

April 18, 2023

Ms. Bethany Rhodes
Executive Director
Ohio Retirement Study Council

Subject: Review of Ohio Police and Fire Funding Period and Actuarial Status as of January 2022

Dear Bethany:

As required by Section 742.311 of the Ohio Revised Code (ORC), we have reviewed the adequacy of the current statutory contribution rates to the Ohio Police and Fire Pension Fund (OP&F).

Section 742.311 of the ORC requires an annual review of the adequacy of the contribution rates provided under sections 742.31, 742.33, and 742.34 and the contribution rates recommended in a report by the actuary of OP&F for the forthcoming year. Section 742.31 governs the contributions made by the employees, 742.33 governs the contributions made by police officers' employers and 742.34 governs the contributions made by the firefighter employers.

Cavanaugh MacDonald Consulting, LLC (CMC), actuary for OP&F, made a calculation that the unfunded liability for the statutory pension benefits would be fully amortized over a period of 29 years, based on the current level of contributions. The UAAL of \$7.422 billion as of January 1, 2022 would decline to zero by December 31, 2050. We were able to replicate the CMC calculations of the projection of the unfunded actuarial accrued liability funding period based on their actuarial methods, assumptions and level of contributions.

Our primary finding however, is that the assumed level of future OP&F administrative expenses assumed by CMC is not realistic and not an appropriate consideration for this determination of funding period.

We do not believe that the 29-year funding period is calculated using realistic assumptions of future OP&F administrative expenses. Specifically, the CMC methodology assumes that a one-time \$9 million credit from OPERS to OP&F recognizing the cost of OPERS benefits for OP&F staff would recur year-after-year for 29 years. This will not occur.

In a letter dated December 2, 2022, CMC provided a comparison of the expected 2022 amortization contribution of 17.76% based on the January 1, 2021 valuation to the actual 2022 amortization contribution of 18.52% based on the January 1, 2022 valuation before assumption changes. Their breakdown is provided in the following chart:

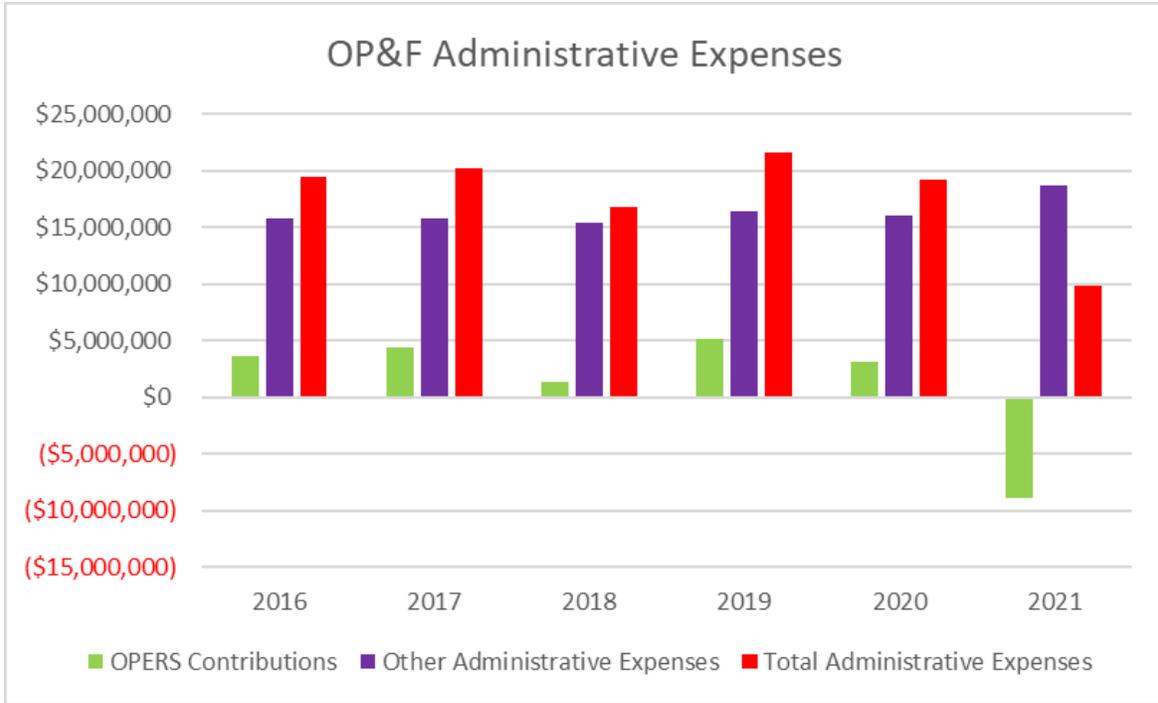
2022 Amortization Contribution based on:			
	1.1.2021 Valuation	1.1.2022 Valuation and old assumptions	Difference
The employer contribution rate	21.66%	21.70%	0.04%
Less the Health Care Allocation	-.50%	-.50%	0.00%
Less the Normal Cost rate	-14.63%	-14.56%	0.07%
Less administrative expenses	-1.03%	-0.38%	0.65%
Plus the State Subsidy	0.01%	0.01%	0.00%
Plus the member contribution rate	12.25%	12.25%	0.00%
Amortization Contribution rate	17.76%	18.52%	0.76%

CMC stated “As seen above, the primary cause of the increase in the amortization is administrative expenses. Administrative expenses in 2020 were \$24.9 million, and in 2021 were \$9.6 million a reduction of 60%.” Further inspection of this reduction in administrative expenses demonstrates our concern.

With the assistance of ORSC Staff, we developed the following from the OP&F Annual Comprehensive Financial Reports

	Net Administrative Expenses	OPERS Contributions	All Other Net Administrative Expenses
2016	\$19,517,891	\$3,672,521	\$14,845,370
2017	20,218,704	4,426,337	15,792,367
2018	16,780,220	1,340,383	15,439,837
2019	21,612,071	5,207,356	16,404,715
2020	19,218,035	3,123,667	16,094,368
2021	9,780,703	(8,921,262)	18,701,965

This illustrates that other than the OPERS Contributions for retiree healthcare benefits for the OP&F staff, administrative expenses – as shown in the right column – have been relatively stable and slightly increasing. OPERS contributions have been very volatile and even resulted in a nearly \$9 million negative accounting expense in 2021. This is also illustrated in the graph on the following page:



The methodology assumed by the actuary essentially is predicated on this \$9 million expense reduction continuing every year for the next 29 years, somehow freeing up cash that can be used to pay down the OP&F unfunded liability. We find this impossible to believe.

If we were to recalculate the funding projection on the basis that the \$9 million OPERS adjustment is not recurring, we find that the funding period as of January 1, 2022 is not 29 years, but is 31 years. Other reasonable methods could be used to estimate future administrative expenses. The assumption that \$9 million credit from OPERS will recur and can somehow be used to fund pension benefits for OP&F members is not a reasonable assumption and not an appropriate measure of the fund’s financial future.

Conclusion

The conclusion of our annual review of the adequacy of the contribution rates provided under sections 742.31, 742.33, and 742.34 and the contribution rates recommended in a report by the actuary of OP&F for 2022 and beyond is that the calculation of a 29-year OP&F funding period is not reasonable.

We are happy to discuss this further with ORSC staff, the Council, and OP&F.

Sincerely,

William B. Fornia, FSA

Cc: Linda Bournival, KMS Actuaries

This report demonstrates the findings discussed in our summary and other issues related to OP&F's progress in meeting the funding objectives.

Topics to be addressed in this report include:

- Adequacy of current statutory contributions rates to fund current statutory benefits
- Requirements of ORC
- Projection methodology
- Impact of Medicare Part B benefits
- Potential future changes to actuarial assumptions
- Likelihood of necessity for future changes in benefits or contributions
- Health care benefits
- Potential ORSC recommendations

BACKGROUND

Cavanaugh MacDonald Consulting, LLC (CMC), actuary for OP&F, issued the report on Actuarial Valuation of Pension Benefits as of January 1, 2022 in October 2022. The actuarial report is an essential measure of the funded position of OP&F. While the Actuarial Valuation focuses on pension benefits only, the report also includes the valuation of Medicare Part B premium reimbursements as requested by the Ohio Retirement Study Council (ORSC) so that further analysis of the impact of Part B reimbursements can be conducted.

An actuarial valuation is built upon five pillars:

- All individual demographic data of OP&F members (active, terminated, and retired)
- OP&F benefit provisions
- Actuarial assumptions as to future contingent events
- Pension fund asset information
- Funding policy and actuarial funding methods

The actuary uses these parameters to determine various actuarial measures, including:

- Actuarial Accrued Liabilities (AAL) for benefits as of the valuation date (January 1, 2022)
- Unfunded Actuarial Accrued Liabilities (UAAL)
- Normal Cost Rate: The contribution requirement to systematically fund the future service liabilities
- Funding Period necessary to completely amortize the UAAL

ADEQUACY

Cavanaugh MacDonald Consulting, LLC (CMC), actuary for OP&F, made a calculation that the unfunded liability for the statutory pension benefits would be fully amortized over a period of 29 years, based on the current level of contributions. The UAAL of \$7.422 billion as of January 1, 2022 would decline to zero by December 31, 2050. We were able to replicate the CMC calculations of the projection of the UAAL funding period based on their actuarial methods, assumptions and level of contributions. Although we did replicate the calculations, as discussed above they are based on an assumption that \$9 million OPERS

credit would continue for the next 29 years and be available to fund pension benefits for OP&F members. This will not occur. Consequently, we do not find that the 29 year calculation is valid.

These calculations were based on a smoothed Actuarial Value of Assets (AVA) of \$17.096 billion. The true Market Value of Assets (MVA) is \$18.777 billion. It is a common actuarial technique to use a smoothed Actuarial Value of Assets. This is done to prevent overcompensating for heavy swings in asset values. This smoothing technique is a major reason that the funding period did not fall further as a result of strong 2021 investment return. We calculate that if the calculation had been based on the MVA, the funding period would have been 19 years. Recall that this calculation as of the beginning of 2021 produced a funding period of 23 years. This demonstrates the higher volatility of this measure.

The UAAL is \$5.741 billion, based on the unsmoothed MVA. The AVA is \$1.681 billion less than the current (unsmoothed) MVA. Because the smoothing impact of this \$1.681 billion will be completely recognized within five years – long before the thirty-year funding period, an argument could be made that the funding period calculation should be based on the MVA instead of the AVA. This means that if experience after January 1, 2022 is exactly as expected, the unfunded liability will be completely amortized in 2040, a period of 19 years.

When including the liabilities for statutory Medicare Part B reimbursement, the AAL grows by \$224 million. The CMC methodology assumes that \$224 million of the \$967 million in assets in the separate Health Care Stabilization Fund (HCSF) are considered to be allocated toward this Medicare Part B AAL. Consequently, there is no impact on Unfunded AAL by including Medicare Part B. We find that this approach is reasonable, although the solvency of the HCSF is weakened. This allocation of \$224 million of the \$967 million total represents 23% of the HCSF.

When this approach was utilized as of January 1, 2015, 48% of the HCSF was needed to be allocated to the Medicare Part B liability. This grew to 61% as of January 1, 2017. This was because the Medicare Part B AAL was increasing while the total HCSF was decreasing. But the actuarial liability for Medicare Part B benefits decreased from \$551 million as of January 1, 2017 to \$224 million as of January 1, 2022. This decrease was substantial and primarily due to an OP&F Board Policy to not increase the Medicare Part B reimbursement rate (from \$107 per month) for the next three years. In addition, the actuarial assumption is now that there will be no further increase in this reimbursement rate. This improves funding available for pensions significantly, but, of course, is a consequence of the reduced Medicare Part B reimbursement. Furthermore, OP&F moved to an exchange-based retiree health program, which reduces the outflows from the HCSF.

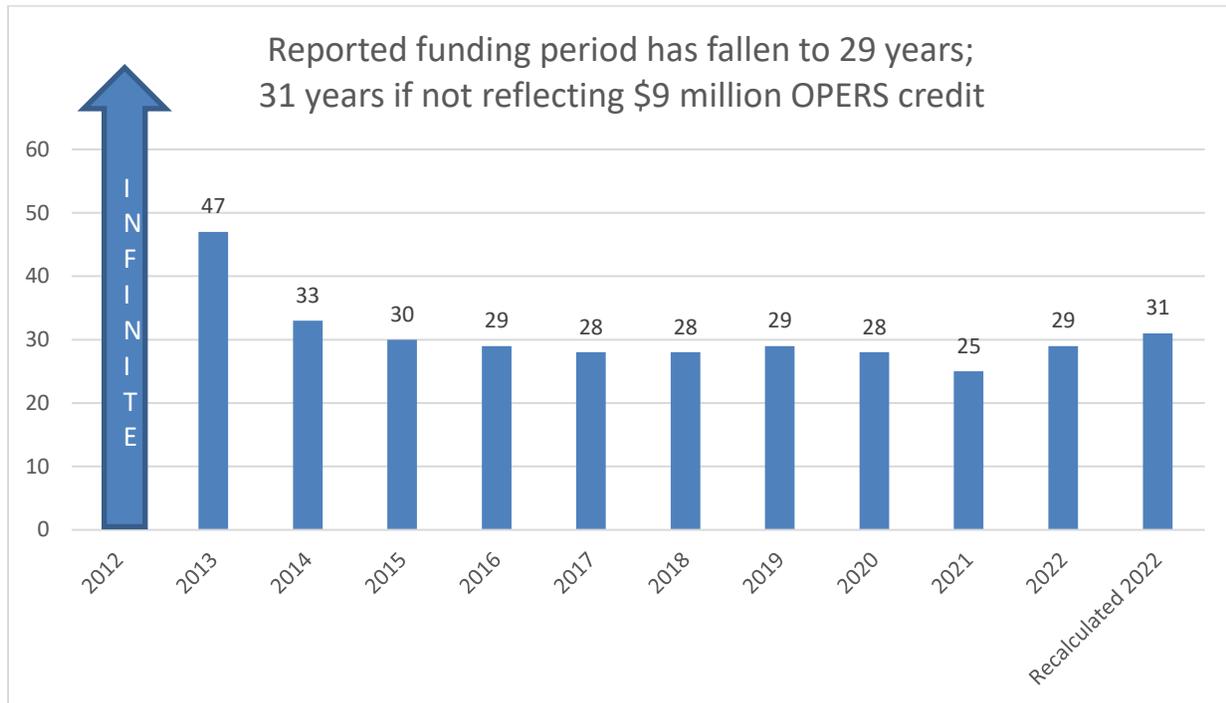
Our calculations are summarized in the table below and Appendix I. All dollar figures are in \$billions as of January 1, 2022.

Funding Period on Various Bases (values in \$billions)

Statutory Benefits Considered	Asset Basis	Actuarial Liability	Assets	UAAL	Funding Period
Pension Only	AVA	\$24.518	\$17.096	\$7.422	29 years
Pension Only	MVA	24.518	18.777	5.741	19 years
Pension and Medicare B Reimbursement	AVA	24.712	17.096	7.646*	29 years
Pension and Medicare B Reimbursement	MVA	24.712	18.777	5.965*	19 years

* Unfunded Liability for scenarios with Medicare B reimbursement assumes that the reimbursement will be paid from the Health Care Stabilization Fund.

Note that the amortization period has fallen since it was 47 years in 2013. It would be 29 years for 2022 if the \$9 million OPERS credit were to continue, and 31 years if not. Prior to 2013 and Senate Bill 340, the OP&F amortization period was infinite, meaning that the contributions were projected to never pay off the unfunded liability. This shows strong improvement since 2012-2013, but some deterioration since 2014, since the funding period is expected to reduce by one each year as the date of anticipated full funding approaches. These are illustrated in the following graph.



REQUIREMENTS OF ORC 742.311

The Ohio Revised Code 742.311, for which this report is written, requires that the ORSC shall annually review the *adequacy* of the OP&F contribution rates. An additional requirement is that the calculations be based on the “entry age normal actuarial cost method” (EAN). We confirm that CMC is using EAN as the basis for its calculations.

ORC 742.311 also states that the ORSC “shall make recommendations to the general assembly that it finds necessary for the proper financing of the benefits of [OP&F].”

CMC reports that:

Section 742.16 of the ORC, as adopted by Senate Bill No. 82, sets forth an objective that the funding period is no more than 30 years. If the funding period exceeds 30 years, a plan shall be developed and presented by the Board of Trustees to the ORSC to reduce the funding period to not more than 30 years. Section 742.14 of the ORC, as amended by Senate Bill No. 340, sets forth that the 30-year funding analysis be performed every three years and the 30-year plan, if necessary, be developed and presented not later than 90 days after the Board of Trustees’ receipt of the actuarial valuation and 30-year funding analysis. The

most recent triennial analysis was based on the January 1, 2022 actuarial valuation, and showed the funding period was 29 years, so no 30-year funding plan is required. The next analysis will be performed based on the January 1, 2025 actuarial valuation.

The funding period reported by CMC is now 29 years. We do not agree that this is a realistic figure. The funding period is expected to shorten as strong investment returns for 2020 and 2021 become more fully incorporated into the actuarial value of assets but will also increase due to poor 2022 investment return.

PROJECTION METHODOLOGY

While CMC is using the EAN method, they are reflecting certain future anticipated changes in its projections which determine the funding period. We believe that this approach is reasonable, although the methods do not follow the specific traditional use of the EAN method and its corresponding amortization period. Because the nature of the traditional EAN method does not incorporate important characteristics of the OP&F (and other Ohio plans) funding structure, CMC has modified this method in a manner which we find is reasonable and appropriate.

CMC calculates an employer amortization contribution rate toward the unfunded liability of 17.09% in its Table 1 Summary of Actuarial Valuation Results. CMC then goes on to demonstrate that the 17.09% amortization rate with anticipated future adjustments is sufficient to amortize the unfunded liability over 29 years. This is demonstrated in CMC's Table 7 and verified by PTA/KMS in Appendix 1 of this report. Note that the 17.09% rate is projected to increase to 17.19% by 2031. This increase is expected to occur because the normal cost for future members is projected to decrease as new members have a normal cost which is lower than the normal cost for current members. This cost savings is 0.10% of pay.

Note that traditional actuarial methods and their amortization calculations would not reflect this future expectation. Under the traditional calculation method, an actuarial contribution requirement is determined based only on the current normal cost rate plus an amortization of unfunded liability over a fixed period based on AVA. We believe that it is reasonable and appropriate to include this anticipation of the changes to the normal cost of future members in the funding period calculation as does CMC.

In our table on page 5, we calculated the funding period using both AVA and MVA. At this point in the investment cycle, the MVA exceeds the AVA. This is because the 2019, 2020 and 2021 investment gains have not been fully recognized in AVA. CMC's projection calculations used the (lower) AVA. In general, we believe it also important to consider the true MVA. This would determine the funding period for statutory benefits as 19 years. The use of the higher MVA shortens the period by 10 years. While 2021 investment returns were strong (almost 19%), returns during 2022 were poor. This points to the importance of using a smoothed AVA method.

In a potential future year when hard decisions may be likely necessary in order to stay within the 30-year period, there could be a larger disparity between MVA and AVA. The purpose of AVA is to smooth out investment return fluctuations and not make panic decisions based on short term results. But 742.14 only requires a triennial report for a funding plan. This also has an effect of smoothing out fluctuations. We recommend that all decisions pertaining to plan changes be based on considering both MVA and AVA. ORSC requires reporting on an AVA basis only.

MEDICARE PART B IMPACT

As stated previously, the CMC 30-year funding period calculation did not explicitly reflect the non-pension statutory benefit of the reimbursement of Medicare Part B premiums. The inclusion of this benefit increases both the liabilities and assets and has no impact on the UAAL and therefore no impact on the funding period at this time.

There may be some ambiguity in this requirement, because 742.16 of the ORC, which discusses the thirty-year funding plan specifies “unfunded actuarial accrued pension liabilities.” While CMC’s funding period calculation did not explicitly address the Medicare Part B issue, because there are sufficient assets in the Health Care Stabilization Fund (\$967 million) to cover these liabilities (\$224 million) at this time, the issue is moot. If experience deteriorates, there might not be sufficient assets in the future and the distinction might be relevant.

The \$224 million is not explicitly segregated for Medicare Part B payments and would decline in the future years if other health benefits (beyond Medicare Part B payments) are provided. In particular, 0.50% of pay is allocated to the HCSF, but 0.09% has been calculated as the normal cost for the Medicare Part B benefits. This means that 0.41% can be explicitly attributed to health care benefits other than Medicare Part B. This substantial increase from 2017 is due to the reduction in anticipated future Medicare Part B premium reimbursement. The 0.09% contribution and the \$224 million AAL attributed to Medicare Part B reimbursements are not dedicated or segregated, but comingled with other HCSF assets and liabilities.

During 2021 and 2020, the HCSF had the following cash flow, as shown in Table 4 of the CMC Health Care Actuarial Reports (all values in thousands):

Summary of HCSF Market Value of Plan Assets (values in \$thousands)

Item	2021	2020
Market Value of HCSF as of January 1	\$881,584	\$878,689
Contributions		
Employer	12,758	12,167
Member Premiums	0	0
Total	12,758	12,167
Benefits and Administrative Expenses	87,193	84,564
Investment Income	159,291	74,729
Other Income	262	563
Market Value of HCSF as of December 31	966,702	881,584

In very approximate terms, CMC is projecting that the HCSF is decreasing each year by \$87 million due to benefits and increasing by \$13 million due to contributions plus other income. If investment return on the \$967 million fund is 7.5% as assumed, that would generate roughly \$73 million. So the HCSF was expected to drop by about \$1 million per year. In particular, CMC projects insolvency in 2047 if returns are 7.5% and in 2040 if returns are 5.5%.

OP&F moved to an Exchange solution effective January 1, 2019, which provides eligible retirees and survivors with a fixed monthly stipend earmarked to pay for health care, and OP&F’s reimbursement of Medicare Part B premiums. This has reduced net outflows substantially, as they dropped from \$219 million in 2018 to \$77 million in 2019, \$85 million in 2020 and \$87 million in 2021.

Prior to the 2018 investment losses and the move to an Exchange solution, the HCSF was projected to be depleted by 2034. This is now 2046. Note that this is five years prior to the full funding of pension benefits. This means that even if all actuarial assumptions are met, the HCSF would be depleted prior to the payoff of the unfunded pension liability.

CHANGES TO ACTUARIAL ASSUMPTIONS

The OP&F Board voted to reduce their assumed rate of return from 8.00% to 7.50% in February, 2022. This analysis reflects the reduction and we have reviewed certain calculations from the actuary and find them consistent with our calculations. These were discussed in our letter of May 25, 2022 analyzing a proposed increase in employer contributions from HB 512. In particular, we reviewed the statement from CMC, that “After reducing the assumed rate of return from 8.00% to 7.50%, based on the current contribution rates, the funding period is estimated to be 39 years.”

Although the assumed rate of investment return was reduced to 7.50%, when assumptions are next reviewed, there may be another consideration in a reduction in the 7.50% assumed rate of investment return. This is for two related reasons.

First is that the low interest rate environment which began with the 2008 financial crisis shows little sign of abating, even as post-pandemic inflation increases. Long term treasury rates are still near historic lows and long-term inflation expectations remain at low rates. For example, CMC’s 7.50% rate was built upon a pillar of 2.75% inflation. Long term inflation predictions generally call for an inflation rate somewhat less than this.

Second is that public plans around the country, based on their actuaries’ advice, are reducing their assumed rates of investment return. According to data in November 2022 from NASRA (National Association of State Retirement Administrators), only one plan of 131 surveyed, has an investment return higher than 7.5%. Even as OP&F reduces their assumed rate of return to 7.5%, they are one of only 7 (the most optimistic 5.25%). According to NASRA’s March, 2023 Issue Brief, the average plan is using 6.93% for their nominal investment return assumption and 2.52% for their inflation assumption.

LIKELIHOOD OF NECESSITY FOR FUTURE CHANGES

Based on the actuarial valuation as of January 1, 2022, CMC has projected that a statutorily required 30-year maximum funding period for statutory benefits will continue to be met. We do not believe that this calculation was made using reasonable assumptions (specifically, the continuing of \$9 million OPERS credit). We also now know that investment returns were poor for 2022.

We expect that if the inappropriate \$9 million OPERS credit assumption were corrected and poor 2022 returns are considered, the funding period will possibly exceed 30 years in 2023.

We expanded our estimate to recognize the poor 7.64% investment loss through November 2022 and the asset smoothing method, but our estimates do not reflect any unanticipated experience during 2022 or further changes in actuarial assumptions. It is not unusual for these other changes to impact the funding period by several years.

The results are based on the market peak of January 1, 2022. We had been informed that OP&F investment return through November of 2022 was -7.64%. We estimated that if investment returns for the remainder of 2022 were at the assumed rate of 7.50% per year (about 0.6% per month), the full return for 2022 would be about -7% (a loss of 7%). This means that OP&F will have missed the 7.5% target by about 14.5%. But OP&F beat the 8% target by 11% in 2021, by 1% in 2020, and by 9% in 2019. The asset smoothing method has not yet completely reflected these three good years and will only partially reflect the bad 2022 year. Based on 2022 return of -7% and based on the unrealistic CMC assumed ongoing \$9 million OPERS credit, we calculated that the thirty-year maximum period would continue to be met as of January 1, 2023 and would actually further improve to 27 years. This is precisely the purpose of asset smoothing methods – to recognize strong investment return gradually so that when returns are poor the consequences won’t be so dire.

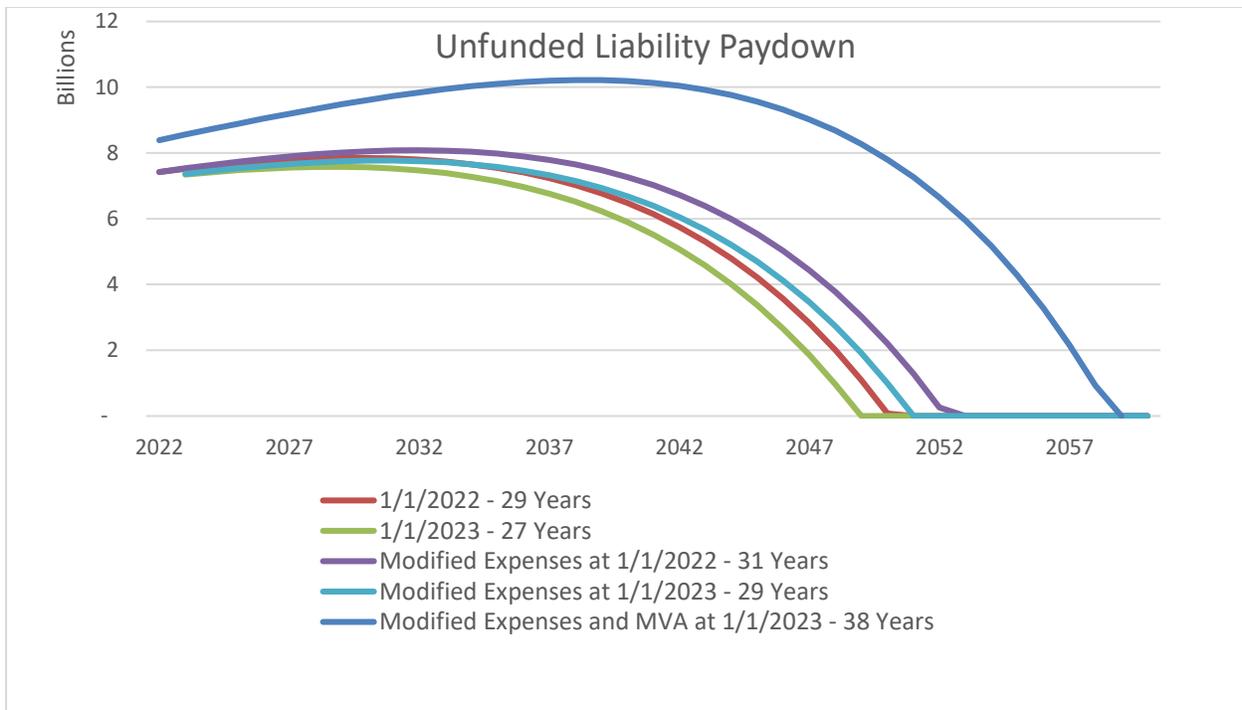
As of January 1, 2023, we estimate that the asset smoothing method will result in approximately \$907 million of investment return which is not reflected in the actuarial value of assets. But by the end of this year (based on a 7% investment loss), this will revert to approximately \$0.7 billion of investment underperformance to be recognized in future actuarial asset values. So while we would have a 30 year funding period as of January 1, 2023, it would be expected to get a bit longer, if future returns are 7.5%.

The following table summarizes our estimates (based on faulty CMC assumption of \$9 million credit):

Actuarial Valuation Date as of January 1	Expected Return on Plan Assets	Investment Return in 2022	Assets Recognized	Unfunded Liability	Funding Period
2022	7.5%		AVA	\$7.4 billion	29 years
2022	7.5%		MVA	\$5.7 billion	19 years
2023	7.5%	-7%	AVA	\$7.3 billion	27 years
2023	7.5%	-7%	MVA	\$8.4 billion	35 years

The graph below shows that the funding period is 29 years as of 1/1/2022 based on a 7.5% return, \$9 million ongoing credit, and the actuarial value of assets (AVA) and is estimated to shrink to 27 years as of 1/1/2023, based on AVA, once another year of strong returns is included in the smoothed assets, even with the inclusion of poor 2022 returns.

We have also illustrated the funding periods which would occur if the administrative expense assumption had not been decreased by 0.65%. This results in funding periods of 31 years and 29 years as of 1/1/2022 and 1/1/2023, respectively. However, using Market Value of Assets (MVA) as of 1/1/23 would result in a funding period of 38 years. As discussed above, we believe that these are the more appropriate measures of the funding period.



As mentioned above, the January 1, 2023, actuarial valuation will measure all variables and modify further actuarial assumptions. This will lead to results which will be more or less favorable than our estimates above. But all things being equal, after correcting for the faulty assumption of ongoing \$9 million OPERS credit, we believe that it is likely that the funding period as of January 1, 2023, could be more than 30 years, and likely that the funding period in future years will be longer than 30 years.

HEALTH CARE BENEFITS

The actuarial analysis discussed above and presented in the CMC report are based on statutory pension benefits, the statutory Medicare Part B reimbursement benefit, and a contribution to retiree health care benefits of only 0.50%.

This level of 0.50% is not sufficient to provide meaningful retiree health benefits. CMC has not conducted a complete Actuarial Valuation of Retiree Health Care Benefits as of January 1, 2022, but has only prepared an Actuarial Solvency Projection of the HCSF. However, Buck reported key facts in its October, 2016 Actuarial Valuation of Retiree Health Care Benefits as of January 1, 2016. These include:

- The Normal Cost rate for the current level of benefits was 9.66% of pay
- The annual rate for amortizing the unfunded liability was 7.53% of pay
- The employer contribution toward the health care stabilization fund is 0.50% of pay
- The funded ratio (Assets divided by AAL) was 18%

From the 1/1/2022 Pension Actuarial Valuation, CMC reports that the normal cost for the Medicare Part B Premium Reimbursement benefit increased from 0.08% to 0.09%.

From the 1/1/2022 Solvency Projection, as shown in our table on page 8, CMC reports that:

- Employer contributions plus member contributions to HCSF were \$13 million during 2021
- HCSF benefits and administrative expenses were \$87 million during 2021

This all means that the current contribution rate is nowhere near adequate to fund the current level of healthcare benefits in the long term. The move to a stipend-based approach effective 2019 has helped extend the solvency somewhat.

POTENTIAL ORSC RECOMMENDATIONS

OP&F does report that the funding period is 29 years. This is heavily dependent on assumed future expenses which we believe are not likely to be attained. In particular, an ongoing \$9 million credit from OPERS is reflected in the long-term expense projections. We would encourage ORSC to explore this issue further with OP&F.

RECAP OF FINDINGS

- The reported funding period of 29 years is based on an invalid assumption that \$9 million in credit from OPERS will continue for 29 years and be available to fund pension benefits.
- We have replicated the calculations in OP&F's funding period determination.
- These calculations are highly dependent on historically low administrative expenses continuing for the next thirty years. We would not expect this to actually occur. Correcting for this would extend the funding period beyond thirty years.
- Although this is a substantial improvement over the 2012 and 2013 situation, it is no improvement since 2015, when the plan was projected to be fully funded by 2044.
- Because investment returns were strong for the years 2019 through 2021 and these have not yet been fully phased-in to the AVA, the thirty-year period might also be met as of January 1, 2023, even though returns for 2022 were very poor.
- We expect that further modifications would be necessary to maintain 30-year funding.

Actuarial calculations were performed under the direction of William Forna, FSA. I am a Member of the American Academy of Actuaries and qualified to render this actuarial opinion. We are available to discuss these findings and recommendations in more detail.

APPENDIX I – Funding Period Calculations

Replication of CMC Calculation – Based on January 1, 2022 Valuation

Year	Plan Year	Outstanding Balance at Beginning of Year (UAAL)	Assumed Amortization Contribution Rate	Assumed Payroll @ 3.25% Growth Rate	Mid-Year Amortization Contribution Amount	Outstanding Balance at End of Year (UAAL)
1	2022	\$ 7,421,747,982	17.09%	\$ 2,619,248,911	\$ 447,629,639	\$7,514,266,793
2	2023	7,514,266,793	17.11%	2,704,374,501	462,684,468	7,598,115,336
3	2024	7,598,115,336	17.14%	2,792,266,672	478,549,273	7,671,803,540
4	2025	7,671,803,540	17.15%	2,883,015,339	494,450,089	7,734,532,042
5	2026	7,734,532,042	17.17%	2,976,713,337	510,963,695	7,784,843,510
6	2027	7,784,843,510	17.17%	3,073,456,521	527,603,104	7,821,676,232
7	2028	7,821,676,232	17.18%	3,173,343,858	545,190,928	7,843,035,964
8	2029	7,843,035,964	17.18%	3,276,477,533	562,937,875	7,847,597,250
9	2030	7,847,597,250	17.18%	3,382,963,053	581,338,190	7,833,422,780
10	2031	7,833,422,780	17.19%	3,492,909,352	600,294,996	7,798,530,389
11	2032	7,798,530,389	17.19%	3,606,428,906	619,981,854	7,740,609,301
12	2033	7,740,609,301	17.19%	3,723,637,845	640,261,634	7,657,317,608
13	2034	7,657,317,608	17.18%	3,844,656,075	660,582,937	7,546,709,462
14	2035	7,546,709,462	17.16%	3,969,607,398	681,215,588	7,406,413,317
15	2036	7,406,413,317	17.14%	4,098,619,638	702,663,928	7,233,356,849
16	2037	7,233,356,849	17.14%	4,231,824,776	725,263,928	7,023,888,967
17	2038	7,023,888,967	17.13%	4,369,359,082	748,525,565	6,774,592,815
18	2039	6,774,592,815	17.12%	4,511,363,252	772,121,078	6,482,135,104
19	2040	6,482,135,104	17.11%	4,657,982,558	797,097,509	6,141,846,950
20	2041	6,141,846,950	17.11%	4,809,366,991	822,976,947	5,749,204,812
21	2042	5,749,204,812	17.10%	4,965,671,418	849,250,625	5,299,873,384
22	2043	5,299,873,384	17.11%	5,127,055,739	876,999,078	4,788,071,890
23	2044	4,788,071,890	17.10%	5,293,685,050	905,065,275	4,208,785,632
24	2045	4,208,785,632	17.09%	5,465,729,815	933,893,721	3,556,162,936
25	2046	3,556,162,936	17.08%	5,643,366,034	963,972,569	2,823,407,124
26	2047	2,823,407,124	17.07%	5,826,775,430	994,839,224	2,003,691,397
27	2048	2,003,691,397	17.05%	6,016,145,631	1,025,954,309	1,090,236,184
28	2049	1,090,236,184	17.04%	6,211,670,364	1,058,247,192	74,789,856
29	2050	74,789,856	17.02%	6,413,549,651	1,091,523,201	-

Resulting Funding Period = 29 Years

APPENDIX I – Funding Period Calculations (continued)

Alternate Calculation – Based on Adjusted Administrative Expense Assumption of 1.03%

Year	Plan Year	Outstanding Balance at Beginning of Year (UAAL)	Assumed Amortization Contribution Rate	Assumed Payroll @ 3.25% Growth Rate	Mid-Year Amortization Contribution Amount	Outstanding Balance at End of Year (UAAL)
1	2022	\$ 7,421,747,982	16.44%	\$ 2,619,248,911	\$ 430,604,521	\$7,531,918,811
2	2023	7,531,918,811	16.46%	2,704,374,501	445,140,043	7,635,281,702
3	2024	7,635,281,702	16.49%	2,792,266,672	460,444,774	7,730,528,527
4	2025	7,730,528,527	16.50%	2,883,015,339	475,697,531	7,817,104,469
5	2026	7,817,104,469	16.52%	2,976,713,337	491,753,043	7,893,526,897
6	2027	7,893,526,897	16.52%	3,073,456,521	507,735,017	7,959,110,544
7	2028	7,959,110,544	16.53%	3,173,343,858	524,553,740	8,012,174,942
8	2029	8,012,174,942	16.53%	3,276,477,533	541,601,736	8,051,543,431
9	2030	8,051,543,431	16.53%	3,382,963,053	559,203,793	8,075,614,355
10	2031	8,075,614,355	16.54%	3,492,909,352	577,727,207	8,082,285,115
11	2032	8,082,285,115	16.54%	3,606,428,906	596,503,341	8,069,988,671
12	2033	8,069,988,671	16.54%	3,723,637,845	615,889,700	8,036,669,789
13	2034	8,036,669,789	16.53%	3,844,656,075	635,521,649	7,980,497,153
14	2035	7,980,497,153	16.51%	3,969,607,398	655,382,181	7,899,519,731
15	2036	7,899,519,731	16.49%	4,098,619,638	675,862,378	7,791,234,683
16	2037	7,791,234,683	16.49%	4,231,824,776	697,827,906	7,652,053,912
17	2038	7,652,053,912	16.48%	4,369,359,082	720,070,377	7,479,373,098
18	2039	7,479,373,098	16.47%	4,511,363,252	743,021,528	7,269,944,964
19	2040	7,269,944,964	16.46%	4,657,982,558	766,703,929	7,020,255,284
20	2041	7,020,255,284	16.46%	4,809,366,991	791,621,807	6,726,003,471
21	2042	6,726,003,471	16.45%	4,965,671,418	816,852,948	6,383,522,569
22	2043	6,383,522,569	16.46%	5,127,055,739	843,913,375	5,987,298,752
23	2044	5,987,298,752	16.45%	5,293,685,050	870,811,191	5,533,469,899
24	2045	5,533,469,899	16.44%	5,465,729,815	898,565,982	5,016,827,102
25	2046	5,016,827,102	16.43%	5,643,366,034	927,205,039	4,431,742,489
26	2047	4,431,742,489	16.42%	5,826,775,430	956,756,526	3,772,136,896
27	2048	3,772,136,896	16.40%	6,016,145,631	986,647,884	3,032,068,865
28	2049	3,032,068,865	16.39%	6,211,670,364	1,018,092,773	2,203,892,976
29	2050	2,203,892,976	16.37%	6,413,549,651	1,049,898,078	1,280,627,454
30	2051	1,280,627,454	16.34%	6,621,990,015	1,082,033,168	254,798,646
31	2052	254,798,646	16.34%	6,837,204,690	1,117,199,246	-

Resulting Funding Period = 31 Years