.9
Administrative Expense Contribution ⁴	1.4	0.4	0.7	0.1	2.5
Total Contribution	\$ 51.8	\$ 29.9	\$ 0.7	\$ 0.1	\$ 82.4

Sample: 30-Year Level Dollar⁵

UAAL Contribution	\$ 39.3	\$ 23.0	\$ (0.8)	\$ (0.8)	\$ 60.7
\$0 Minimum UAAL Contribution	39.3	23.0	-	-	62.3
Administrative Expense Contribution ⁴	1.4	0.4	0.7	0.1	2.5
Total Contribution	\$ 40.7	\$ 23.4	\$ 0.7	\$ 0.1	\$ 64.8

Totals may not add due to rounding.

¹ Unfunded Actuarial Accrued Liability in accordance with the draft Funding Policy including the use of the Funding Value of Assets (FVA) shown in Section G.

² Administrative expenses for DWSD are paid by General City through 2023.

³ Total employer contributions, including amounts paid by the employer but funded from other sources as required by POA, if any. Employer contributions are assumed to be made at the end of the fiscal year.

⁴ FY 2024 and later administrative expenses were allocated (see Section D of the report) and anticipated to be paid by the individual units.

⁵ **The use of a 30-year level dollar amortization significantly increases the risk of the Plan becoming insolvent (running out of money) compared to the use of a 20-year level dollar or 30-year level principal amortization. This scenario is included at Retirement System's request. Contributions based on the amortization method and period are significantly less than the contributions based on the amortization method and period contemplated in the POA (30-year level principal).**

Valuation Results (Continued)

Actuarially Determined Employer Contributions (ADEC) (Continued)

Fiscal year 2024 is the first year (post-bankruptcy) the employer will be required to make actuarially determined employer contributions in accordance with the plan document. **The Board has not yet adopted a Funding Policy. As requested, and in order to help the Board and Investment Committee understand how the amortization period and method in the draft policy might affect the computed employer contribution rate, we have included three sample Fiscal Year 2024 employer contribution calculations based on three different amortizations of the Unfunded Actuarial Accrued Liability (UAAL).**

We understand the Employer has set aside some money to contribute to the Pension Plans at some point in the future. This valuation does not reflect any of those assets since they are not being held within the Retirement System trust.

Since the FY 2023 POA contribution is significantly less than the actuarially determined amount would have been, the funding ratio is expected to continue to decline between now and June 30, 2023. In fact, the anticipated POA contribution for FY 2023 is less than the interest that will accrue on the UAAL and about one-quarter of the annual benefit payments.

It may become difficult to manage the significant amount of cash needed to pay retirement benefits in this plan under a 30-year level dollar amortization method. **The use of a 30-year level dollar amortization significantly increases the risk of the Plan becoming insolvent (running out of money) compared to the use of a 20-year level dollar or 30-year level principal amortization.**

The charts that follow show projections of the funded status and employer contributions under a 20-year level dollar, 30-year level principal, and 30-year level dollar policy starting in FY 2024 using both the Funding Value of Assets (FVA) and the Market Value of Assets (MVA). For purposes of these projections, we have assumed the objective would be for each group (General City, DOT, DWSD, and Library) to separately fund their UAAL. **These projections assume that if any division's assets deplete, no extra contributions will be assessed. Separately assessing extra contributions by divisions may result in a different projected total employer contribution than those shown here.** We have also assumed that each group would have a \$0 minimum UAAL contribution. We will continue to work with the Board and Investment Committee to develop a funding policy. For the projections in this report, we note the following:

- Under the FVA projections, the DWSD and Library groups are projected to be more than 100% funded on June 30, 2023.
- Starting in FY 2024 the only contributions for divisions that are more than 100% funded is for administrative expenses (in accordance with the draft funding policy included in the appendix).
- For divisions that are projected to be over 100% funded on June 30, 2023, the funded ratio is projected to continue growing.
- Under the FVA projections, the funded ratio for DOT is projected to be 20% funded on June 30, 2023. We note the following implication of the low DOT funded status.
 - Under the 30-Year Level Principal method, the funded status for DOT is projected to fall below 15% on June 30, 2040.
 - Under the 30-Year Level Dollar method, the assets allocated for DOT are projected to be depleted by June 30, 2032. At that point, we have assumed that DOT would not be responsible for making additional contributions equal to the benefit payments, and would therefore have a negative asset balance for a period of time.

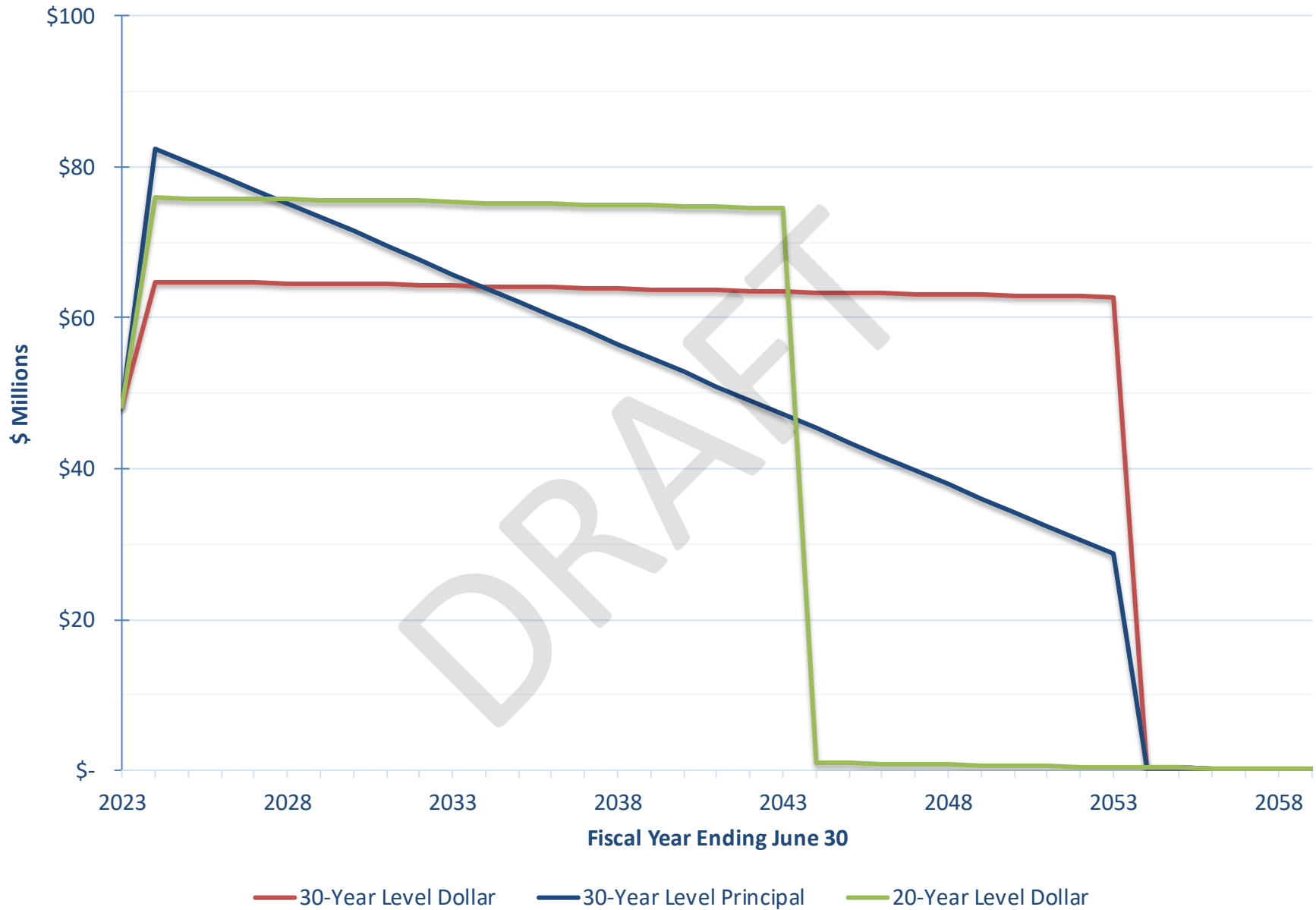
Valuation Results (Continued)

Actuarially Determined Employer Contributions (ADEC) (Concluded)

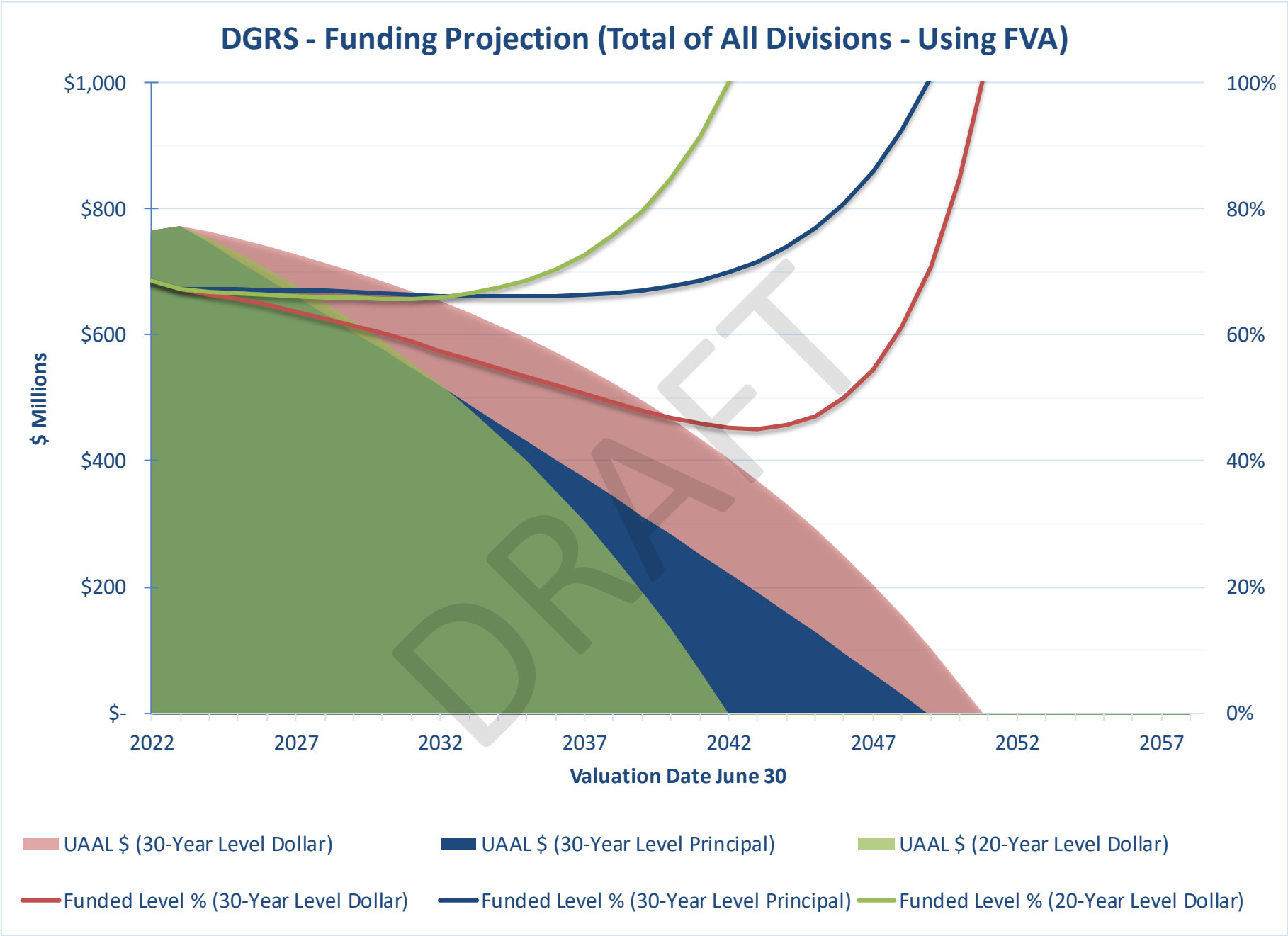
- Under the FVA projections, the projected UAAL contributions for DWSD decrease to \$0 beginning in FY 2024 in this valuation (there is a small contribution requirement for administrative expenses). At any point in the future, plan experience may result in an unfunded actuarial accrued liability for DWSD. In addition, under a different assumption set (such as a lower assumed rate of return), the DWSD may have an unfunded actuarial accrued liability. We understand that the City, System and GLWA have a Memorandum of Understanding dated December 1, 2015 for assessing contributions, if any, to GLWA. This report does not reflect that agreement.

DRAFT

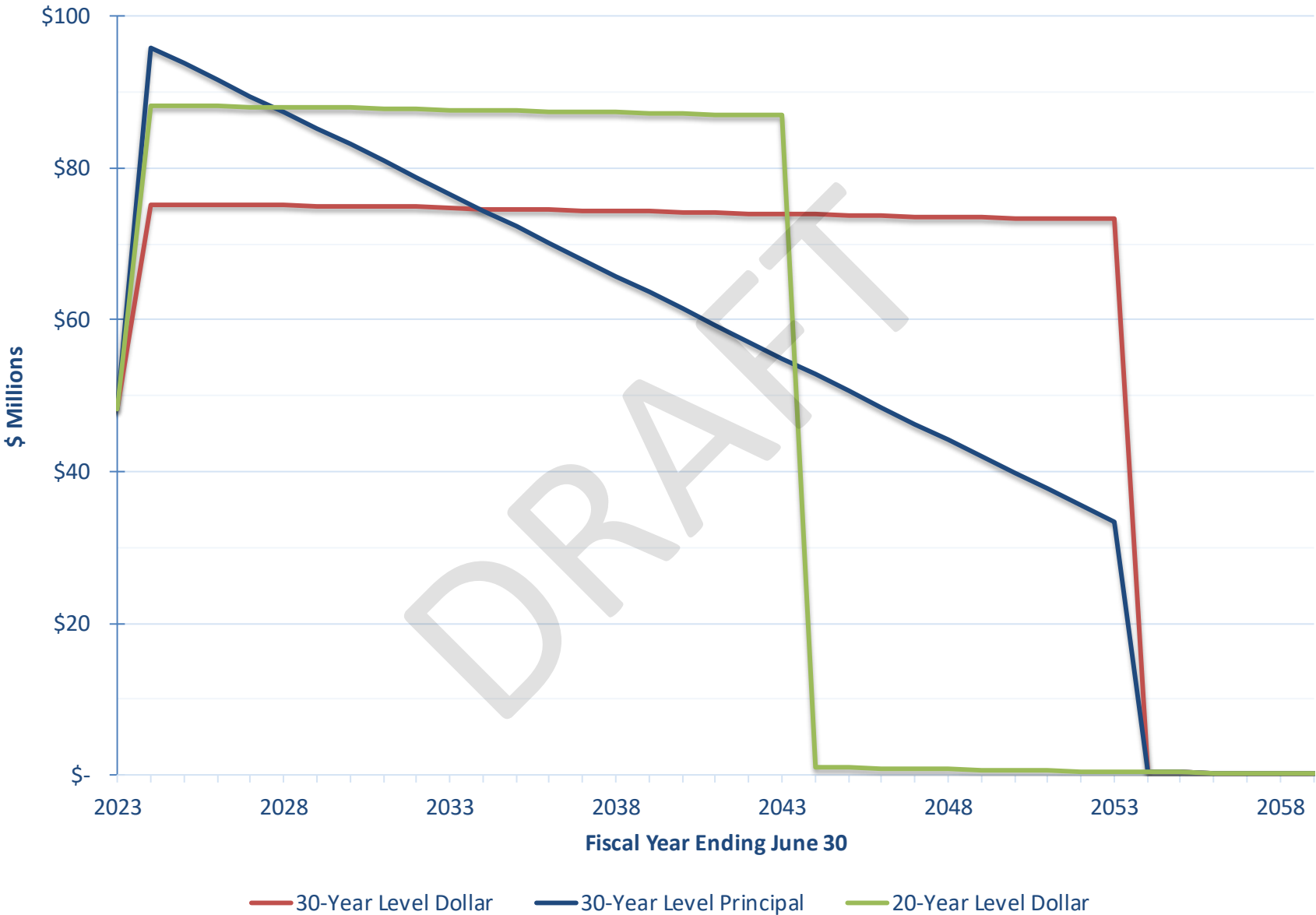
DGRS - Employer Contributions (Total of All Divisions - Using FVA)



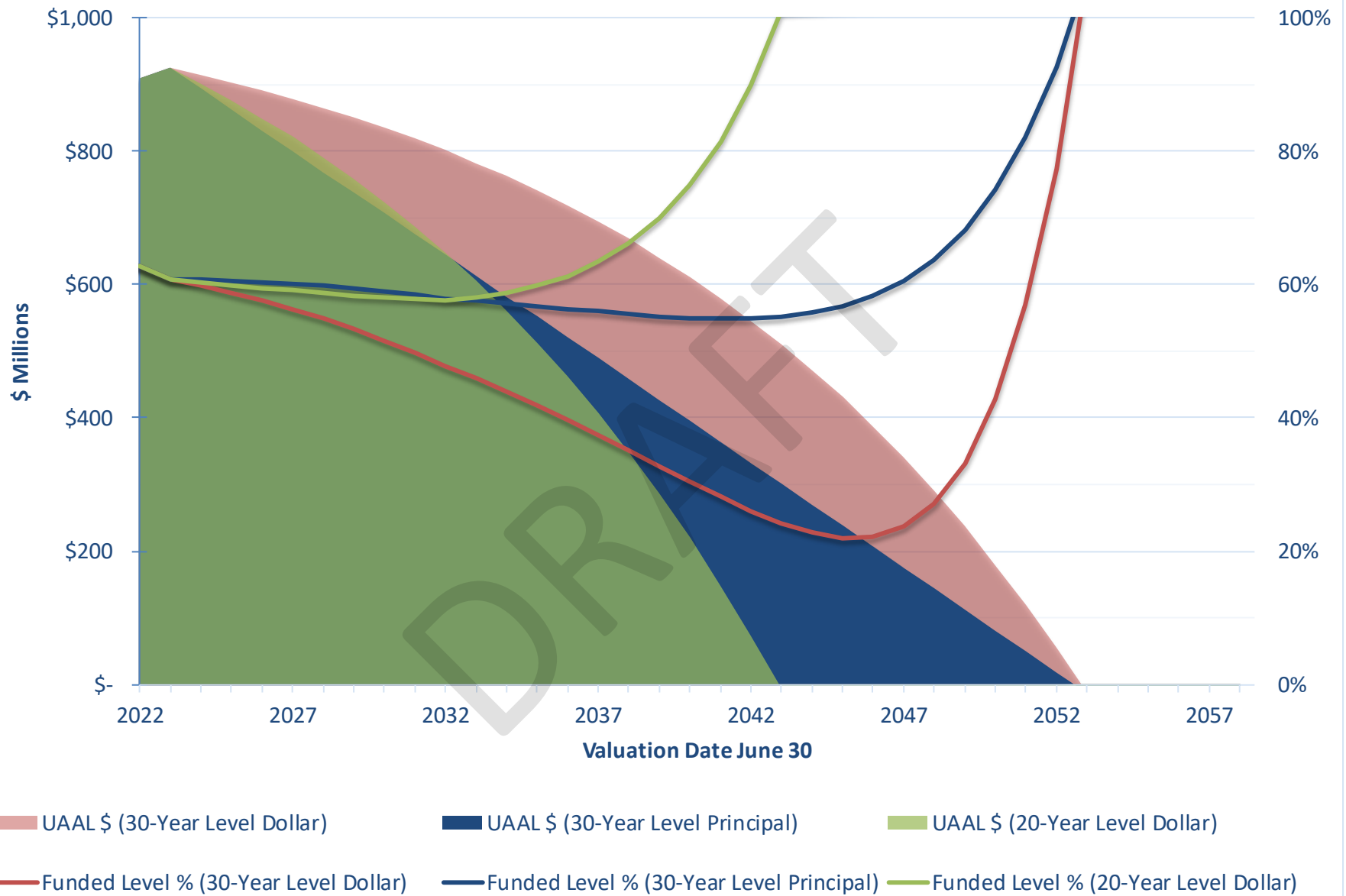
DGRS - Funding Projection (Total of All Divisions - Using FVA)



DGRS - Employer Contributions (Total of All Divisions - Using MVA)



DGRS - Funding Projection (Total of All Divisions - Using MVA)



Valuation Results (Concluded)

Present Value	June 30, 2022	June 30, 2021
Accrued Pension Liabilities (Employer Financed)		
Retirees and beneficiaries	\$ 1,856,204,265	\$ 1,915,878,072
Inactive members future deferred pensions	212,577,507	214,790,496
Active members	183,430,716	209,090,483
Total accrued pensions	\$ 2,252,212,488	\$ 2,339,759,051
Pension fund balances	1,475,568,437	1,741,300,968
Unfunded accrued pension liabilities	\$ 776,644,051	\$ 598,458,083
Accrued Annuity Liabilities (Member Financed)		
Retirees and beneficiaries		
Future annuities	\$ 94,991,973	\$ 98,087,136
Member annuities & future refunds	91,394,995	104,783,035
Total accrued annuity liabilities	\$ 186,386,968	\$ 202,870,171
Annuity fund balances	54,277,858	77,348,330
Unfunded accrued annuity liabilities*	\$ 132,109,110	\$ 125,521,841
Totals		
Actuarial Accrued Liabilities (AAL)	\$ 2,438,599,456	\$ 2,542,629,222
Market Value of Assets (MVA)	1,529,846,295	1,818,649,298
Unfunded Actuarial Accrued Liabilities (UAAL)	\$ 908,753,161	\$ 723,979,924
POA Funded Status	62.7%	71.5%

* Liabilities are gross before accounting for ASF claw-back. Assets currently include a receivable of approximately \$95.7 million related to the ASF claw-back. We believe the receivable is included in the pension fund balances.

Historical Results (\$ Millions)							
	2020	2019	2018	2017	2016	2015	2014
Total AAL	\$ 2,716.5	\$ 2,866.1	\$ 2,929.1	\$ 2,995.8	\$ 3,032.3	\$ 3,139.1	\$ 3,222.4
MVA	1,596.1	1,798.9	1,940.6	1,966.7	1,933.5	2,131.3	2,015.2
UAAL	\$ 1,120.4	\$ 1,067.2	\$ 988.4	\$ 1,029.1	\$ 1,098.8	\$ 1,007.8	\$ 1,207.1
POA Funded Status	58.8%	62.8%	66.3%	65.6%	63.8%	67.9%	62.5%

Comments

Component II History

The City of Detroit filed for bankruptcy on July 18, 2013. A final Plan of Adjustment (“POA”) was confirmed on November 7, 2014 and the official exit from bankruptcy was on December 10, 2014. In connection with the POA, very significant changes were made to the benefits that the General Retirement System provides and to the contributions that it will receive. In particular, the benefits provided by the Retirement System were divided into two separate plans, referred to as “Component I” and “Component II.” The benefits provided in each component were effective July 1, 2014 and are described in detail in the Emergency Manager Order No. 44, dated December 8, 2014.

Experience

Experience was less favorable than assumed during the year ending June 30, 2022. The chart below shows the estimated loss by division.

Development of Actuarial Gain or Loss

(\$ Millions)

	General City	D.O.T.	DWSD	Library	System Total
(1) UAAL as of June 30, 2021 (BOY)	\$ 416.4	\$ 257.2	\$ 56.3	\$ (5.9)	\$ 724.0
(2) Actual POA Contribution (EOY)	2.8	0.1	42.9	2.5	48.3
(3) Administrative Expenses	2.2	0.2	-	0.1	2.5
(4) Interest at 6.75%	28.2	17.4	3.8	(0.4)	49.0
(5) Benefit Changes	-	-	-	-	-
(6) Assumption Changes	-	-	-	-	-
(7) Projected UAAL* as of June 30, 2022	\$ 444.0	\$ 274.7	\$ 17.2	\$ (8.7)	\$ 727.2
(8) Actual UAAL* as of June 30, 2022	541.2	282.7	84.4	0.5	908.8
Gain or Loss (MVA): (7) - (8)	\$ (97.2)	\$ (8.0)	\$ (67.2)	\$ (9.1)	\$ (181.6)
Gain or Loss from Excess Interest Transfers (Inc. FY 2021)	\$ 0.5	\$ 0.4	\$ 0.2	\$ -	\$ 1.2
Gain or Loss from Liabilities	14.0	5.4	9.0	1.6	30.0
Gain or Loss from Investments (MVA)	(111.8)	(13.8)	(76.4)	(10.7)	(212.7)
Total Gain or Loss (MVA)	\$ (97.2)	\$ (8.0)	\$ (67.2)	\$ (9.1)	\$ (181.6)
MVA to FVA Adjustment	72.0	8.7	53.7	7.4	141.8
Total Gain or Loss (FVA)	\$ (25.2)	\$ 0.7	\$ (13.5)	\$ (1.7)	\$ (39.8)

* Unfunded actuarial accrued liability.

Comments

Experience (Continued)

Source of Actuarial Gain or Loss

Type of Risk Area	Gain (Loss) in Period	
	Totals (\$ in Millions)	Percent of AAL [^]
Data Improvements	\$ 6.0	0.2 %
ASF Transfers	\$ -	0.0 %
Excess Interest Transfers (Inc. FY 2021)	\$ 1.2	0.0 %
Risks Related to Experience		
Economic Risk Areas:		
Investment Return (MVA)*	\$ (212.7)	(8.4)%
Demographic Risk Areas:		
Full and Reduced Service Retirements	(1.3)	(0.1)%
Death Benefits	0.1	0.0 %
Disability Benefits	-	0.0 %
Other Terminations	5.4	0.2 %
Post-Retirement Mortality	19.7	0.8 %
Total Gain or Loss Related to Experience	\$ (188.8)	(7.4)%
Total Gain or Loss During Period (MVA)	\$ (181.6)	(7.1)%
Total Gain or Loss During Period (FVA)	\$ (39.8)	(1.6)%

[^] Beginning of year Actuarial Accrued Liabilities were \$2,542.6 million.

* The loss in investment return on a FVA basis was \$70.9 million.

Demographic Experience

	Number Count		A/E%
	Actual A	Expected E	
Retirement (including early)	130	106	122%
Disability	0	8	0%
Vested Terminations	161	71	228%
Other Terminations (including pre-retirement death)	90	24	382%
Post-Retirement Death	642	480	134%

Expected counts are based on the assumptions used in the prior valuation.

In the last couple of years, we have seen higher terminations than expected. We have not yet determined if this is a long-term trend. Furthermore, we continue to see active members added to the Legacy data. We have assumed these were either data corrections or re-hires. We have observed this every year since 2014. The change this year is included in the "Data Improvements" source of gains/losses shown above. This year, 46 members were added as active members to this plan. This resulted in an increase in accrued liabilities (a loss) of approximately \$0.6 million, after accounting for members that were known to come from the deferred and retiree rolls.

Comments (Continued)

Experience (Concluded)

The chart below reconciles our estimate from the June 30, 2021 valuation to our calculation from this valuation (June 30, 2022).

The June 30, 2022 loss, primarily due to investments losses, created upward pressure on the FY 2024 employer contribution.

Reconciliation of June 30, 2024 UAAL Contributions – 30-Year Level Principal (\$ Millions)

	General					System
	City	D.O.T.	DWSD	Library	Total*	
Estimated FY 2024 UAAL Contribution from 2021 Valuation	\$ 47.7	\$ 29.6	\$ (2.5)	\$ (1.2)	\$ 73.6	
Gain or Loss from Investments (MVA basis)	12.0	1.5	8.2	1.2	22.9	
Gain or Loss from Excess Interest Transfers (Inc. FY 2021)	(0.1)	-	-	-	(0.1)	
Gain or Loss from Liabilities	(1.5)	(0.6)	(1.0)	(0.2)	(3.2)	
FY 2024 UAAL Contribution Using MVA	\$ 58.2	\$ 30.5	\$ 4.8	\$ (0.2)	\$ 93.2	
MVA to FVA Adjustment	(7.7)	(0.9)	(5.8)	(0.8)	(15.3)	
Adjustment for \$0 minimum	-	-	1.0	1.0	2.0	
FY 2024 UAAL Contribution Using FVA	\$ 50.4	\$ 29.5	\$ -	\$ -	\$ 79.9	

* Totals may not add due to rounding.

Reconciliation of June 30, 2024 UAAL Contributions – 30-Year Level Dollar (\$ Millions)

	General					System
	City	D.O.T.	DWSD	Library	Total*	
Estimated FY 2024 UAAL Contribution from 2021 Valuation	\$ 37.2	\$ 23.1	\$ (1.9)	\$ (0.9)	\$ 57.4	
Gain or Loss from Investments (MVA basis)	9.4	1.2	6.4	0.9	17.8	
Gain or Loss from Excess Interest Transfers (Inc. FY 2021)	-	-	-	-	(0.1)	
Gain or Loss from Liabilities	(1.2)	(0.5)	(0.8)	(0.1)	(2.5)	
FY 2024 UAAL Contribution Using MVA	\$ 45.3	\$ 23.7	\$ 3.7	\$ (0.2)	\$ 72.6	
MVA to FVA Adjustment	(6.0)	(0.7)	(4.5)	(0.6)	(11.9)	
Adjustment for \$0 minimum	-	-	0.8	0.8	1.6	
FY 2024 UAAL Contribution Using FVA	\$ 39.3	\$ 23.0	\$ -	\$ -	\$ 62.3	

* Totals may not add due to rounding.



Comments (Continued)

Actuarial Assumptions

We understand that the Board may continue to explore changes in the assumed rate of return. However, per legal counsel, we also understand that for the annual actuarial valuation the 6.75% assumed rate of return cannot be changed until the June 30, 2024 valuation, including for purposes of calculating the actuarially determined contribution. We anticipate the next comprehensive review of experience to cover the period from July 1, 2020 to June 30, 2025.

Service Credit on Workshare

We understand that the bankruptcy court has granted a change to the Component I (Hybrid) Plan to allow members in workshare to get credit for that time. Since the Legacy (Component II) plan benefits are frozen as of June 30, 2014, the change only effects the vesting/eligibility service in the Legacy (Component II) plan. This may allow some of the members valued to retire a few months earlier. While we do not have final data to evaluate the impact of this change, based on our analysis dated May 13, 2022, we believe the impact on the Component II (Legacy) plan is not material (less than 0.01% of total liabilities).

Reasonable Actuarially Determined Employer Contribution

Upcoming actuarial standards will require that an actuary calculate and disclose a reasonable actuarially determined contribution. We have not assessed whether any of the sample contribution amounts in this report fulfill the requirement of a reasonable actuarially determined contribution.

Annuity Reserve Fund (ARF)

Typically, we would compare the Annuity Reserve Fund (ARF) to the ARF liabilities and recommend a transfer if liabilities exceed assets. However, the annuity claw-back receivable created by the Bankruptcy (which relates to the ARF and the ASF) makes this analysis much more complicated. If the System would like us to perform this calculation, we will need additional information not routinely provided for the valuation. Please let us know if this is needed.

In general, assets were reviewed for reasonableness. During that review, we discovered that the ARF does not appear to have been credited with any interest. As a result, we recommend that all the reserve amounts be reviewed.

Annuity Savings Fund (ASF) Claw-Back Data

For the June 30, 2015 valuation, the System's auditors determined a receivable in accordance with GAAP accounting that was included in the reported June 30, 2015 assets. The reported assets for the June 30, 2022 status valuation also included a receivable for the remaining claw-back payments. We have assumed this information, received by the System's auditors, was reasonable. This assumption complies with the Actuarial Standards of Practice.

Comments (Continued)

Annuity Savings Fund (ASF) Interest Credits

The ASF fund is credited with the lesser of 5.25% interest and the total fund earnings. We understand that any earnings in excess of 5.25% (that otherwise would have been credited to the ASF fund if not for the 5.25% cap) will be transferred to Component I assets, to the extent needed, for funding of transition liability. Since ASF liabilities are equal to ASF balances, we did not model any such future excess earnings as part of this valuation. However, since the fund earned 28% during FY 2021, we expect that there will be a transfer of excess ASF interest in FY 2023 related to last year's performance. Approximately \$20.6 million was added to the liabilities in this report to account for anticipated excess earnings expected to occur as a result of return on assets in the 2021 fiscal year. No additional liabilities were included in this report to account for anticipated excess earnings expected to occur as a result of return on assets. We have discussed the potential for additional liability with the Plan's accountants and have been instructed that the excess earnings should not be included as a liability in the GASB Statement Nos. 67 and 68 reports.

We understand that the System has adopted a procedure for computing the ASF interest credits lagging the actual experience of the assets. We have not reviewed or audited this procedure. If the Retirement System can provide the methodology for determining the transfer, we may be able to reflect the Retirement System's methodology.

As of June 30, 2021, it appears that Component I may be fully funded under a 0.0% assumed Variable Pension Improvement Factor (VPIF). There does not currently exist a policy that allocates that unfunded amount between Transition Costs and non-Transition Costs. Since future excess interest transfers are affected by whether or not the Transition Costs are fully funded, we recommend that the Board adopt a method of allocating any unfunded amounts (after exclusion of the Rate Stabilization Fund (RSF)) between Transition Costs and other liabilities. If the Board wishes, we can work with legal counsel and suggest a few methods for consideration and discuss the advantages and disadvantages with the Board. For purposes of this valuation we have assumed the Component I Transition Cost is fully funded as of June 30, 2021. For Component II, this assumption only affects ASF Return Excess transfers calculated starting with the June 30, 2022 valuation.

Comments (Continued)

Estimated Excess Interest Transfers

Fiscal Year	FY 2 Years Prior to Transfer					Investment		Estimated		Resulting	Assets to be
	Transfer is	ASF Balance	Assumed ASF	ASF Balance	Estimated	Return Excess	ASF Return	Component I	Funded	Percent	Transferred
Expected	BOY	Payment	EOY	Year	Return	Percent	Excess	Transition Cost	Status	Transfer	Out (BOY)
(A)	(B)	(C)	(D)	(E)	(F)	(G) = (F) - 5.25%	(H) = (G) x (B)	(I)		(J)	(K) = (H) x (J)
2023	\$ 91,394,995	\$ 11,677,579	\$ 84,213,037	2021	27.84%	22.59%	\$ 20,646,129	<100%		100%	\$20,646,129
2024	84,213,037	11,677,579	76,654,027	2022	-5.77%	0.00%	\$ -	>=100%		50%	\$ -

We understand this calculation will be performed by staff and may be different than shown above. The estimates above are used to approximate the effect on UAAL.

Section E-16(c) of the Combined General Plan is shown below:

In any Plan Year during the period beginning on or after July 1, 2014 and ending June 30, 2023 in which the annual rate of return credited to the accounts of members investing in the Annuity Savings Fund as provided in paragraph (b) is less than the actual rate of return net of expenses of the Retirement System's invested assets for the second Plan Year immediately preceding the Plan Year in which the annual rate of return is credited ("ASF Return Excess"), an amount equal to the value of the ASF Return Excess shall be transferred to the Pension Accumulation Fund maintained under Component I of the Combined Plan and shall be used to fund the Transition Cost relating to Component I. The Transition Cost is a measure of the liability that Component I of the Retirement System has at its inception; due to the fact that at its inception, members in Component I of the Retirement System receive vesting and eligibility credit under Component I for service that was earned prior to July 1, 2014 and is otherwise credited to members under Component II of the Retirement System. Transition Cost is calculated by the Plan Actuary. In the event there is an ASF return excess for a Plan Year following the Plan Year in which such transfers have fully funded the Transition Costs relating to Component I, fifty percent (50%) of such ASF Return Excess shall be transferred to the Pension Accumulation Fund maintained under Component II and the remaining fifty percent (50%) of such ASF Return Excess shall be transferred to Component I and credited to the Rate Stabilization Fund maintained under Component I. "Transition Cost" shall be determined by the Plan Actuary.

Comments (Continued)

Option Factors

The Board adopted option factors for the Plan in 2018 but they have not been implemented. We have not been provided with a specific effective date for the new factors. However, we understand the intent is to implement the new factors with the new data system. For the sake of simplicity, we have assumed the new factors apply to all retirements after the valuation date. We will continue to work with the System in the calculation of optional forms of payment. In particular, the Board may want to consider updating the assumptions used in optional forms of payment in order to recognize recent changes to the assumptions used in the annual actuarial valuations.

DWSD Members

For the June 30, 2017 valuation we received a separate file indicating the June 30, 2014 DWSD status of members. Any members that were indicated as being DWSD division members on that file were valued under the DWSD for this valuation, regardless of the division reported on this year's valuation data.

New Data System

We understand that the Retirement System is in the process of moving to a new data system and that future valuation data will be provided from that system beginning with the 2023 valuation. We also understand that data may have gone through additional cleaning/auditing as it has been entered into the new system. We anticipate that data will be more precise for valuation purposes once the new system is providing that data. Please note that changes in data may impact future valuation results and generate gains or losses.

Restoration

This valuation assumes no future restoration of Component II benefits (consistent with the expectation of the POA). Any future restoration will be reflected beginning in the next valuation after being granted.

DWSD (Water/Sewer) Contributions

The DWSD contributions and liabilities determined in this report do not consider the separation of DWSD-R and GLWA from the DWSD. For the illustrative employer contributions in this report, we have assumed that contributions would be assessed to the City based on the total unfunded liability for DWSD and without regard to any contribution agreement with GLWA. Our understanding is that the split of DWSD liabilities between DWSD-R and GLWA will be determined by the System's staff under previously established procedures.

We recommend that the proposed administrative expense contribution for DWSD be reviewed in the context of the 2015 agreement between the City, the Retirement System, and the Great Lakes Water Authority. We further recommend that the Retirement System inform us of how the administrative expense contribution for DWSD should be treated.

Comments (Concluded)

Divisional Results

Divisional results are shown on page 2. One result that stands out is the funded status (market value basis) of the DOT division at 25%. This is much lower than the other divisions. We expect that all of the assets in the Retirement System back all of the liabilities in the Retirement System. Therefore, if this division runs out of money before all of its benefits are paid, the Retirement System will pay DOT benefits from other divisional assets. In that case, the total Retirement System funded status is a better measure than individual division funded ratios. However, the manner in which divisional contributions have historically been determined treats each division as a standalone plan for the purpose of determining the actuarially determined employer contribution. Assuming the Board continues this method for Fiscal Year 2024 (the first year actuarially determined employer contributions are assessed to the employer), this low funded status for the DOT (relative to the other divisions) could result in a higher DOT employer contribution (relative to the other divisions). The Board may also want to consider a more aggressive funding policy for the DOT division if they want to avoid using other divisional assets to pay DOT benefits. Please let us know if the Board would like us to do any special projects related to this situation, such as divisional cash flow projections or divisional funding policy suggestions.

Funded Status of the Plan

The Retirement System was defunded because the POA mandated contributions were significantly less than what the actuarially computed contribution would have been for the 10-year period after the POA was established. We would be happy to assist the Board in determining what the funded status would be if actuarially determined contributions had been made in the 10-year period after the POA was established.

Future Results

In order to minimize the risk of insolvency, it is important that an adequate funding policy be adopted and that employer contributions in an amount greater than or equal to the actuarially determined amount (in accordance with that adequate policy) are received.

Conclusion

It is likely that the funded status will decline and the unfunded actuarial accrued liability will increase between now and June 30, 2023. On a market value basis, the funded status is projected to decline to approximately 61% as of June 30, 2023 if the market rate of return equals 6.75% and all other assumptions are met.

Recommendation

We recommend that every potential action be taken to generate contributions to the Retirement System above those provided in the POA in FY 2023. Benefit payments to retirees in the Plan were almost \$236 million compared to the FY 2022 contribution of \$48.3 million.

We additionally recommend that the Board and Investment Committee adopt a funding policy that adequately funds the plan.



Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution

The determination of the accrued liability and the actuarially determined contribution requires the use of assumptions regarding future economic and demographic experience. Risk measures, as illustrated in this report, are intended to aid in the understanding of the effects of future experience differing from the assumptions used in the course of the actuarial valuation. Risk measures may also help with illustrating the potential volatility in the accrued liability and the actuarially determined contribution that result from the differences between actual experience and the actuarial assumptions.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions due to changing conditions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period, or additional cost or contribution requirements based on the Plan's funded status); and changes in plan provisions or applicable law. The scope of an actuarial valuation does not include an analysis of the potential range of such future measurements.

Examples of risk that may reasonably be anticipated to significantly affect the plan's future financial condition include:

1. **Investment Risk** – actual investment returns may differ from the expected returns;
2. **Asset/Liability Mismatch** – changes in asset values may not match changes in liabilities, thereby altering the gap between the accrued liability and assets and consequently altering the funded status and contribution requirements;
3. **Contribution Risk** – actual contributions may differ from expected future contributions. For example, actual contributions may not be made in accordance with the plan's funding policy or material changes may occur in the anticipated number of covered employees, covered payroll, or other relevant contribution base;
4. **Salary and Payroll Risk** – actual salaries and total payroll may differ from expected, resulting in actual future accrued liability and contributions differing from expected;
5. **Longevity Risk** – members may live longer or shorter than expected and receive pensions for a period of time other than assumed; and
6. **Other Demographic Risks** – members may terminate, retire or become disabled at times or with benefits other than assumed resulting in actual future accrued liability and contributions differing from expected.

The effects of certain trends in experience can generally be anticipated. For example, if the investment return since the most recent actuarial valuation is less (or more) than the assumed rate, the cost of the plan can be expected to increase (or decrease). Likewise, if longevity is improving (or worsening), increases (or decreases) in cost can be anticipated.

The timely receipt of the actuarially determined contributions is critical to support the financial health of the plan. Users of this report should be aware that contributions made at the actuarially determined rate do not necessarily guarantee benefit security.

Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution

Plan Risk Measures

Risks facing a pension plan evolve over time. A young plan with virtually no investments and paying few benefits may experience little investment risk. An older plan with a large number of members in pay status and a significant trust may be much more exposed to investment risk. Generally accepted plan maturity measures include the following:

	2022	2021
Ratio of the Market Value of Assets to total payroll*	5.4	6.8
Ratio of Actuarial Accrued Liability to payroll*	8.6	9.5
Ratio of Actives to Retirees and Beneficiaries	0.1	0.2
Ratio of net cash flow to Market Value of Assets	-12.5%	-10.4%
Duration of the Actuarial Accrued Liability	8.1	8.2

* Payroll for this purpose is Component I payroll of \$284.4 million for 2022 and \$267.0 million for 2021.

POA Funding Ratio

The **POA Funded Ratio** is an expected return-based measurement of the pension obligations. It is based upon the POA mandated 6.75% interest rate assumption (assumption prescribed by another party). It determines an amount that will be sufficient to provide benefits if the portfolio earns the expected 6.75% return on assets and all other assumptions are met. This measure is appropriate for assessing the need for or amount of future contributions if all assumptions are met. This measure is not appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligation, in other words, of transferring the obligation to a third party in a market value type transaction.

Funded Ratio - POA

	Defined Benefit	ASF	Total
A Actuarial Accrued Liability (AAL)	\$ 2,347,204,461	\$ 91,394,995	\$ 2,438,599,456
B Market Value of Assets	1,438,451,300	91,394,995	1,529,846,295
C Unfunded Actuarial Accrued Liability (A-B)	\$ 908,753,161	\$ -	\$ 908,753,161
D Funded Ratio (B/A)	61.3%	100.0%	62.7%

Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution

Solvency Liability

The **Solvency Liability** is a market-based measurement of the pension obligations. It represents the amount the plan would need to invest in low risk securities to provide the benefits with greater certainty. For this purpose, the solvency liability is computed at 3.69% as of June 30, 2022, based on the long-term municipal bond rate ("20-Year Municipal GO AA Index" rate from the Fidelity Index as of June 30, 2022). No adjustment has been made for the credit quality of the plan sponsor. This measure may not be appropriate for assessing the need for or amount of future contributions. This measure may not be appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligation.

Funded Ratio – Solvency

	Defined Benefit	ASF	Total
A Market-Based Liability (MBL)	\$ 3,093,133,537	\$ 91,394,995	\$ 3,184,528,532
B Market Value of Assets	1,438,451,300	91,394,995	1,529,846,295
C Unfunded Market-Based Liability (A-B)	\$ 1,654,682,237	\$ -	\$ 1,654,682,237
D Funded Ratio (B/A)	46.5%	100.0%	48.0%

The difference between the two measures (POA and Solvency) is one illustration of the savings the sponsor anticipates by taking on the risk in a diversified portfolio.

Description of Plan Risk Measures

Ratio of Market Value of Assets to Payroll

The relationship between assets and payroll is a useful indicator of the potential volatility of contributions. For example, if the market value of assets is 2.0 times the payroll, a return on assets 5% different than assumed would equal 10% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in plan sponsor contributions as a percentage of payroll.

Ratio of Actuarial Accrued Liability to Payroll

The relationship between actuarial accrued liability and payroll is a useful indicator of the potential volatility of contributions for a fully funded plan. A funding policy that targets a funded ratio of 100% is expected to result in the ratio of assets to payroll and the ratio of liability to payroll converging over time.

The ratio of liability to payroll may also be used as a measure of sensitivity of the liability itself. For example, if the actuarial accrued liability is 2.5 times the payroll, a change in liability 2% other than assumed would equal 5% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in liability (and also plan sponsor contributions) as a percentage of payroll.

Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution

Description of Plan Risk Measures (Concluded)

Ratio of Actives to Retirees and Beneficiaries

A young plan with many active members and few retirees will have a high ratio of actives to retirees. A mature open plan may have close to the same number of actives to retirees resulting in a ratio near 1.0. A super-mature or closed plan may have significantly more retirees than actives resulting in a ratio below 1.0.

Ratio of Net Cash Flow to Market Value of Assets

A positive net cash flow means contributions exceed benefits and expenses. A negative cash flow means existing funds are being used to make benefits payments. A certain amount of negative net cash flow is generally expected to occur when benefits are prefunded through a qualified trust. Large negative net cash flows as a percent of assets may indicate a super-mature plan or a need for additional contributions.

Duration of Actuarial Accrued Liability

The duration of the actuarial accrued liability may be used to approximate the sensitivity to a 1% change in the assumed rate of return. For example, a duration of 10 indicates that the liability would increase approximately 10% if the assumed rate of return were lowered 1%.

Additional Risk Assessment

Additional risk assessment is outside the scope of the annual actuarial valuation. Additional assessment may include scenario tests, sensitivity tests, stochastic modeling, and stress tests. The draft Funding Policy included in Section G of this report includes additional possible risk metrics. We can include those at the Board's request.

SECTION B

FUND ASSETS

Statement of Plan Assets (Reported Assets at Market Value)

Market Value - June 30, 2022	
Cash and Cash Equivalents	\$ 103,349,973
Investments at Fair Value	1,326,599,796
Receivables	102,485,447
Cash and Investments held as collateral for securities lending	56,629,288
Capital Assets - Net	3,803,811
Accounts Payable	(63,022,020)
Total Current Assets	<u>\$ 1,529,846,295</u>

DRAFT

Market Value of Assets

Reserve Accounts

Funds	Fund Balances	
	June 30, 2022	June 30, 2021
Annuity Savings	\$ 91,394,995	\$ 104,783,035
Annuity Reserve	(37,117,137)	(27,434,705)
Pension Accumulation	(227,582,083)	(65,451,896)
Pension Reserve	1,703,150,520	1,806,752,864
Total Fund Balances	\$ 1,529,846,295	\$ 1,818,649,298

Revenues and Expenditures

	Pension Funds	Annuity Funds	Total Funds
Balance, July 1, 2021	\$ 1,741,300,969	\$ 77,348,329	\$ 1,818,649,298
Prior valuation audit adjustment	-	-	-
Market Value July 1, 2021	\$ 1,741,300,969	\$ 77,348,329	\$ 1,818,649,298
Revenues			
Employer Contributions	\$ 47,900,000	\$ -	\$ 47,900,000
Employee Contributions	-	-	-
Foundation Contributions	375,000	-	375,000
ASF Recoupment Interest	5,775,503	-	5,775,503
Investment Income (Net of Investment Expenses)	(102,743,787)	(46,243)	(102,790,030)
Other Income	(548,957)	801,241	252,284
Total	\$ (49,242,241)	\$ 754,998	\$ (48,487,243)
Expenditures			
Benefit Payments	\$ 212,727,480	\$ 10,029,115	\$ 222,756,595
Refund of Member Contributions	-	13,796,354	13,796,354
ASF Recoupment Write Off	1,221,731	-	1,221,731
Transfer to Component I (Transition Cost)	-	-	-
Administrative Expenses	2,541,080	-	2,541,080
Total	\$ 216,490,291	\$ 23,825,469	\$ 240,315,760
Market Value June 30, 2022	\$ 1,475,568,437	\$ 54,277,858	\$ 1,529,846,295
Market Value Rate of Return (Net of all expenses)	(6.04)%	1.15%	(5.77)%
Net Cash Flow as Percent of Assets	(9.59)%	(30.80)%	(10.49)%

Rates of return are dollar-weighted estimates assuming contributions occur at the end of the year and remaining items are mid-year cash flows. "ASF Recoupment Interest" and "Other" items are treated as investment cash flows.

Note that interest credits to the ASF (and other reserves) are determined by Plan provisions and Board policy (including any timing issues) as calculated by the Retirement System's staff.

Allocation of Assets Used for Valuation by Reserve Account and Division

	June 30, 2021	Adjustments	Contributions	Benefit Payments	Admin. Expenses	Investment and Other	June 30, 2022
Annuity Savings Fund							
General	\$ 56,834,178	\$ -	\$ -	\$ (5,749,975)	\$ -	\$ (1,117,864)	\$ 49,966,339
D.O.T.	22,783,374	-	-	(4,514,011)	-	857,441	19,126,804
DWSD	17,265,043	-	-	(3,243,666)	-	915,457	14,936,834
Library	7,900,440	-	-	(288,702)	-	(246,720)	7,365,018
Totals	\$ 104,783,035	\$ -	\$ -	\$ (13,796,354)	\$ -	\$ 408,314	\$ 91,394,995
Annuity Reserve Fund							
General	\$ (16,474,842)	\$ -	\$ -	\$ (5,617,918)	\$ -	\$ 177,869	\$ (21,914,891)
D.O.T.	(900,758)	-	-	(915,409)	-	83,268	(1,732,899)
DWSD	(8,418,985)	-	-	(3,128,228)	-	70,238	(11,476,975)
Library	(1,640,120)	-	-	(367,561)	-	15,309	(1,992,372)
Totals	\$ (27,434,705)	\$ -	\$ -	\$ (10,029,116)	\$ -	\$ 346,684	\$ (37,117,137)
Pension Accumulation Fund							
General	\$ (61,621,095)	\$ (53,445,345)	\$ 2,765,012	\$ -	\$ (2,225,371)	\$ (50,678,577)	\$ (165,205,376)
D.O.T.	(147,084,079)	(23,547,304)	109,988	-	(190,555)	(6,782,480)	(177,494,430)
DWSD	108,276,995	(30,458,190)	42,900,000	-	-	(36,632,710)	84,086,095
Library	34,976,283	(1,674,296)	2,500,000	-	(125,154)	(4,645,205)	31,031,628
Totals	\$ (65,451,896)	\$ (109,125,135)	\$ 48,275,000	\$ -	\$ (2,541,080)	\$ (98,738,972)	\$ (227,582,083)
Pension Reserve Fund							
General	\$ 978,186,655	\$ 53,445,345	\$ -	\$ (118,034,281)	\$ -	\$ -	\$ 913,597,719
D.O.T.	261,581,696	23,547,304	-	(30,810,938)	-	-	254,318,062
DWSD	518,648,809	30,458,190	-	(57,745,077)	-	-	491,361,922
Library	48,335,704	1,674,296	-	(6,137,183)	-	-	43,872,817
Totals	\$ 1,806,752,864	\$ 109,125,135	\$ -	\$ (212,727,479)	\$ -	\$ -	\$ 1,703,150,520
Retirement System Totals	\$ 1,818,649,298	\$ -	\$ 48,275,000	\$ (236,552,949)	\$ (2,541,080)	\$ (97,983,974)	\$ 1,529,846,295

Funding Value of Assets

	2021	2022	2023	2024
A. Funding Value Beginning of Year	\$ 1,596,101,989	\$ 1,818,649,298		
B. Market Value End of Year	1,818,649,298	1,529,846,295		
C. Market Value Beginning of Year	1,596,101,989	1,818,649,298		
D. Contributions During Year:				
D1. City Contributions (End of Year)	48,275,000	48,275,000		
D2. Member Contributions	0	0		
D3. Total	48,275,000	48,275,000		
E. Disbursements:				
E1. Benefits Paid During Year	225,790,173	222,756,595		
E2. Refunds	11,333,604	13,796,354		
E3. Transfers	0	0		
E4. Administrative Expenses*	N/A	2,541,080		
E5. Total	237,123,777	239,094,029		
F. Investment Income:				
F1. Average Funding Value	1,477,540,101	1,699,102,284		
F2. Assumed Rate	6.75%	6.75%		
F3. Amount for Immediate Recognition: F1 X F2		114,689,404		
F4. Market Total: B - C - D3 + E5	411,396,086	(97,983,974)		
F5. Amount for Phased-In Recognition: F4-F3		(212,673,378)		
G. Phased-In Recognition of Investment Income:				
G1. Current Year: F5/3		(70,891,126)		
G2. 1st Prior Year		0	\$ (70,891,126)	
G3. 2nd Prior Year		0	0	\$ (70,891,126)
G4. Total Recognized Investment Gain		(70,891,126)	(70,891,126)	(70,891,126)
H. Total Interest Distributed - Current Year: F3 + G4	411,396,086	43,798,278		
I. Funding Value End of Year:				
I1. Preliminary Funding Value End of Year: A + D - E + H		1,671,628,547		
I2. Upper Corridor Limit 115% x B		1,759,323,239		
I3. Lower Corridor Limit 85% x B		1,300,369,351		
I4. Funding Value End of Year	\$ 1,818,649,298	\$ 1,671,628,547		
J. Difference Between Market & Funding Value: B - I4	1,818,649,298	(141,782,252)		
K. Recognized Rate of Return: H / F1	27.84%	2.58%		
L. Market Rate of Return: F4 / (F1 + C - A)	27.84%	(5.77)%		
M. Ratio of Funding Value to Market Value: I4 / B	100.00%	109.27%		

*Prior to the 2022 fiscal year, the investment return was net of administrative expenses.

The Funding Value of Assets recognizes assumed investment income (line F3) fully each year. Differences between actual and assumed investment income (line F5) are phased-in over a closed 3-year period. During periods when investment performance exceeds the assumed rate, Funding Value of Assets will tend to be less than market value. During periods when investment performance is less than the assumed rate, Funding Value of Assets will tend to be greater than market value. The Funding Value of Assets is unbiased with respect to Market Value. At any time, it may be either greater or less than Market Value.

SECTION C

PARTICIPANT DATA

Reconciliation of Raw Data

Active Members

A) Count reported in Legacy file	2,019
B) In Legacy file but not in Hybrid file	(33)
C) Hired after plan closed	(89)
D) Non-active Status	(24)
E) Agency "88"	(17)
F) Non-eligible class code & bargaining unit	-
G) No hire date in Hybrid file	-
H) Zero salary in Hybrid file	(6)
I) Number of records to value	<u>1,850</u>

Inactive Vested Members

A) Number of records reported on data file	2,605
B) In Legacy active file but not otherwise in database and not in Hybrid active file	-
C) Valued as inactive in prior year and would not have otherwise been valued in Legacy this year	115
D) Valued as a vested active member in prior year but not in this year's active file and would not have otherwise been valued in Legacy this year	69
E) Deceased	-
F) Less than 8 years of vesting service	(156)
G) Number of records to value	<u>2,633</u>

Retired Members and Beneficiaries

A) Number of records reported on data file	45,922
B) Number of records in P/F plan	(17,152)
C) Records not currently in receipt of benefits based on reported status codes	(17,254)
D) Component I (Hybrid) Records	(598)
E) Number of records valued	<u>10,918</u>

Notes:

Active Row B: Are records that appeared in the Legacy active file but did not appear in the Hybrid active file. It was assumed that these members were no longer active in the General plan.

Active Row D: The Active data file contains a field titled "Stat." Active members were only valued if the record for this field had a value of "1."

Active Row E: Agency "88" is the 36th District Court. We understand that members in that agency are not eligible to receive benefits.

Active Row F: We have received a separate list of Class Codes and Bargaining Units that are not eligible to receive benefits.

Inactive Vested Row B: See the note for Row B of the active member reconciliation.

Inactive Vested Row C: Only includes records that appear in the raw database last year.

Retired Row C: The Retired Life file has a field named "STATUS." We understand that if this field is not blank or equal to zero, the member is no longer receiving a benefit and should not be valued.

Reconciliation of Year-to-Year Data as of June 30, 2022

	Active	Term. Vested	Retirees		Totals
	Count	Count	Count	Annual Benefits	Count
2021	2,185	2,645	11,173	\$ 212,713,879	16,003
Change in Pay/Pensions	N/A	N/A	N/A	(1,016,844)	
Rehired (Not Vested)	22				22
Rehired (Vested)	24	(23)	(1)	(744)	-
New Beneficiary			104	1,418,916	104
Retired	(130)	(114)	275	4,418,868	31
Non-Duty Disabled			-	-	-
Duty Disabled			-	-	-
Assumed Death/Removals		(65)	(642)	(10,542,048)	(707)
Vested Term	(161)	161			-
Non-Vested Terminated	(90)				(90)
Data Adjustment	-	29	9	151,752	38
2022	1,850	2,633	10,918	\$ 207,143,779	15,401

Notable Data Changes:

31 new Retirees came from nowhere. We believe many of these are a result of new EDRO's.

65 Terminated Vested members were valued last year but will not be valued this year. We have assumed these members refunded and forfeited their defined benefit.

The data adjustments relate to records where we could not specifically identify the activity during the year. This could be the result of duplicate Social Security numbers or corrected Social Security numbers.

Data Approximations and Assumptions

As part of our review of the data received from the System, we discussed questionable or missing data with System staff and developed approximations and assumptions in order to perform the valuation. We provided System staff with a letter dated December 23, 2022 with additional information regarding data reconciliation, processing instructions, and assumptions regarding unresolved issues. Note, that letter disclosed our remaining data processing procedures and assumptions and details our reconciliation and final valuation data.

The purpose of this section in this report is to summarize any unresolved concerns about questionable data that are relevant and could have a significant effect on the valuation as disclosed in that letter. This summary also discusses any significant steps we have taken to improve the data due to identifying questionable data values or relationships, significant judgments, or assumptions we have applied to the data.

Active

For active members, frozen AFC amounts and frozen service as of June 30, 2014 was reported. For purposes of this valuation, we matched the June 30, 2022 actives to the active data reported for the June 30, 2014 valuation to check against AFC as of June 30, 2014. In cases where the frozen AFC as reported in the 2022 data file was less than 75% of the AFC as reported on the 2014 data file, the AFC as reported on the 2014 data file was used. This boundary was determined after an analysis of the raw AFC data showed that the AFC for several members was unreasonably low. In cases where AFC was reported in to be \$0 in both the current data file and the 2014 data file, the current salary was used in place of the AFC.

Deferred Vested

Data provided for deferred vested members was incomplete. As part of the processing of deferred member data, in cases where AFC was incomplete, we used \$30,000 to estimate the AFC. Component II benefit service is not directly provided on the file. The Component II (Legacy) file includes total vesting service and the Component I (Hybrid) file includes Component I benefit service. Since Component II benefit service was frozen as of June 30, 2014 for members that terminated after June 30, 2014, Component II (Legacy) benefit service was determined by subtracting service in the Component I (Hybrid) inactive file from total vesting service in the corresponding Component II (Legacy) inactive file. Members with vesting service of less than 8 years were assumed to be non-vested and were not valued. We estimated the commencement date with the following rules:

- Age 55 if 30 or more years of service and hired before July 1986;
- Age 60 if less than 30 years of service, but more than 10 years of service and hired before 1986; and
- Age 62 for all others.

The entire amount of the deferred benefit was assumed to commence at the same time regardless of the date of hire.

Data Approximations and Assumptions

Retired and Beneficiary

It is our understanding that the current pension amount provided in the retiree data includes the 4.5% reduction as mandated in the POA. However, for members that retired prior to July 1, 2015, the other pension amounts provided in the data (original pension amount, equated pension amount, and prior year's pension amount) did not reflect the 4.5% reduction and, as such, were reduced by 4.5% when valuing any related liability. Other adjustments/assumptions include:

- In cases where the benefit is identified to be a joint and survivor benefit and a beneficiary is not listed in the data, it was assumed that male spouses were 3 years older than females;
- Benefits for dependent children are assumed to cease at age 21; and
- For non-converted disabled members, converted benefits are:
 - assumed to commence at age 60; and
 - estimated, based on reported service and projected service from the date of disability to age 60.

DRAFT

Summary of Member Data June 30, 2022

Active Members

	General	D.O.T.	DWSD	Library	Totals [^]
Number	1,134	305	252	159	1,850
% Change in active members	(14.5)%	(17.1)%	(14.0)%	(19.3)%	(15.3)%
Average reported 2014 AFC [^]	\$48,587	\$56,276	\$45,909	\$43,645	\$49,065
Average benefit service	14.3	15.4	14.7	16.9	14.7
Average age	54.6	55.4	55.1	56.5	55.0
Average eligibility service	21.2	22.5	21.9	23.3	21.7

[^] In cases where the 2014 AFC reported on the current file was less than 75% of the 2014 AFC as reported in 2014, the 2014 AFC as reported in 2014 was used.

Retired Members and Survivor Beneficiaries

	General	D.O.T.	DWSD	Library	Totals
Number	6,350	1,589	2,656	323	10,918
Annual benefits (\$ millions) #	\$ 120.3	\$ 30.6	\$ 59.6	\$ 6.5	\$ 217.0
Average benefits #	\$18,952	\$19,279	\$22,434	\$20,048	\$19,879
% Change in reported average benefit	0.0 %	(0.5)%	(0.7)%	(2.5)%	(0.3)%

Includes annuities. Does not include reductions resulting from the annuity claw-backs.

Inactive Vested Members

	General	D.O.T.	DWSD	Library	Totals
Number	1,427	359	749	98	2,633
Average AFC	\$39,726	\$44,727	\$49,297	\$33,527	\$42,900
Average years of service	15.2	14.6	15.0	13.0	15.0
Annual benefits (\$ millions)	\$ 14.0	\$ 3.8	\$ 9.0	\$ 0.7	\$ 27.5
Average benefits	\$9,818	\$10,553	\$12,059	\$ 7,249	\$10,460
% Change in average years of service	(0.4)%	(3.5)%	(1.1)%	(4.0)%	(1.2)%
% Change in average AFC	(0.4)%	(1.2)%	0.1 %	0.8 %	(0.6)%

Active Members as of June 30, 2022 by Attained Age and Years of Service Retirement System Totals

Attained Age	Years of Service to Valuation Date							Total No.
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	
Under 20	0							0
20-24	0	0						0
25-29	0	0	0					0
30-34	0	26	6	0				32
35-39	2	19	23	9	1			54
40-44	2	18	27	42	32	1		122
45-49	5	45	33	49	70	30	0	232
50-54	4	19	41	63	133	91	30	381
55-59	6	25	28	66	143	121	84	473
60-64	1	27	26	40	77	66	132	369
65-69	0	13	15	11	21	21	50	131
70-74	0	5	5	7	9	5	8	39
75-79	0	0	2	2	6	2	5	17
Totals	20	197	206	289	492	337	309	1,850

Group Averages:

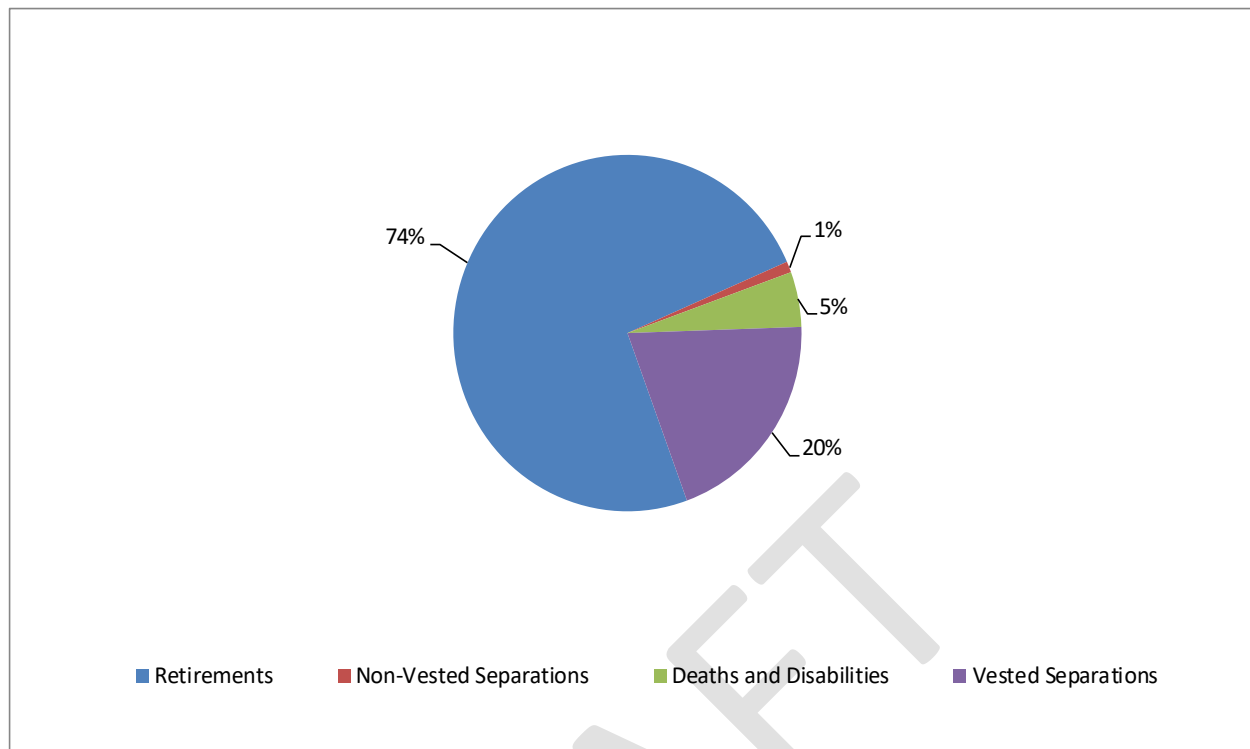
Age: 55.0 years

Benefit Service: 14.7 years

Eligibility Service: 21.7 years

Service shown in this schedule is Legacy Benefit service plus Hybrid Benefit service.

Expected Terminations from Active Employment for Current Active Members



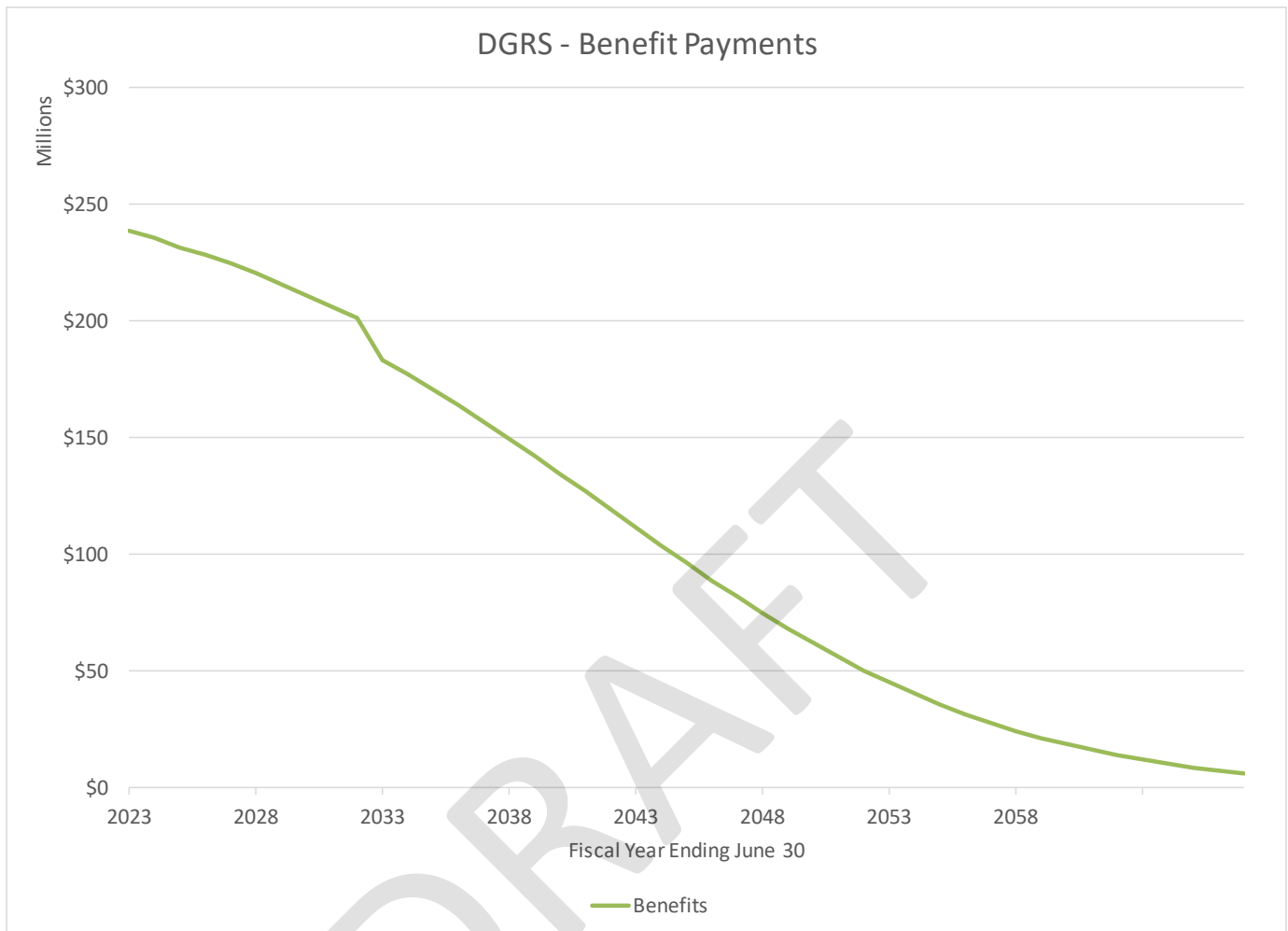
The chart shows the expected future development of the present population in simplified terms. The Retirement System presently covers 1,850 active members. Eventually, 28 people are expected to terminate covered employment prior to retirement and forfeit eligibility for an employer provided benefit. 1,730 people are expected to receive monthly retirement benefits either by retiring directly from active service, or by retiring from vested deferred status. 92 people are expected to become disabled or die in service. Vested Separations may include members eligible to retire in this Component II (Legacy) plan but not yet eligible to retire in the Component I (Hybrid) plan. A detailed discussion on how members eligible to retire in Component II (Legacy) but not eligible to retire in Component I (Hybrid) are treated is included in Section D of this report.

Actual versus expected retirements for the 2022 fiscal year is shown below:

Year Ended June 30,	Expected	Actual
2022	106	130

Expected Benefit Payments

Shown below is a graph of projected benefit payments remaining in the Retirement System.



The graph above shows the projection of future expected benefit payments. As shown on the prior pages, contributions are expected to be significantly less than benefit payments for many years. The assets in the plan are not sufficient to cover current retiree liabilities and the ratio of assets (Market Value) to retiree benefit payroll is six and a half years. In a closed/frozen mature plan such as this one, it may become difficult to manage the significant amount of cash needed to pay retirement benefits if the amortization period is extended beyond 20 years.

Retirees and Beneficiaries as of June 30, 2022

Tabulated by Attained Ages

Retirement System Totals

Attained Ages	Age & Years of Service#		Disability		Death-in-Service		Totals	
	No.	Annual Allowances	No.	Annual Allowances	No.	Annual Allowances	No.	Annual Allowances
Under 20*	52	\$ 762,672	0	\$ 0	0	\$ 0	52	\$ 762,672
20-24	9	98,724					9	98,724
25-29	6	67,356					6	67,356
30-34	15	137,592	0	0			15	137,592
35-39	14	90,480	0	0	1	27,732	15	118,212
40-44	18	126,036	2	14,076	1	6,000	21	146,112
45-49	35	314,652	13	90,480	3	23,088	51	428,220
50-54	119	1,890,228	29	241,752	8	94,776	156	2,226,756
55-59	410	8,676,696	76	828,516	15	230,736	501	9,735,948
60-64	1,283	26,221,459	151	2,451,156	34	478,608	1,468	29,151,223
65-69	2,053	40,564,824	225	3,062,532	35	490,452	2,313	44,117,808
70-74	2,071	44,631,840	154	2,247,864	43	889,920	2,268	47,769,624
75-79	1,558	33,630,012	104	1,284,492	32	577,392	1,694	35,491,896
80-84	918	16,546,116	42	484,500	26	353,148	986	17,383,764
85-89	626	9,845,268	22	229,464	17	216,300	665	10,291,032
90-94	403	5,838,168	6	42,672	23	182,292	432	6,063,132
95 and Over	235	2,836,812	10	86,232	21	230,664	266	3,153,708
Totals	9,825	\$192,278,935	834	\$11,063,736	259	\$3,801,108	10,918	\$207,143,779

* May include records with defective birth dates.

Includes survivor beneficiaries of deceased retirees.

Retirees and Beneficiaries as of June 30, 2022

Tabulated by Year of Retirement

Year of Retirement	No.	Annual Allowances	
		Total	Average
1950 & before	3	\$ 71,172	\$23,724
1951-1955	4	67,200	16,800
1956-1960	0	0	0
1961-1965	4	16,188	4,047
1966-1970	13	70,236	5,403
1971-1975	49	363,144	7,411
1976-1980	127	1,100,232	8,663
1981-1985	279	3,249,108	11,646
1986-1990	485	6,052,920	12,480
1991-1995	947	13,839,540	14,614
1996-2000	1,234	22,013,892	17,839
2001-2005	1,750	39,163,075	22,379
2006-2010	1,963	43,804,332	22,315
2011-2015	2,358	48,562,044	20,595
2016	394	8,017,560	20,349
2017	249	4,016,280	16,130
2018	236	3,542,736	15,012
2019	226	3,376,548	14,940
2020	222	3,692,304	16,632
2021	265	4,287,228	16,178
2022	110	1,838,040	16,709
Totals	10,918	\$207,143,779	\$18,973

SECTION D

METHODS AND ASSUMPTIONS

Summary of Assumptions and Methods Used for Actuarial Valuations Adopted by the Board of Trustees

All assumptions are estimates of future experience except as noted. The rationale for the assumptions is based on experience studies where noted.

Economic Assumptions

The investment return rate used in making the valuation was 6.75% per year, compounded annually (net after investment expenses). This assumption is prescribed by the Eighth Amended Plan for the Adjustment of Debts of the City of Detroit (POA).

Price inflation is not directly used in the valuation. For purposes of assessing the reasonability of the investment return assumptions, we assumed price inflation of 2.50% per year.

Future ***administrative expenses*** are assumed to be 1.01% of benefit payments and refunds.

Non-Economic Assumptions

For healthy post-retirement mortality, the PubG-2010(B) Below-Median General Retiree table was used for mortality assumptions going forward, decreased by 3% for males and increased by 26% for females.

For disabled post-retirement mortality, PubNS-2010 Non-Safety Disabled Retiree mortality table was used, increased 4% for males and decreased 2% for females.

For pre-retirement mortality rates, the PubG-2010(B) Below-Median General Employee mortality table was used for both males and females.

The tables are projected to be fully generational, based on the 2-dimensional, sex distinct mortality improvement scale MP-2021 (which was intended to be used with the Pub-2010). 75% of all deaths-in-service are assumed to be non-duty related. This table was first used as of June 30, 2021. The rationale for the mortality assumption is based on the 2015-2020 Mortality Experience Study issued February 4, 2022.

The probabilities of retirement for members eligible to retire are shown on the following pages. These probabilities were revised for the June 30, 2021 valuation. The rationale is based on the 2015-2020 Experience Study.

The probabilities of separation from service (including *death-in-service* and *disability*) are shown for sample ages on the following pages. These probabilities were revised for the June 30, 2021 valuation. The rationale is based on the 2015-2020 Experience Study.

Summary of Assumptions and Methods Used for Actuarial Valuations Adopted by the Board of Trustees (Concluded)

Funding Methods

The unit credit cost method was used in determining age & service pension liabilities, vesting liabilities, and casualty pension liabilities. Under this method, there is no normal cost since benefits are frozen and there are no future accruals and actuarial accrued liability is the present value of each individual's accrued benefit.

Unfunded Actuarial Accrued Liabilities. Actual employer contributions through June 30, 2023 are set by the POA. The amortization period and method after 2023 has not yet been established by the Board.

Employer contribution dollars were assumed to be paid at the end of the employer fiscal year.

Present assets are set equal to the Market Value.

The data about persons now covered and about present assets was furnished by the System's administrative staff. Although examined for general reasonableness, the data was not audited by the Actuary.

Single Life Retirement Values

Based on PubG-2010(B)
97% of Male Rates/126% of Female Rates
Using Projection Scale MP-2021

Sample Attained Ages in 2022	Future Life Expectancy (Years)	
	Men	Women
45	37.56	40.04
50	32.64	34.98
55	28.26	30.39
60	24.02	25.88
65	19.92	21.43
70	15.95	17.10
75	12.31	13.09
80	9.11	9.55

DRAFT

Probabilities of Age/Service Retirement for Members Eligible to Retire

Retirement Ages	Percent of Eligible Active Members Retiring within Next Year with Unreduced Benefits		
	EMS	D.O.T.	Others
62	40%	20%	20%
63	40%	20%	20%
64	40%	20%	20%
65	40%	20%	20%
66	40%	20%	20%
67	40%	30%	20%
68	40%	30%	20%
69	40%	30%	20%
70	100%	100%	20%
71			20%
72			20%
73			20%
74			20%
75			20%
76			20%
77			20%
78			20%
79			20%
80			100%
Ref	851	3304	3305

All members are assumed to retire while eligible for Component I (Hybrid) retirement only. The rationale is based on the 2015-2020 Experience Study.

Probabilities of Early Retirement for Members Eligible for Early Retirement

Retirement Ages	Percent of Eligible Active Members Retiring within Next Year with Reduced Benefits
55	6.5%
56	6.5%
57	6.5%
58	7.5%
59	8.5%
60	9.5%
61	9.5%
62	9.5%
Ref	3303

All members are assumed to retire while eligible for Component I (Hybrid) retirement only. The rationale is based on the 2015-2020 Experience Study.

Sample Rates of Separation from Active Employment Before Retirement

Sample Ages	Years of Service	% of Active Members Separating within Next Year	
		Withdrawal	
		EMS	Other
ALL	0	16.00%	28.00%
	1	15.00%	19.00%
	2	15.00%	15.00%
	3	11.00%	14.00%
	4	11.00%	14.00%
25	5 & Over	10.05%	13.00%
30		8.85%	11.91%
35		7.80%	9.25%
40		6.60%	7.19%
45		5.10%	5.91%
50		3.60%	5.00%
55		3.00%	5.00%
60		3.00%	5.00%
	Ref	1405	1406
		1608	1609

Sample Ages	% of Active Members Becoming Disabled within Next Year											
	D.O.T.						Others					
	Ordinary			Duty			Ordinary			Duty		
25	0.16%			0.24%			0.03%			0.03%		
30	0.19%			0.28%			0.04%			0.04%		
35	0.26%			0.39%			0.05%			0.05%		
40	0.37%			0.56%			0.08%			0.08%		
45	0.56%			0.84%			0.12%			0.12%		
50	0.70%			1.05%			0.15%			0.15%		
55	0.82%			1.23%			0.17%			0.17%		
60	0.94%			1.41%			0.20%			0.20%		
Ref	1238	x	1.20	1238	x	1.80	1238	x	0.25	1238	x	0.25

The rationale is based on the 2015-2020 Experience Study.

Miscellaneous and Technical Assumptions

Administrative Expenses	Administrative expenses are assumed to be 1.01% of benefit payments and are to be included in the employer contribution.
Annuity Savings Fund (ASF) Interest Credits	For purposes of calculating future refunds of member contributions, the ASF is assumed to earn 5.25% interest in all future years.
Annuity Savings Fund Excess Interest	<p>The Component I (Hybrid) Transition Cost is funded by Component II (Legacy) ASF returns in excess of 5.25%. ASF return excess ceases in 2023 and the POA mandates the use of a 6.75% return assumption until 2023. The current assumption is:</p> <ul style="list-style-type: none"> For purposes of determining valuation assets and liabilities, only considering transfers related to prior investment experience. <p>For purposes of determining the Section 9.5 funded status in Component I (Hybrid), projecting the amount of future transfers.</p>
Average Final Compensation (AFC)	<p>Frozen AFC is reported in the data provided for the annual valuation. Longevity payments are included directly in the reported frozen AFC but Sick Leave is not. Eligibility for inclusion of Sick Leave is based upon the members Bargaining Unit. If eligible, we take the AFC provided to us, use the 75% of 2014 AFC check, and then add on an estimate for sick leave. The sick leave is estimated with the following formula:</p> $[\text{Annual pay reported in 2014 valuation}] \times [\text{Capped Sick Leave Bank hours reported in 2014 valuation}] / [8 \text{ hours/work day}] / [260 \text{ work days/year}] / [3\text{-years in average period}] \times [25\% \text{ added to AFC}]$ <p>Where [Capped Sick Leave Bank hours reported in 2014 valuation] is the smaller of:</p> $[\text{Sick Leave Bank hours reported in 2014 valuation}] \text{ OR } [\text{Frozen Service}] \times [8 \text{ hours/work day}] \times [25 \text{ days/year of service}]$ <p>We annually test the reported AFC against a sample set of retirees to determine if any additional adjustments should be made to the liability. No additional adjustment was made for this report.</p>
Benefit Service	Exact Fractional service is used to determine the amount of benefit payable.
Data Adjustments	Assumptions regarding incomplete or missing data are reviewed annually with the System and adjusted as directed by the System.
Decrement Operation	Disability and mortality decrements do not operate during the first five years of service. Disability and withdrawal do not operate during retirement eligibility.
Decrement Relativity	Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.

Miscellaneous and Technical Assumptions

Decrement Timing	Decrements of all types are assumed to occur mid-year.
Deferred Vested Benefit Commencement Age	Members are assumed to commence benefits at the age in which they are first eligible for unreduced benefits.
Disability Change Age	For active members that become duty disabled, the Component II (Legacy) plan is assumed to only be responsible for the frozen benefit which becomes payable starting at the earliest of when the member would have accrued 30 years of service credit (25 for EMS) or age 60.
Eligibility Testing	Eligibility for benefits is determined based upon the age nearest birthday and rounded service on the date the decrement is assumed to occur.
Forfeiture Assumption	It is assumed that 0% of members will elect to forfeit their benefit.
Incidence of Contributions	Employer contributions are assumed to be received on the last day of the fiscal year.
Marriage Assumption	100% of males and 100% of females are assumed to be married for purposes of death-in-service benefits. Male spouses are assumed to be three years older than female spouses for active member valuation purposes.
Member Contributions	Member contributions to this Component II plan are assumed to have ceased with the bankruptcy.
New Entrant Assumption	No assumption is made for experience related to members rehiring/reentering active service.
Normal Form of Benefit	Straight life is the normal form of benefit. The Board adopted assumptions for Actuarial Equivalence to be an 80%/20% unisex blend of RP-2014 mortality (Male/Female) with Blue Collar Adjustment, set ahead one year for males and females, projected 11 years with MP-2014, an interest rate of 6.75%, and no COLA for optional forms of payment and early retirement reduction. Assumptions for annuitizing member contributions are the same except for using a 60%/40% unisex blend and a 5.25% assumed rate of interest. Prior to the use of these factors, actuarial equivalent factors were based on 7.5% interest and the 1984 Group Annuity Mortality table.
Pop-Up Benefits	For current retirees with a pop-up benefit, the value of the pop-up was estimated by valuing a non-pop-up option and increasing the associated liabilities by 2%.

Miscellaneous and Technical Assumptions

Service Credit Accruals Service accruals for calculating benefits end as of June 30, 2014 for Component II (Legacy) and begin as of June 30, 2014 for Component I (Hybrid). However, service in Component I (Hybrid) and Component II (Legacy) may be used to satisfy benefit eligibility requirements in both plans.

The rationale is based on the 2015-2020 Experience Study, modified as necessary for changes in data or administration.

DRAFT

SECTION E

PLAN PROVISIONS

Summary of Benefit Provisions Evaluated

Component II Frozen Benefits

All Component II benefits are frozen as of June 30, 2014 based on service and average final compensation accrued as of that date and the provisions of the Detroit General Retirement System as it existed on June 30, 2014. Frozen benefits are further reduced by 4.5% and all future cost-of-living adjustments (“COLAs”) were eliminated. Benefits resulting from the Annuity Savings Fund and benefits paid from the Annuity Reserve Fund were subject to a separate reduction described as a “Claw-back.” Details of the claw-back provision are complicated and can be found in the Eighth Amended Plan of Adjustment. The benefits evaluated in this report are the frozen reduced benefits after adjusting the assets for the claw-back. Component II benefits are payable after separation from service, upon meeting the eligibility conditions of the plan as it existed on June 30, 2014, regardless of whether the individual is eligible to receive a Component I benefit at that time.

Our understanding of the June 30, 2014 plan provisions is provided below for completeness. The material below does not have legal standing and is not intended to cover all potential situations that could occur. If there are discrepancies between the description below and appropriate legal documents, the latter necessarily govern.

Age and Service Pension

Eligibility - Any age (minimum age 55 for non-EMS members hired after 1995) with 30 years of service (25 for EMS members), or age 60 with 10 years of service, or age 65 with 8 years of service.

Annual Amount - EMS Members: Sum of a) a basic pension of \$12 for each of the first 10 years of service, plus b) a pension equal to 2.0% of AFC multiplied by years of service. Maximum benefit is 90% of AFC.

Other Members: Sum of a) a basic pension of \$12 for each of the first 10 years of service, plus b) a pension equal to the first 10 years of service multiplied by 1.6% of AFC, plus 1.8% of AFC for each year of service greater than 10 years up to 20 years, plus 2.0% of AFC for each year of service greater than 20 years up to 25 years, plus 2.2% of AFC for each year of service greater than 25 years. Future benefit accruals for certain active members (depending on bargaining unit) were reduced to 1.5% of final average compensation per year of service.

Type of Average Final Compensation (AFC) - Highest 3 consecutive years out of the last 10. Pension benefits will not be diminished if compensation is reduced because of a fiscal emergency. Effective July 1, 1999, in computing the AFC, a member shall have the option of adding the value of 25% of unused accrued sick leave to the earnings used in computing the AFC. Longevity is added to AFC in accordance with the following schedule: \$150 after 5 years, \$300 after 10 years, \$450 after 15 years, \$600 after 20 years, and \$750 after 25 years.

Early Retirement

Eligibility - Any age with 25 or more years of service (min. age 55 for members hired after 1995).

Annual Amount - Same as regular retirement but actuarially reduced.



Summary of Benefit Provisions Evaluated (Continued)

Deferred Retirement (Vested Benefit)

Eligibility - Hired prior to 7-1-80: Age 40 with 8 years of service. Hired on or after 7-1-80: Any age with 10 years of service.

Benefit Commencement - **APTE hired prior to July 1, 1988:** Benefit begins at the age the member would have become eligible for regular retirement if service had continued. **SAAA, Non-Union and lawyers hired prior to June 30, 1986:** Benefit begins at the age the member would have become eligible for regular retirement. **Others:** Benefits based on service rendered by June 30, 1986 begin at the age the member would have become eligible for regular retirement. Benefits based on service rendered after July 1, 1986 begin at age 62.

Annual Amount - Same as regular retirement but based on average final compensation and service at the time of termination.

Duty Disability Retirement

Eligibility - Service related disability before eligibility for service retirement prior to and July 1, 2014. No service requirement.

Annual Amount - An annuity which is the actuarial equivalent of the accumulated contributions at date of disability plus a pension of two-thirds of average final compensation at time of disability. The maximum annual pension is \$5,700 (\$9,000 for EMS). At the earliest of when the member would have accrued 30 years of service credit (25 for EMS) or age 60, the annuity is recomputed assuming contributions would have continued at a salary level equal to final compensation. The pension is recomputed with additional service credit granted from the date of disability to age 60 (or 30 years of service credit) or June 30, 2014, whichever is earlier. **Benefits payable prior to conversion/re-computation, if any, were assumed to be paid outside the trust.**

Non-Duty Disability Retirement

Eligibility - Disability from any cause before age 60 with 10 or more years of service prior to July 1, 2014.

Annual Amount - Computed in the same manner as a regular retirement benefit. Maximum annual pension to age 60 is \$6,000. Benefit is recomputed at age 60 with no maximum. **Benefits payable prior to age 60, if any, were assumed to be paid from outside the trust.**

Duty Death Before Retirement

Eligibility - Death from service related causes. No age or service requirements.

Annual Amount - One-third of final compensation as of June 30, 2014 to the surviving spouse for life or until remarriage, plus an equal share of 1/4 of final compensation to each unmarried child under age 18. If there is no eligible spouse, eligible children each receive 1/4 of final compensation; if there are more than 2 such children, each child shares an equal part of 1/2 of final compensation. Maximum total amount for spouse and children is \$9,000 annually. If there is no eligible spouse or children, dependent parents each receive 1/6 of deceased's final compensation, to a total maximum of \$600 annually.



Summary of Benefit Provisions Evaluated (Concluded)

Non-Duty Death Before Retirement

Eligibility - Death-in-service at any age with 15 years of service; or after age 60 with 10 years of service; or after age 65 with 8 years of service.

Annual Amount - To Surviving Spouse: Computed as a regular retirement benefit but reduced in accordance with a 100% joint and survivor election for members with 20 or more years of service. For members with 15 years of service but less than 20, benefit is reduced in accordance with a 50% joint and survivor election. To Dependent Children if no Surviving Spouse: \$9,000 payable to age 19 of the youngest child or for life if child is physically or mentally impaired for members with 20 or more years of service (\$6,000 if less than 20 years of service).

Post-Retirement Cost-of-Living Adjustments

Benefit is increased annually by 2.25% of the **original** pension amount at retirement. Post-retirement cost-of-living increases were eliminated on future accruals for certain active members (depending on bargaining unit).

Member Contributions

Members have the option of choosing one of four contribution amounts: (1) 0%; (2) 3.0% of compensation up to the Social Security wage base, plus 5.0% of compensation in excess of the Social Security wage base; (3) 5.0% of total compensation; or (4) 7.0% of total compensation. Member contributions can be paid as a lump sum or annuitized at retirement to provide an annuity in addition to the pension (which is not affected by the level of member contributions).

SECTION F

GLOSSARY

Glossary

<i>Accrued Service</i>	The service credited under the plan which was rendered before the date of the actuarial valuation.
<i>Actuarial Accrued Liability (AAL)</i>	The difference between the Actuarial Present Value of Future Benefits, and the Actuarial Present Value of Future Normal Costs.
<i>Actuarial Assumptions</i>	Assumptions about future plan experience that affect costs or liabilities, such as: mortality, withdrawal, disablement, and retirement; future increases in salary; future rates of investment earnings; future investment and administrative expenses; characteristics of members not specified in the data, such as marital status; characteristics of future members; future elections made by members; and other items.
<i>Actuarial Cost Method</i>	A procedure for allocating the Actuarial Present Value of Future Benefits between the Actuarial Present Value of future Normal Costs and the Actuarial Accrued Liability.
<i>Actuarially Determined Employer Contribution</i>	The employer's periodic required contributions, expressed as a dollar amount or a percentage of covered plan compensation, determined under the Plan's actuarial funding policy.
<i>Actuarial Equivalent</i>	Of equal Actuarial Present Value, determined as of a given date and based on a given set of Actuarial Assumptions.
<i>Actuarial Present Value (APV)</i>	The amount of funds required to provide a payment or series of payments in the future. It is determined by discounting the future payments with an assumed interest rate and with the assumed probability each payment will be made.
<i>Actuarial Present Value of Future Benefits (APVFB)</i>	The Actuarial Present Value of amounts which are expected to be paid at various future times to active members, retired members, beneficiaries receiving benefits, and inactive, non-retired members entitled to either a refund or a future retirement benefit. Expressed another way, it is the value that would have to be invested on the valuation date so that the amount invested plus investment earnings would provide sufficient assets to pay all projected benefits and expenses when due.
<i>Actuarial Valuation</i>	The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, Funding Value of Assets, and related Actuarial Present Values for a plan.

Glossary

AFC	Average Final Compensation.
Amortization Method	A method for determining the Amortization Payment. The most common methods used are level dollar and level percentage of payroll. Under the Level Dollar method, the Amortization Payment is one of a stream of payments, all equal, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the Amortization payment is one of a stream of increasing payments, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the stream of payments increases at the rate at which total covered payroll of all active members is assumed to increase.
Amortization Payment	That portion of the plan contribution or ARC which is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.
Amortization Period	The period used in calculating the Amortization Payment.
ARF	Average Reserve Fund.
ASF	Annuity Savings Fund of the Component II (Legacy) Plan.
Closed Amortization Period	A specific number of years that is reduced by one each year, and declines to zero with the passage of time. For example, if the amortization period is initially set at 20 years, it is 19 years at the end of one year, 18 years at the end of two years, etc.
COLA	Cost-of-Living Adjustment.
Contribution Budgeting Liability	An expected return-based measure of pension obligation.
DIA	Detroit Institute of Arts
D.O.T	Department of Transportation.
Duration	An approximate measure of sensitivity to changes in interest rates.
DWSD	<i>Detroit Water and Sewerage Department.</i>
Employer Normal Cost	The portion of the Normal Cost to be paid by the employer. This is equal to the Normal Cost less expected member contributions.

Glossary

<i>E.M.S.</i>	Emergency Medical Service.
<i>Equivalent Single Amortization Period</i>	For plans that do not establish separate amortization bases (separate components of the UAAL), this is the same as the Amortization Period. For plans that do establish separate amortization bases, this is the period over which the UAAL would be amortized if all amortization bases were combined upon the current UAAL payment.
<i>Experience Gain/Loss</i>	A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions, during the period between two actuarial valuations. To the extent that actual experience differs from that assumed, Unfunded Actuarial Accrued Liabilities emerge which may be larger or smaller than projected. Gains are due to favorable experience, e.g., the assets earn more than projected, salaries do not increase as fast as assumed, members retire later than assumed, etc. Favorable experience means actual results produce actuarial liabilities not as large as projected by the actuarial assumptions. On the other hand, losses are the result of unfavorable experience, i.e., actual results that produce Unfunded Actuarial Accrued Liabilities which are larger than projected.
<i>Funded Ratio</i>	The ratio of the Funding Value of Assets to the Actuarial Accrued Liability.
<i>Funding Value of Assets (FVA)</i>	The value of the assets as of a given date, used by the actuary for valuation purposes. This may be the market or fair value of plan assets or a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the funded ratio and the actuarially determined employer contribution (ADEC).
<i>FY</i>	Fiscal Year.
<i>GASB</i>	Governmental Accounting Standards Board.
<i>GASB Statement No. 67 and GASB Statement No. 28</i>	These are the governmental accounting standards that set the accounting rules for public retirement systems and the employers that sponsor or contribute to them. GASB Statement No. 68 sets the accounting rules for the employers that sponsor or contribute to public retirement systems, while GASB Statement No. 67 sets the rules for the systems themselves.
<i>GLWA</i>	Great Lakes Water Authority
<i>MVA</i>	Market Value Assets.
<i>Normal Cost</i>	The annual cost assigned, under the Actuarial Cost Method, to the current plan year.

Glossary

<i>Open Amortization Period</i>	An open amortization period is one which is used to determine the Amortization Payment but which does not change over time. In other words, if the initial period is set as 30 years, the same 30-year period is used in determining the Amortization Period each year. In theory, if an Open Amortization Period is used to amortize the Unfunded Actuarial Accrued Liability, the UAAL will never completely disappear, but will become smaller each year, either as a dollar amount or in relation to covered payroll.
<i>PAF</i>	Pension Accumulation Fund.
<i>POA</i>	The 8th Amended Plan for the Adjustment of the Debt of the City of Detroit.
<i>Reserve Account</i>	An account used to indicate that funds have been set aside for a specific purpose and are not generally available for other uses.
<i>RSF</i>	Rate Stabilization Fund
<i>Solvency Liability</i>	A market-based measurement of the pension obligations.
<i>Transition Cost</i>	Initial unfunded liability as described in Section E-16 of the Plan document.
<i>Unfunded Actuarial Accrued Liability</i>	The difference between the Actuarial Accrued Liability and Funding Value of Assets.
<i>Valuation Date</i>	The date as of which the Actuarial Present Value of Future Benefits are determined. The benefits expected to be paid in the future are discounted to this date.
<i>VPIF</i>	Variable Pension Improvement Factor. Discussed in Section 6.2 of the Plan Document.

SECTION G

DRAFT FUNDING POLICY

Note: This Funding Policy has not been adopted by the Board or approved by the Investment Committee. It is included in this report to illustrate our understanding of prior discussions that we've had with the Board and Investment Committee. The red text, in particular, is intended to call attention to items that we believe needs further consideration from the Board and Investment Committee.

General Retirement System of the City of Detroit

Actuarial Funding Policy

Introduction

The purpose of this Actuarial Funding Policy is to record the funding objectives and policy set by the Board of Trustees (Board) for the General Retirement System of the City of Detroit (the System). The Board establishes this Actuarial Funding Policy to help ensure the systematic funding of future benefit payments for members of the Plan.

In 2014, the Plan for the System was written and approved by the bankruptcy court as part of the City's Plan of Adjustment (POA). At that time, the original retirement plan was split into two retirement plans: Component I (Hybrid) and Component II (Legacy). In accordance with the POA, employer contributions and certain assumptions cannot be changed until fiscal year 2024. This Policy is intended to establish a funding policy for the period beginning in fiscal year 2024, when employer contributions must be determined on an actuarial basis. Nothing in this Policy is intended to prevent the Board from altering the Policy prior to fiscal year 2024 as conditions change or additional information becomes available to the Board.

This Policy shall be regularly reviewed by the Board.

Funding Objectives

1. Provide benefit security to members of the System:
 - A. For purposes of this policy, benefit security means having adequate liquidity to pay benefits when due.
2. Establish an appropriate employer contribution based on the following objectives:
 - A. Fully funding the Legacy plan liability in 20 years from June 30, 2023;
 - B. Fully funding the Hybrid plan liability in 15 years from June 30, 2023; and
 - C. Managing employer contribution volatility.
3. Provide a reasonable margin for adverse experience to help offset risks.
4. Measure and monitor funding status, post-2024 contribution estimates and risks.
 - A. Perform annual valuations; and
 - B. Include post-2024 actuarial determined employer contributions (based on this Policy) in annual actuarial valuations performed for fiscal years before 2024.

Elements of Actuarial Funding Policy

The Plans will have annual actuarial valuations each June 30. Employer contributions will be determined for the fiscal year ending two years after the valuation date. For example, the actuarially determined employer contribution for the fiscal year ending June 30, 2024 will be determined by the June 30, 2022 annual actuarial valuation.

Annual actuarial valuations may or may not also serve other purposes such as for Legacy plan restoration, Hybrid plan Section 9.5 fiscal responsibility calculations, and/or Annuity Savings Fund excess interest transfers between components. Unless otherwise stated, those purposes are not subject to this Policy.

For funding purposes, annual actuarial valuations will include the following elements of the Actuarial Funding Policy:

1. Actuarial Cost Method

- A. Hybrid Plan: The Entry Age actuarial cost method shall be used in determining the Actuarial Accrued Liability (AAL) and Normal Cost with the entry age based on the date of hire. Since this component was created in July 2014 and granted eligibility and vesting service prior to July 2014 (for members hired before that date), this plan had an unfunded actuarial accrued liability on the plan effective date, known as the transition liability.
- B. Legacy Plan: The Unit Credit Normal actuarial cost method shall be used in determining Actuarial Accrued Liability (AAL) and Normal Cost. Since this component is closed and accrued benefits are frozen as of June 30, 2014, this method results in no normal costs and an AAL that equals the Present Value of Accrued Benefits (PVAB) of each member.

2. Asset Smoothing Method

- A. For determining (or estimating) employer contributions on or after fiscal year 2024, the Funding Value of Assets will be based on a method that employs smoothing of market gains and losses over a closed period. The smoothing period for recognize market gains and losses (above or below the assumed rate of return) will be a 3-year period.
- B. The Funding Value of Assets shall not diverge from the Market Value of Assets by more than 15%.
- C. The annual valuation will calculate results on both the smoothed value of assets and the (non-smoothed) Market Value of Assets beginning with the June 30, 2022 valuation (the Funding Value of Assets will initially be set to the Market Value of Assets as of June 30, 2021 with smoothing beginning prospectively). The post-2024 contribution estimate will always be based on the smoothed value of assets. Other results (UAAL, Funded Status, etc.) will be based on the Market Value of Assets prior to 2024 and the smoothed value of assets starting in 2024.

3. Amortization Method

A. Hybrid

- a) A Level Percent of Payroll amortization method shall be used to systematically eliminate (pay off) the Unfunded Actuarial Accrued Liability (UAAL) over a closed 15-year period from the later of July 1, 2023 or the applicable fiscal year after the funded status falls below 100%.
- b) If the funded status for a division is above 100%, the contribution requirements for the division's UAAL will be \$0 (thereby creating a minimum employer contribution of employer normal cost).
- c) Layered amortizations will be considered by the Board for contributions after fiscal year 2024.

Considerations for layering could include:

- (i) Length of initial period remaining;
 - (ii) Source of liability being amortized (i.e., new liabilities related to benefit changes and assumptions changes may be amortized over specific periods);
 - (iii) Magnitude of base that could be added in the current year;
 - (iv) The change in contribution levels from the prior year (i.e., if a previous base is falling off and the current base is going in the opposite direction, it might be better to roll it into an existing base in order to levelized contributions).
- d) Funding for any division that is at risk of depleting division assets may be accelerated. Divisions shall not be permitted to have a funded status below 0%.

B. Legacy

- a) The Level Dollar amortization method shall be used to systematically eliminate (pay off) the Unfunded Actuarial Accrued Liability (UAAL) over a closed period of no more than 20 years from July 1, 2023.
- b) If the funded status for a division is above 100%, the contribution requirements for the division's UAAL will be \$0 (thereby creating a minimum employer contribution of administrative expenses).
- c) Layered amortizations will be considered by the Board for contributions after fiscal year 2024.

Considerations for layering could include:

- (i) Length of initial period remaining;
 - (ii) Source of liability being amortized (i.e., new liabilities related to benefit changes and assumptions changes may be amortized over specific periods);
 - (iii) Magnitude of base that could be added in the current year;
 - (iv) The change in contribution levels from the prior year (i.e., if a previous base is falling off and the current base is going in the opposite direction, it might be better to roll it into an existing base in order to levelized contributions).
- d) Funding for any division that is at risk of depleting division assets may be accelerated. Divisions shall not be permitted to have a funded status below 0%.

4. Funding Target and Cash Flow Projections

- A. The targeted funded ratio shall be 100%.
- B. The Legacy annual actuarial valuation shall include projections of estimated employer contributions, expected benefit payments and estimated funded status to the later of fiscal year 2054 or 30 years after the applicable employer contribution fiscal year.
- C. Section 9.5 of the plan details the actions to be taken if the 5-year projected funded status falls below 100% (Hybrid, only).

5. Risk Management

A. Assumption Changes

- a) The actuarial assumptions to be used shall be those last adopted by the Board based on the most recent experience study and upon the advice and recommendation of the actuary. In accordance with the City Ordinance, the actuary shall conduct an experience study at least every five years. The results of the study shall be the basis for the actuarial assumption changes recommended to the Board;
- b) The actuarial assumptions may be updated at any time, as advised by the actuary, if significant plan design changes or other significant events occur that would dictate such a change; and
- c) Even though the investment rate of return may not be changed for determining employer contributions until after June 30, 2023, the Board may elect to show valuation results under an alternative reasonable assumed rate of investment return prior to 2023.

B. Risk Measures

- a) Risk measures will be included in the annual actuarial valuations. Below is a list of potential measures to be included. The measures may be changed over time as deemed appropriate.
 - (i) Classic measures
 - Funded ratio (assets / liability) on both a market value and funding value (if funding value is not equal to market).
 - UAAL amortization period (years required to pay down the UAAL based on current funding rates).
 - Portfolio rate of return for the year on both the market value and funding value of assets.
 - 5-year and 10-year geometric average portfolio rate of return on both the market value and funding value of assets (developed prospectively).
 - 5-year and 10-year standard deviation of return on both the market value and funding value of assets (developed prospectively).
 - (ii) Duration of the Actuarial Accrued Liability
 - Measures the sensitivity of the liability to a 1% change in assumed rate of return. A decrease in this measure indicates a decrease in assumed rate sensitivity and vice versa.
 - (iii) Total UAAL / Covered Payroll
 - Measures the risk associated with contribution rates relative to the impact on the ability to fund the UAAL. A decrease in this measure indicates a decrease in UAAL contribution risk and vice versa.
 - Consideration will be given to using total payroll or revenue source, if available.

(iv) Total Assets / Covered Payroll

- Measures the risk associated with the potential impact of asset experience on contributions. A decrease in this measure indicates a decrease in asset risk and vice versa.
- Consideration will be given to using total payroll or revenue source, if available.

(v) Total AAL / Covered Payroll

- Measures the risk associated with the potential impact of liability experience on contributions. A decrease in this measure indicates a decrease in experience risk and vice versa. This also provides a long-term measure of the asset risk where the System has a target funded ratio of 100%.
- Consideration will be given to using total payroll or revenue source, if available.

(vi) Non-Investment Cash Flow / Beginning of year assets

- Measures depletion risk, sensitivity to annual investment gains and losses risk and the maturity of the plan. For a mature open plan, this may converge to the negative of the real rate of return assumption (investment return less wage inflation). A less negative number (or a positive number) indicates a less mature plan and/or a plan that is at lower risk of fund depletion and less sensitive to annual gains and losses. A more negative number indicates a more mature plan and/or a plan that is more at risk of fund depletion and more sensitive to annual gains and losses. For a super-mature closed plan such as the Legacy plan, this may become more negative over time as liquidity needs increase.

(vii) Market Value of Assets / Benefit Payments

- Measure depletion risk. A low value estimates the number of years to depletion disregarding future contributions and investment return.

(viii) Solvency Liability

- Measures the estimated cost of accrued benefits as a result of minimizing investment risk in the portfolio.

b) Risk Control: The Board shall carefully monitor the risk measures above and shall consider steps to mitigate risk, particularly as the Legacy funded ratio increases. Examples of risk mitigating techniques include, but are not limited to:

- (i) Reviewing investment risk in accordance with the Board's Investment Policy;
- (ii) Adding provisions for adverse deviation in the actuarial assumptions;
- (iii) Increasing employer contributions (through a change in methods, assumptions, or amortization period); and
- (iv) Other.

1. **Actuarial Accrued Liability (AAL):** The difference between (i) the actuarial present value of future plan benefits, and (ii) the actuarial present value of future normal cost. Sometimes referred to as “accrued liability” or “past service liability.”
2. **Actuarial Assumptions:** Estimates of future plan experience with respect to rates of mortality, disability, turnover, retirement, rate or rates of investment income and salary increases. Decrement assumptions (rates of mortality, disability, turnover and retirement) are generally based on past experience, often modified for projected changes in conditions. Economic assumptions (salary increases and investment income) consist of an underlying rate in an inflation-free environment plus a provision for a long-term average rate of inflation.
3. **Actuarial Cost Method:** A mathematical budgeting procedure for allocating the dollar amount of the “actuarial present value of future plan benefits” between the actuarial present value of future normal cost and the actuarial accrued liability. Sometimes referred to as the “actuarial funding method.”
4. **Actuarial Gain (Loss):** A measure of the difference between actual experience and that expected based upon a set of actuarial assumptions during the period between two actuarial valuation dates, in accordance with the actuarial cost method being used. For example, if during a given year the assets earn more than the investment return assumption, the amount of earnings above the assumption will cause an unexpected reduction in UAAL, or “actuarial gain” as of the next valuation. These include contribution gains and losses that result from actual contributions made being greater or less than the level determined under the policy.
5. **Actuary:** A person who is trained in the applications of probability and compound interest to problems in business and finance that involve payment of money in the future, contingent upon the occurrence of future events. Most actuaries in the United States are Members of the American Academy of Actuaries (MAAA). The Society of Actuaries is an international research, education and membership organization for actuaries in the life and health insurance, employee benefits, and pension fields. It administers a series of examinations leading initially to Associateship and the designation ASA and ultimately to Fellowship with the designation FSA.
6. **Amortization:** Paying off an interest-bearing liability by means of periodic payments of interest and principal, as opposed to paying it off with a lump sum payment.
7. **Experience Study:** An actuarial investigation of demographic and economic experiences of the system during the period studied. The investigation was made for the purpose of updating the actuarial assumptions used in valuing the actuarial liabilities.
8. **Funding Value of Assets:** The value of current plan assets recognized for valuation purposes. Generally based on a phased-in recognition of all or a portion of market related investment return. Sometimes referred to as Actuarial Value of Assets or Smoothed value of Assets.
9. **Market Value of Assets:** The fair value of plan assets as reported in the plan’s audited financial statements.
10. **Normal Cost (NC):** The annual cost assigned, under the actuarial funding method, to current and subsequent plan years. Sometimes referred to as “current service cost.” Any payment toward the unfunded actuarial accrued liability is not part of the normal cost.
11. **Unfunded Actuarial Accrued Liability (UAAL):** The positive difference, if any, between the actuarial accrued liability and valuation assets. Sometimes referred to as “unfunded accrued liability.”
12. **Unit Credit Normal Actuarial Cost Method:** A funding method that calculates the Normal Cost as the present value of the change in accrued benefits for active members.