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***NEBRASKA PUBLIC EMPLOYEES
RETIREMENT SYSTEM***

STATE PATROL RETIREMENT SYSTEM

**ACTUARIAL VALUATION REPORT
AS OF JULY 1, 2021**

**Sixty-Sixth Actuarial Report for
System Plan Year Beginning July 1, 2021
and
State Fiscal Year Ending June 30, 2023**





TABLE OF CONTENTS

<u>Sections</u>	<u>Page</u>
Actuarial Certification Letter	
Section 1 – Board Summary.....	1
Section 2 – Scope of the Report.....	14
Section 3 – Assets	15
Table 1 – Market Value of Assets by Investment Category.....	16
Table 2 – Change in Market Value of Assets.....	17
Table 3 – Development of Actuarial Value of Assets.....	18
Section 4 – System Liabilities.....	20
Table 4 – Present Value of Future Benefits.....	21
Table 5 – Actuarial Accrued Liability.....	22
Table 6 – Actuarial Balance Sheet	23
Table 7 – Actuarial Gain/(Loss).....	24
Table 8 – Gain/(Loss) Analysis by Source.....	25
Table 9 – Projected Benefit Payments.....	26
Section 5 – Employer Contributions	27
Table 10 – Amortization Schedule for the Unfunded Actuarial Accrued Liability.....	28
Table 11 – Actuarial Required Contribution Rate.....	29
Section 6 – Risk Considerations.....	30
Table 12 – Historical Asset Volatility Ratios.....	34
Table 13 – Historical Cash Flows	35
Table 14 – Liability Maturity Measurements.....	36
Table 15 – Historical Member Statistics	37
Table 16 – Comparison of Valuation Results under Alternate Investment Return Assumptions	38
Section 7 – Historical Funding and Other Information	39
Table 17 – Schedule of Funding Progress.....	40
Table 18 – Schedule of Contributions from the Employer and Other Contributing Entities.....	41
Appendix A – Membership Data	42
Appendix B – Summary of Plan Provisions	53
Appendix C – Summary of Actuarial Assumptions.....	57
Appendix D – Glossary of Terms	65



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November 9, 2021

Public Employees Retirement Board
Nebraska Public Employees Retirement System
Post Office Box 94816
Lincoln, NE 68509

Dear Members of the Board:

At your request, we performed an actuarial valuation of the State Patrol Retirement System as of July 1, 2021 for purposes of determining the actuarial required contribution rate for the plan year ending June 30, 2022. It is our understanding that any additional required State contributions for this plan year will be made on July 1, 2022 (State fiscal year end 2023). The major findings of the valuation are contained in this report, which reflects the benefit and funding provisions in place on July 1, 2021. There were several changes to the actuarial assumptions and methods as a result of the quadrennial experience study completed in 2020. In addition, Legislative Bill 17 (LB 17), which was passed by the 2021 Nebraska Legislature, changed the amortization period from 30 years to 25 years for new bases established on or after July 1, 2021. These changes, and their impact on the current valuation results, are discussed in further detail in the Board Summary of this report.

In preparing our report, we relied, without audit, on information (some oral and some in writing) supplied by the System's staff. This information includes, but is not limited to, statutory provisions, member data and financial information. We found this information to be reasonably consistent and comparable with the information received in prior years. The valuation results depend on the integrity of this information. If any of this information is inaccurate or incomplete, our results may be different, and our calculations may need to be revised.

We further certify that all costs, liabilities, rates of interest and other factors for the State Patrol Retirement System have been determined on the basis of actuarial assumptions and methods which are individually reasonable (taking into account the experience of the System and reasonable expectations); and which, in combination, offer the best estimate of anticipated experience affecting the System. Nevertheless, the emerging costs will vary from those presented in this report to the extent actual experience differs from that projected by the actuarial assumptions. The Public Employees Retirement Board has the final decision regarding the appropriateness of the assumptions and adopted the set of assumptions indicated in Appendix C.

In order to prepare the results in this report, we have utilized actuarial models that were developed to measure liabilities and develop actuarial costs. These models include tools that we have produced and tested, along with commercially available valuation software that we have reviewed to confirm the appropriateness and accuracy of the output. In utilizing these models, we develop and use input parameters and assumptions about future contingent events along with recognized actuarial approaches to develop the



Public Employees Retirement Board
November 9, 2021
Page 2

needed results. 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; 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 our assignment, we did not perform an analysis of the potential range of future measurements.

Actuarial computations presented in this report are for purposes of determining the funding amounts for the System as specified in the Nebraska state statutes. The calculations in the enclosed report have been made on a basis consistent with our understanding of the System's funding requirements and goals. Determinations for purposes other than meeting these requirements may be significantly different from the results contained in this report. Accordingly, additional determinations may be needed for other purposes. For example, actuarial computations for purposes of fulfilling financial accounting requirements for the System under Governmental Accounting Standards No. 67 and No. 68 are provided in separate reports.

We note that as we prepare this report, the world is still recovering from the Covid-19 pandemic. We have considered all available information, but do not believe there is sufficient data yet to warrant the modification of any of our assumptions. We will continue to monitor the situation and advise the Board in the future of any adjustment we believe would be appropriate.

The consultants who worked on this assignment are pension actuaries. Cavanaugh Macdonald's advice is not intended to be a substitute for qualified legal or accounting counsel.

Based on the foregoing, we hereby certify that, to the best of our knowledge and belief, this report is complete and accurate and has been prepared in accordance with generally recognized and accepted actuarial principles and practices. We are members of the American Academy of Actuaries and meet the Qualification Standards to render the actuarial opinion contained herein. We are available to answer any questions on the material contained in the report, or to provide explanations or further details as may be appropriate.

We respectfully submit the following report and look forward to discussing it with you.

Sincerely,

A handwritten signature in blue ink that reads 'Patrice Beckham'.

Patrice A. Beckham, FSA, EA, FCA, MAAA
Principal and Consulting Actuary

A handwritten signature in blue ink that reads 'Brent A. Banister'.

Brent A. Banister Ph.D., FSA, EA, MAAA, FCA
Chief Actuary



SECTION 1 – BOARD SUMMARY

This report presents the results of the July 1, 2021 actuarial valuation of the State Patrol Retirement System (System). The primary purposes of performing this actuarial valuation are to:

- Determine the level of State contributions for the plan year ending June 30, 2022 which are sufficient to meet the funding policy set out in the Nebraska state statutes.
- Disclose asset and liability measurements as well as the current funded status of the System as of the valuation date.
- Assess and disclose the key risks associated with funding the System.
- Compare actual and expected experience under the System during the plan year ended June 30, 2021.
- Analyze and report on trends in System contributions, assets and liabilities over the past several years.

The actuarial valuation results provide a “snapshot” view of the System’s financial condition on July 1, 2021. As the result of various factors, the System’s unfunded actuarial accrued liability (UAAL) decreased from \$60.6 million last year to \$51.4 million this year and the funded ratio increased from 88% to 91%. In addition, the actuarial required contribution rate decreased from 45.42% of pay last year to 43.74% of pay in this year’s valuation, a decrease of 1.68%.

The Nebraska statutes require the State to make an additional contribution if the regular, payroll-related contributions by members and the State are insufficient to meet the actuarial required contribution for the plan year. **Based on the results of the July 1, 2021 actuarial valuation, an additional State contribution of \$3,752,980 is required for the plan year ending June 30, 2022 (expected to be paid July 1, 2022). This is a decrease from the additional amount in the June 30, 2020 actuarial valuation of \$4,082,024.**

Legislative Changes

Legislative Bill 17 (LB 17), which was passed by the 2021 Nebraska Legislature, changed the amortization period for amortization bases established on or after July 1, 2021 from 30 years to 25 years. This includes changes in the UAAL due to assumption changes or actuarial experience gains. If the UAAL is less than or equal to zero, then all prior amortization bases are considered fully funded and the UAAL is reinitialized and amortized over a 25-year period as of the actuarial valuation date.

Changes to Actuarial Assumptions and Methods

By statute, an experience study for the Nebraska Public Employees Retirement System, which includes the Nebraska State Patrol Retirement System, is performed every four years. As a result of the 2020 quadrennial experience study, several changes to the actuarial assumptions and methods were recommended and adopted by the Board at their December 21, 2020 meeting. Please see the Experience Study report, dated December 21, 2020, for complete details and discussion on all of the assumption and method changes. The key assumption changes include:

- Economic assumptions:
 - Price inflation assumption was lowered from 2.75% to 2.35%.
 - Investment return assumption was lowered from 7.50% to 7.00%.
 - COLA assumption for Tier 1 members was lowered from 2.25% to 2.00%.
 - Payroll growth assumption was lowered from 3.50% to 2.85%.
 - Individual salary increase assumption was changed to reflect the lower general wage inflation as well as changes to the merit salary scale to better reflect the observed experience.



SECTION 1 – BOARD SUMMARY

- An explicit assumption for administrative expenses of 0.26% of payroll is included as a component of the actuarial contribution rate.
- Demographic assumptions:
 - Retirement rates were adjusted to better reflect observed experience.
 - Mortality assumption for non-disabled participants was changed to the Pub-2010 General Members (Above Median) Mortality Tables (100% of male rates, 95% female rates), set back one-year, projected generationally using MP-2019 modified to 75% of ultimate rates.
- Amortization period reduced from 30 to 25 years on future amortization bases (required legislation).

The changes to the economic assumptions are being phased in over four years, beginning with the July 1, 2021 valuation, as follows:

	Current (2021 Valuation)	2022 Valuation	2023 Valuation	2024 Valuation
Price Inflation	2.65%	2.55%	2.45%	2.35%
Real Return	4.65%	4.65%	4.65%	4.65%
Investment Return	7.30%	7.20%	7.10%	7.00%
COLA (Tier 1)	2.15%	2.10%	2.05%	2.00%
General Wage Inflation	3.15%	3.05%	2.95%	2.85%
Covered Payroll Growth	3.15%	3.05%	2.95%	2.85%

As the economic assumptions are changed over the next three valuations, it will result in increases in the actuarial accrued liability, normal cost rate and actuarial contribution rate. To the extent those increases are not offset by favorable experience (actuarial gains), the funded ratio is expected to decrease, and the actuarial contribution rate is expected to increase.

The change in the actuarial assumptions and methods increased the actuarial accrued liability by \$6.9 million and the actuarial required contribution rate by 1.24% of pay, as shown in the following table (July 1, 2021 valuation with amounts shown in thousands).



SECTION 1 – BOARD SUMMARY

(\$ in thousands)	Prior Assumptions and Methods	Current Assumptions and Methods	Difference
Actuarial Accrued Liability (AAL)	\$533,640	\$540,576	\$6,936
Actuarial Value of Assets	<u>489,208</u>	<u>489,208</u>	<u>0</u>
Unfunded AAL	\$ 44,432	\$ 51,368	\$6,936
Funded Ratio	91.67%	90.50%	(1.17%)
Normal Cost Rate	30.09%	29.85%	(0.24%)
Administrative Expenses	0.00%	0.26%	0.26%
UAAL Amortization Rate	<u>12.41%</u>	<u>13.63%</u>	<u>1.22%</u>
Total Actuarial Required Contribution	42.50%	43.74%	1.24%
Additional Required State Contribution	\$3,237	\$3,753	\$516

Note: Numbers may not add due to rounding.

Actual Experience Impacting the July 1, 2021 Valuation

The valuation results reflect net favorable experience for the past plan year as demonstrated by an UAAL that was lower than expected. The UAAL as of July 1, 2021 is \$51.4 million compared to an expected UAAL of \$66.6 million. The key factors impacting the 2021 valuation include:

- The rate of return on the market value of assets for the year ending June 30, 2021 was 29.9%, as reported by the Nebraska Investment Council, compared to the assumed return of 7.5% for that year. The asset smoothing method used in the valuation only recognizes 20% of the difference between the dollar amount of the difference between the assumed and actual return in the current valuation. The partial recognition of FY 2021 experience, coupled with the scheduled recognition of the deferred investment experience from the prior four years, resulted in a rate of return on the actuarial (smoothed) value of assets of 11.5%. Because this return is higher than the assumed rate of return (7.5% for FY 2021), there was an actuarial experience gain of \$17.8 million on the actuarial value of assets.
- There was a net actuarial experience loss of \$2.5 million on System liabilities as a result of actual cost-of-living increases that were higher than expected (2.5% versus 2.25%), more retirements than expected and higher salary increases than expected based on the actuarial assumptions.
- The 2016 Legislature made changes to the benefit structure for members hired on or after July 1, 2016 (Tier 2). As a result of an increase in the number of active members covered by Tier 2, the normal cost rate decreased by 0.17% and the employee contribution rate increased by 0.06% (from 16.15% to 16.21%).

The changes to the benefit structure in Tier 2 included final average compensation moving from the average of the three highest 12-month periods to the average of the five highest 12-month periods, the maximum cost-of-living adjustment changing from 2.50% to 1.00%, and the employee and employer contribution rate changing from 16.00% to 17.00%. In addition, Tier 2 members are not eligible to participate in DROP. As a result of the change in the contribution rate for Tier 2 members, statutory contribution rates are expressed as a weighted average of the Tier 1 and Tier 2 contribution rates throughout this report. The weighted statutory employee and employer contribution rate in the current valuation is 16.21%, slightly above the



SECTION 1 – BOARD SUMMARY

Tier 1 contribution rate of 16.00%. This is because there are only 110 members in Tier 2 as of July 1, 2021, which is about 27% of the active membership. While the weighted contribution rate will continue to increase gradually as more of the active members are in Tier 2, we expect it will be a number of years before Tier 2 has a meaningful impact on the System’s liabilities and overall valuation results.

A summary of the key results from the July 1, 2021 actuarial valuation is shown in the following table. As the table indicates, the statutory contribution rates are not sufficient to meet the actuarial required contribution rate and an additional State appropriation of 11.32% of pay, or \$3,752,980, is required. Further detail on the valuation results can be found in the following sections of this Board Summary.

	Valuation Results	
	July 1, 2021	July 1, 2020
Unfunded Actuarial Accrued Liability	\$51,368,046	\$60,605,438
Funded Ratio (Actuarial Assets)	90.50%	88.13%
Normal Cost Rate	29.85%	30.26%
Administrative Expenses	0.26%	N/A
UAAL Amortization Rate	13.63%	15.16%
Total Actuarial Required Contribution	43.74%	45.42%
Weighted Member Contribution Rate	(16.21%)	(16.15%)
Weighted Employer Contribution Rate	(16.21%)	(16.15%)
Additional Required State Contribution Rate	11.32%	13.12%
Additional Required State Contribution*	\$3,752,980	\$4,082,024

* Reflects interest to the expected contribution date in the July 1, 2021 valuation

EXPERIENCE FOR THE LAST PLAN YEAR

Numerous factors contributed to the change in the System’s assets, liabilities, and actuarial required contribution rate between July 1, 2020 and July 1, 2021. The components of the System’s experience are examined in the following discussion.

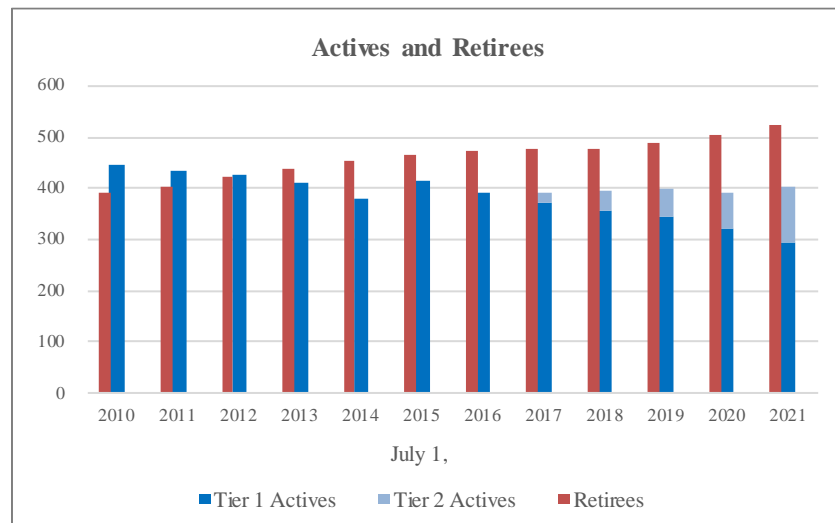
MEMBERSHIP

There were 403 active members (excluding DROP members) in the 2021 valuation compared to 392 in the 2020 valuation, a 2.8% increase. This increase of eleven active members did not have a material impact on the current valuation results. However, the UAAL is amortized assuming future covered payroll will increase with the assumed payroll growth assumption (3.15% for plan year beginning July 1, 2021). If total payroll grows more than 3.15%, the UAAL payment is divided by covered payroll that is larger than expected, which results in a lower UAAL contribution rate. Conversely, a decrease in active members, or payroll growth less than 3.15% per year, results in a higher UAAL contribution rate. The 2021 valuation reflects an increase in covered payroll of only 2.9% compared to the 3.5% assumed increase for plan year ending June 30, 2021, which creates a higher UAAL contribution rate, all other things being equal.



SECTION 1 – BOARD SUMMARY

The graph below compares the number of active and retired members in each valuation since 2010. While the number of active members has fluctuated at times over this period, the number of members receiving a benefit has steadily increased, reaching 525 in this valuation. This is a standard indication of the maturity of the system and is not necessarily unexpected or problematic. However, this metric does indicate the likelihood of a higher degree of contribution rate volatility when actual experience varies from that expected by the assumptions.



ASSETS

As of June 30, 2021, the System had net assets of \$552.1 million, when measured on a market value basis, an increase of \$116.3 million from the prior year.

The market value of assets is not used directly in the calculation of the unfunded actuarial accrued liability and the actuarial required contribution rate. An asset valuation method, which smoothes the effect of market fluctuations, is applied to determine the value of assets used in the valuation. The resulting amount is called the actuarial value of assets. In this year's valuation, the actuarial value of assets is \$489.2 million, an increase of \$39.0 million from the prior year. The components of change in the asset values are shown in the following table.

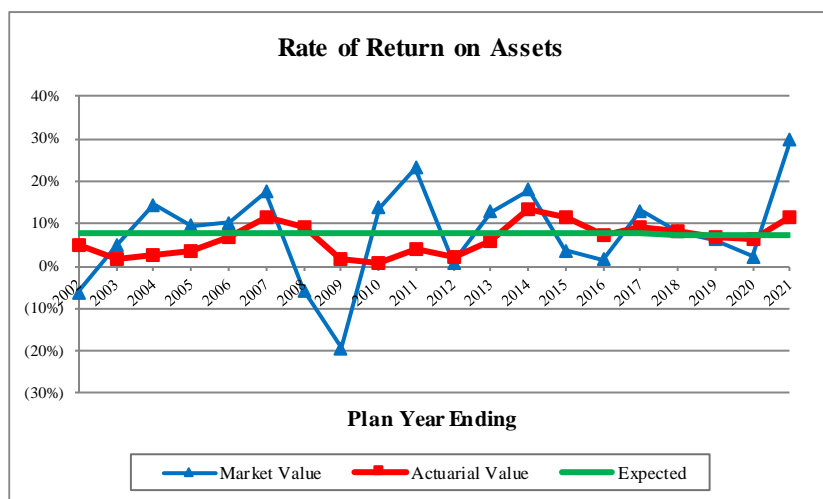
	Market Value (\$M)		Actuarial Value (\$M)	
Net Assets, June 30, 2020	\$	435.8	\$	450.2
- Employer and Member Contributions	+	14.2	+	14.2
- Benefit Payments	-	26.3	-	26.3
- Net Investment Income	+	128.4	+	51.1
Net Assets, June 30, 2021	\$	552.1	\$	489.2
Estimated Rate of Return*		29.9%		11.5%

* Rate of return on the market value of assets was provided by the Nebraska Investment Council.



SECTION 1 – BOARD SUMMARY

The rate of return on the market value of assets was 29.9%, as reported by the Nebraska Investment Council. The return on the actuarial value of assets was 11.5%, which was higher than the 7.5% investment return assumption. As a result, there was an actuarial experience gain on assets of \$17.8 million. As a result of the combined impact of the favorable investment experience for FY 2021 and the scheduled recognition of deferred investment gains and losses, the net deferred investment loss of \$14.4 million in last year’s valuation is now a net deferred investment gain of \$62.9 million in the current valuation. Please see Section 3 of this report for more detailed information on the market and actuarial value of assets.



The rate of return of the actuarial value of assets has been less volatile than the market value return, illustrating the benefit of using an asset smoothing method.

LIABILITIES

The actuarial accrued liability is that portion of the present value of future benefits that will not be paid by future normal costs, i.e. the portion allocated to past years of service. The difference between this liability and the actuarial value of assets as of the valuation date is called the unfunded actuarial accrued liability (UAAL). The dollar amount of unfunded actuarial accrued liability is reduced if the contributions to the System exceed the normal cost for the year plus interest on the prior year’s UAAL.

The unfunded actuarial accrued liability as of July 1, 2021, using both the actuarial and market value of assets, is shown in the following table.

	Actuarial Value of Assets	Market Value of Assets
Actuarial Accrued Liability	\$540,576,453	\$540,576,453
Value of Assets	<u>489,208,407</u>	<u>552,081,721</u>
Unfunded Actuarial Accrued Liability	\$51,368,046	(\$11,505,268)
Funded Ratio	90.50%	102.13%

Absent investment returns lower than expected (7.3%, 7.2%, 7.1% and 7.0% for plan years beginning July 1, 2021 through 2024), the deferred investment experience will be recognized over the next four years and positively impact the plan’s funded status. However, there will be downward pressure on the funded ratio



SECTION 1 – BOARD SUMMARY

as a result of the phase-in of the set of economic assumptions discussed earlier. See Section 4 of the report for the detailed development of the unfunded actuarial accrued liability.

The components of the net decrease of \$9.2 million in the UAAL from July 1, 2020 to July 1, 2021 are shown in the following table:

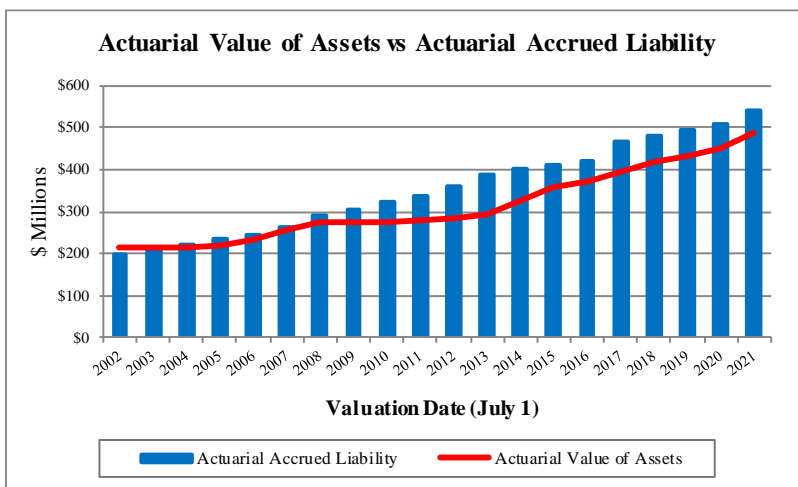
	(\$ Millions)
Unfunded Actuarial Accrued Liability, July 1, 2020	\$60.61
- Expected decrease from amortization method	(0.35)
- Investment experience	(17.82)
- Liability experience	2.54
- Assumption changes	6.94
- Other experience	(0.55)
Unfunded Actuarial Accrued Liability, July 1, 2021	\$51.37

As shown above, various components impacted the amount of the UAAL in the current valuation. Actuarial experience gains (losses), which result from actual experience that is more (less) favorable than anticipated by the actuarial assumptions, are reflected in the UAAL and are measured as the difference between the expected UAAL and the actual UAAL, taking into account any changes due to actuarial assumptions and methods or benefit provisions. Overall, the System experienced a net actuarial experience gain of \$15.3 million which may be explained by considering the separate experience of assets and liabilities. As noted earlier, there was an actuarial experience gain of \$17.8 million on the actuarial value of assets. Unfavorable experience on System liabilities resulted in a net liability experience loss of \$2.5 million, largely due to a cost-of-living increase that was higher than the assumed increase (2.50% versus 2.25%) and unfavorable experience with respect to retirements and salary increases. A breakdown of actuarial experience gains and losses by amount can be found in Table 8 of this report.

As the following graph of historical actuarial assets and actuarial accrued liabilities shows, the System's liabilities grew at a faster pace than the System's assets for the five-year period beginning after the FY 2009 market downturn as that experience was reflected in the smoothing method. As a result, the funded ratio declined over that period. Since 2013, the System's funded ratio has generally been improving. However, changes to the actuarial assumptions in the July 1, 2017 valuation, including lowering the assumed rate of return from 8.0% to 7.5%, increased the System's liabilities and lowered the funded ratio. The 2021 funded ratio remained steady as increasing liabilities due to assumption changes were offset by high asset returns.



SECTION 1 – BOARD SUMMARY



An evaluation of the UAAL purely on a dollar basis may not provide a complete analysis since only the difference between the assets and liabilities (which are both large numbers) is reflected. Another way to evaluate the UAAL and the progress made in its funding is to track the funded ratio, the ratio of the actuarial value of assets to the actuarial accrued liability. The funded status information, which is based on the actuarial value of assets, is shown below (in millions).

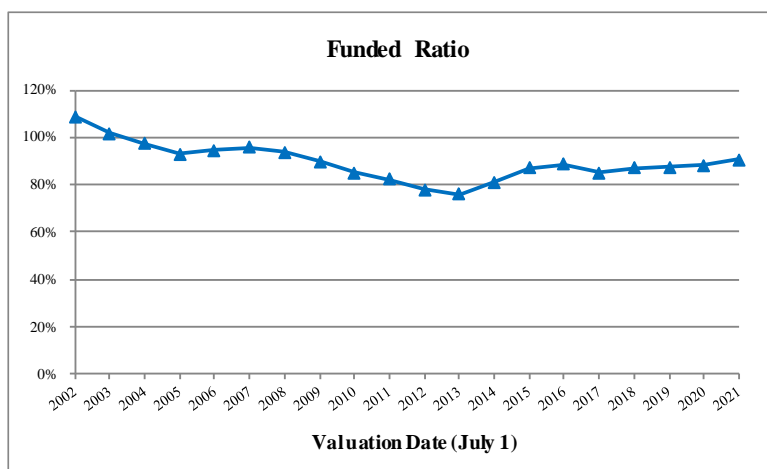
	7/1/2017	7/1/2018	7/1/2019	7/1/2020	7/1/2021
Funded Ratio (AVA/AAL)	84.97%	86.98%	87.34%	88.13%	90.50%
UAAL	\$69.92	\$62.50	\$62.86	\$60.61	\$51.37

Note that the funded ratio does not indicate whether or not the System assets are sufficient to settle benefits earned to date. The funded ratio, by itself, also may not be indicative of future funding requirements. In addition, if the funded ratios were shown using the market value of assets, the results would be different.

The funded ratio over a longer period is shown in the following graph. Given the weighted statutory contribution rate of 32.42% of pay (16.21% by members and 16.21% by the employer) and a normal cost rate of 29.85% of pay, only a small portion of the total fixed contribution rate is available to fund the UAAL. As a result, additional contributions from the State will be necessary to improve the funded ratio absent actual investment experience in future years that is higher than the assumed rate of return.



SECTION 1 – BOARD SUMMARY



ACTUARIAL REQUIRED CONTRIBUTION RATE

The System is funded by statutory contribution rates of 16.00% of pay for Tier 1 members, 17.00% of pay for Tier 2 members, and matching contributions paid by the employer. State statutes require the state of Nebraska to make an additional contribution if the regular, payroll-related contributions by employees and employers are insufficient to meet the actuarial required contribution rate for the plan year. The additional State contribution for each plan year is made on the July 1 following the plan year-end. **Based on the results of the July 1, 2021 actuarial valuation, an additional State contribution of 11.32% of pay, or \$3,752,980, is necessary for the plan year ending June 30, 2022.**

Under the Entry Age Normal cost method, the actuarial required contribution rate consists of three components:

- A “normal cost” for the portion of projected liabilities allocated by the actuarial cost method to service of members during the year following the valuation date.
- An “administrative expense” load for the expenses expected to be paid from the trust for the year.
- An “unfunded actuarial accrued liability contribution” for the excess of the portion of projected liabilities allocated to service to date over the actuarial value of assets.

The UAAL contribution rate is determined by calculating the amortization payments as a level-percent of payroll. This methodology results in dollar amounts of payments that are lower in the initial years of the amortization period but increase each year in the future with the assumed payroll growth assumption (3.15% for plan year beginning July 1, 2021). Because the UAAL contribution rate is determined as a level-percent of payroll, the dollar amount of the UAAL contribution is scheduled to increase 3.15% each year in the future, even if all actuarial assumptions are met. Therefore, if the actual increase in covered payroll is less than assumed, the UAAL contribution rate will increase. The increase in covered payroll from the prior valuation was 2.9% compared to the 3.5% assumed increase in the July 1, 2020 valuation for plan year ending June 30, 2021, resulting in a higher UAAL contribution rate.

See Section 5 of the report for the detailed development of the actuarial contribution rate and the corresponding dollar amount, which are summarized in the following table.



SECTION 1 – BOARD SUMMARY

Contribution Rates	July 1, 2021	July 1, 2020
1. Normal Cost Rate	29.85%	30.26%
2. Administrative Expenses	0.26%	N/A
3. UAAL Contribution Rate	13.63%	15.16%
4. Total Actuarial Required Contribution Rate	43.74%	45.42%
5. Weighted Member Contribution Rate	(16.21%)	(16.15%)
6. Weighted Employer Contribution Rate	(16.21%)	(16.15%)
7. Total Statutory Contribution Rate	(32.42%)	(32.30%)
8. Additional Required State Contribution Rate [4 + 7]	11.32%	13.12%
9. Estimated Payroll	\$ 32,005,893	\$ 31,112,989
10. Additional State Required Contribution* [8 * 9 * 1.073 ^{1/2} , but not less than \$0]	\$ 3,752,980	\$ 4,082,024

* Interest to the expected payment date of July 1 first reflected in the July 1, 2021 valuation.

The actuarial required contribution rate for the plan year ending June 30, 2022 is 43.74%. The weighted contribution rate of 16.21% for the member and employer results in a total payroll-related statutory contribution rate of 32.42% of pay. As a result, there is a contribution shortfall this year of 11.32% of payroll, which is projected to be about \$3.8 million.

The actuarial required contribution, determined this year, based on the snapshot of the System taken on the valuation date of July 1, 2021, will change each year as the deferred investment experience is recognized and other experience (both investment and demographic) impacts the System. Therefore, it is expected to change each year. To the extent the difference between the actual and expected experience is significant, the change in the actuarial contribution rate is also expected to change significantly. This volatility in the actuarial contribution rate can result in extreme volatility in the additional State contribution as it is the difference between the actuarial contribution rate and the statutory contribution rate. Any material change in the actuarial contribution rate will directly flow through and impact the additional State contribution.

The primary components of the change in the actuarial required contribution rate are shown in the following table.



SECTION 1 – BOARD SUMMARY

Total Actuarial Required Contribution Rate, July 1, 2020	45.42%
- Change in normal cost rate	(0.17%)
- Contributions above the Actuarial Required Contribution	0.00%
- Investment experience	(3.12%)
- Liability experience	0.45%
- Payroll increase less than expected	0.04%
- Assumption and Method changes	1.24%
- Other experience	<u>(0.12%)</u>
Total Actuarial Required Contribution Rate, July 1, 2021	43.74%

The historical actuarial required contribution rates and any resulting additional required State contributions as shown in the actuarial valuation report, whether or not actually contributed, are shown below:

History of Expected State Contributions			
Plan Year	Statutory State Contributions	Additional Appropriations	Total
2021/2022	\$ 5,188,155	\$ 3,752,980	\$ 8,941,135
2020/2021	5,024,748	4,082,024	9,106,772
2019/2020	4,926,271	4,112,870	9,039,141
2018/2019	4,791,164	3,983,698	8,774,862
2017/2018	4,592,242	4,337,435	8,929,677
2016/2017	4,449,116	2,541,558	6,990,674
2015/2016	4,547,633	2,725,738	7,273,371
2014/2015	4,149,416	3,866,737	8,016,153
2013/2014	4,386,823	4,652,774	9,039,597
2012/2013	5,005,482	4,552,680	9,558,162
2011/2012	5,291,940	2,255,430	7,547,370
2010/2011	4,597,331	2,770,262	7,367,593
2009/2010	4,203,166	1,801,610	6,004,776
2008/2009	4,361,746	812,087	5,173,833
2007/2008	4,225,729	365,020	4,590,749
2006/2007	3,942,430	813,159	4,755,589
2005/2006	3,766,098	1,080,050	4,846,148
2004/2005	3,050,645	948,654	3,999,299
2003/2004	2,745,970	434,202	3,180,172
2002/2003	2,413,762	0	2,413,762

Note: Information before Plan Year 2013/2014 was produced by prior actuary.



SECTION 1 – BOARD SUMMARY

The actuarial required contribution rate, which for this plan year is determined based on the snapshot of the System taken on the valuation date of July 1, 2021, will change each year as the deferred investment experience is recognized and other experience (both investment and demographic) impacts the System.

RISK ASSESSMENT AND DISCLOSURE

A typical retirement plan faces many different risks. The term “risk” is most commonly associated with an outcome with undesirable results. However, in the actuarial world risk can be translated as uncertainty. The actuarial valuation process uses many actuarial assumptions to project how future contributions and investment returns will meet the cash flow needs for future benefit payments. Of course, we know that actual experience will not unfold exactly as anticipated by the assumptions and that uncertainty, whether favorable or unfavorable, creates risk. Actuarial Standard of Practice Number 51 defines risk as the potential of actual future measurements to deviate from expected results due to actual experience that is different than the actuarial assumptions. Risk evaluation is an important part of managing a defined benefit plan. Please see Section 6 of this report for an in-depth discussion of the specific risks facing the Nebraska State Patrol Retirement System.

As discussed earlier, as we are preparing this report the world is in the midst of recovering from the COVID-19 pandemic. However, we do not believe that there is sufficient data to warrant the modification of any of our long-term actuarial assumptions. We will continue to monitor the situation and advise the Board in the future of any adjustments that we believe would be appropriate.

**SECTION 1 – BOARD SUMMARY****SUMMARY OF PRINCIPAL RESULTS**

	<u>7/1/2021</u> <u>Valuation</u>	<u>7/1/2020</u> <u>Valuation</u>	<u>% Change</u>
1. PARTICIPANT DATA			
Number of:			
Active Members			
- Tier 1	293	320	(8.4%)
- Tier 2	110	72	52.8%
- Total	<u>403</u>	<u>392</u>	2.8%
Retired Members and Beneficiaries	475	458	3.7%
DROP Participants	35	30	16.7%
Disabled Members	15	15	0.0%
Inactive Members	39	36	8.3%
Total Members	<u>967</u>	<u>931</u>	3.9%
Projected Annual Salaries of Active Members	\$ 32,005,893	\$ 31,112,989	2.9%
Annual Retirement Payments for Members in Receipt and DROP Participants	\$ 26,441,313	\$ 24,568,112	7.6%
2. ASSETS AND LIABILITIES			
a. Market Value of Assets	\$ 552,081,721	\$ 435,782,874	26.7%
b. Actuarial Value of Assets	489,208,407	450,151,647	8.7%
c. Total Actuarial Accrued Liability	540,576,453	510,757,085	5.8%
d. Unfunded Actuarial Accrued Liability [c - b]	\$ 51,368,046	\$ 60,605,438	(15.2%)
e. Funded Ratio (Actuarial Value of Assets) [b / c]	90.50%	88.13%	2.7%
f. Funded Ratio (Market Value of Assets) [a / c]	102.13%	85.32%	19.7%
3. EMPLOYER CONTRIBUTION RATES AS A PERCENT OF PAYROLL			
Normal Cost	29.85%	30.26%	(1.4%)
Administrative Expenses	0.26%	N/A	N/A
Amortization of Unfunded Actuarial Accrued Liability	13.63%	15.16%	(10.1%)
Actuarial Required Contribution Rate	<u>43.74%</u>	<u>45.42%</u>	(3.7%)
Weighted Member Contribution Rate	(16.21%)	(16.15%)	0.4%
Weighted Employer Contribution Rate	<u>(16.21%)</u>	<u>(16.15%)</u>	0.4%
Additional Required State Contribution Rate	11.32%	13.12%	(13.7%)
Additional Required State Contribution*	\$ 3,752,980	\$ 4,082,024	(8.1%)

* Interest to the expected payment date was refined in the 7/1/2021 valuation.



SECTION 2 – SCOPE OF THE REPORT

This report presents the actuarial valuation of the State Patrol Retirement System as of July 1, 2021. This valuation was prepared at the request of the Public Employees Retirement Board of the Nebraska Public Employees Retirement System.

Please pay particular attention to our actuarial certification letter, where the guidelines employed in the preparation of this report are outlined. We also comment on the sources and reliability of both the data and the actuarial assumptions upon which our findings are based. Those comments are the basis for our certification that this report is complete and accurate to the best of our knowledge and belief.

A summary of the findings which result from this valuation is presented in the previous section. Section 3 describes the assets and investment experience of the System. Sections 4 and 5 describe how the obligations (liabilities) of the System are to be met under the actuarial cost method in use. Section 6 discloses key maturity measurements and discusses the key risks facing the funding of the System. Section 7 includes some historical funding information.

This report includes several appendices:

- Appendix A Schedules of valuation data classified by various categories of members.
- Appendix B A summary of the current benefit structure, as determined by the provisions of governing law on July 1, 2021.
- Appendix C A summary of the actuarial methods and assumptions used to estimate liabilities and determine contribution rates.
- Appendix D A glossary of actuarial terms.



SECTION 3 – ASSETS

In many respects, an actuarial valuation can be thought of as an inventory process. The inventory is taken as of the actuarial valuation date, which for this valuation is July 1, 2021. On that date, the assets available for the payment of benefits are appraised. The assets are compared with the liabilities of the System, which are generally in excess of assets. The actuarial process then leads to a method of determining the contributions needed by members and the employer in the future to balance the System's assets and liabilities.

Market Value of Assets

The current market value represents the "snapshot" or "cash-out" value of System assets as of the valuation date. In addition, the market value of assets provides a basis for measuring investment performance from time to time. Table 1 is a comparison, at market values, of System assets as of July 1, 2021 and July 1, 2020, in total and by investment category. Table 2 summarizes the change in the market value of assets from July 1, 2020 to July 1, 2021.

Actuarial Value of Assets

Due to extreme volatility, the market value of assets, which represents the "cash-out" value of System assets on a single day, may not be the best measure of the System's ongoing ability to meet its obligations. To arrive at a suitable value of assets for the actuarial valuation, a technique for determining the actuarial value of assets is used which dampens swings in the market value while still indirectly recognizing market values. Under the asset smoothing methodology, the difference between the dollar amount of the actual and expected investment return on the market value of assets is recognized evenly over a five-year period.

Table 3 shows the development of the actuarial value of assets (AVA) as of the valuation date.



TABLE 1
STATE PATROL RETIREMENT SYSTEM
MARKET VALUE OF ASSETS
by Investment Category

	<u>June 30, 2021</u>	<u>June 30, 2020</u>
1. Cash and Equivalents	\$ 189,717	\$ 209,194
2. Investments*	558,733,162	440,710,002
3. Capital Assets	82	98
4. Receivables and Prepays	23,500,009	37,300,409
5. Accounts Payable	<u>(30,341,249)</u>	<u>(42,436,829)</u>
6. Net Assets Available for Pension Benefits	\$ 552,081,721	\$ 435,782,874

* Includes DROP account balances.



TABLE 2
STATE PATROL RETIREMENT SYSTEM
CHANGE IN MARKET VALUE OF ASSETS

	2021	2020
1. Market Value of Assets, Beginning of Year	\$ 435,782,874	\$ 436,611,997
2. Contributions		
(a) Member (includes purchased service)	\$ 5,081,804	\$ 4,970,209
(b) State	5,081,804	4,970,209
(c) State appropriations	4,082,024	4,112,870
(d) Total	\$ 14,245,632	\$ 14,053,288
3. Expenditures		
(a) Benefit payments	\$ 23,050,795	\$ 22,357,949
(b) Refunds	184,266	279,663
(c) DROP Disbursements	3,021,481	2,315,448
(d) Administrative expenses	157,638	120,098
(e) Total	\$ 26,414,180	\$ 25,073,158
4. Investment Return, Net of Investment Expenses		
(a) Investment income	\$ 6,474,899	\$ 7,041,093
(b) Securities lending income	67,765	145,973
(c) Securities lending expense	(12,998)	(106,419)
(d) Net appreciation/(depreciation) in fair value of investments	121,922,834	3,096,042
(e) Other	14,895	14,058
(f) Net investment return	\$ 128,467,395	\$ 10,190,747
5. Market Value of Assets, End of Year [1 + 2(d) - 3(e) + 4(f)]	\$ 552,081,721	\$ 435,782,874
6. Rate of Return, Net of Expenses*	29.9%	2.2%

*Annual money-weighted rate of return, net of investment expense, as reported by the Nebraska Investment Council



TABLE 3
STATE PATROL RETIREMENT SYSTEM
DEVELOPMENT OF ACTUARIAL VALUE OF ASSETS

	Year End			
	6/30/2018	6/30/2019	6/30/2020	6/30/2021
1. Actuarial Value of Assets, Beginning of Year	\$ 395,149,596	\$ 417,588,175	\$ 433,655,500	\$ 450,151,647
2. Unrecognized Return Beginning of Year	1,987,576	3,094,855	2,956,497	(14,368,773)
3. Contributions During Year				
(a) Member	\$ 4,615,214	\$ 4,710,105	\$ 4,970,209	\$ 5,081,804
(b) State	4,615,214	4,710,107	4,970,209	5,081,804
(c) State appropriations	4,337,435	3,983,698	4,112,870	4,082,024
(d) Total	\$ 13,567,863	\$ 13,403,910	\$ 14,053,288	\$ 14,245,632
4. Benefit Payments	19,807,411	21,185,702	22,357,949	23,050,795
5. Refund of Contributions/DROP disbursements	4,021,269	3,768,074	2,595,111	3,205,747
6. Assumed Rate of Return	7.50%	7.50%	7.50%	7.50%
7. Expected Investment Income on (1), (2), (3), (4) and (5)	29,481,800	31,203,784	32,422,392	32,173,051
8. Actual Return on Market Value Net of All Expenses	33,806,675	27,478,833	10,070,649	128,309,757
9. Return to be Spread, End of Year	\$ 4,324,875	\$ (3,724,951)	\$ (22,351,743)	\$ 96,136,706

[8 - 7]



**TABLE 3
(continued)**

**STATE PATROL RETIREMENT SYSTEM
AS OF JULY 1, 2021**

10. Return to be Spread

Plan Year <u>Ending</u>	Return to be <u>Spread</u>	Unrecognized <u>Percent</u>	Unrecognized <u>Return</u>
2021	\$96,136,706	80%	\$76,909,365
2020	(22,351,743)	60%	(13,411,046)
2019	(3,724,951)	40%	(1,489,980)
2018	4,324,875	20%	864,975
			<hr/> \$62,873,314

11. Total Market Value of Assets as of July 1, 2021 \$552,081,721

12. Total Actuarial Value of Assets as of July 1, 2021 \$489,208,407
[11 - 10]

13. Asset Ratios

(a) Actuarial Value to Market Value [12 / 11]	88.61%
(b) Market Value to Actuarial Value [11 / 12]	112.85%



SECTION 4 – SYSTEM LIABILITIES

In the previous section, an actuarial valuation was compared with an inventory process, and an analysis was given of the inventory of assets of the State Patrol Retirement System as of the valuation date, July 1, 2021. In this section, the discussion will focus on the commitments (future benefit payments) of the System, which are referred to as its liabilities.

Table 4 contains an analysis of the actuarial present value of all future benefits (PVFB) for contributing active members, inactive members, retirees and their beneficiaries.

The liabilities summarized in Table 4 include the actuarial present value of all future benefits expected to be paid with respect to each member. For an active member, this value includes the measurement of both benefits already earned and future benefits to be earned. For all members, active and retired, the value extends over benefits earnable and payable for the rest of their lives and for the lives of the surviving beneficiaries.

All liabilities reflect the benefit provisions in place as of July 1, 2021.

Actuarial Accrued Liability

A fundamental principle in financing the liabilities of a retirement program is that the cost of its benefits should be related to the period in which benefits are earned, rather than to the period of benefit distribution. An actuarial cost method is a mathematical technique that allocates the present value of future benefits into annual costs. In order to do this allocation, it is necessary for the funding method to "breakdown" the present value of future benefits into two components:

- (1) that which is attributable to the past and
- (2) that which is attributable to the future.

Actuarial terminology calls the part attributable to the past the "past service liability" or the "actuarial accrued liability." The portion allocated to the future is known as the present value of future normal costs, with the specific piece of it allocated to the current year being called the "normal cost." Table 5 contains the calculation of actuarial accrued liability for the System. The Entry Age Normal actuarial cost method is used to develop the actuarial accrued liability.



TABLE 4
STATE PATROL RETIREMENT SYSTEM
PRESENT VALUE OF FUTURE BENEFITS (PVFB)
AS OF JULY 1, 2021

1. Active Employees	
(a) Retirement	\$ 236,970,093
(b) Termination	3,688,910
(c) Disability	7,727,037
(d) Death	1,625,378
(e) Total	<u>\$ 250,011,418</u>
2. Inactive Vested Members	8,482,211
3. Inactive Nonvested Members	216,483
4. DROP Account Balances	4,311,477
5. Disabled Members	7,009,124
6. Retirees	314,065,505
7. Beneficiaries	<u>30,572,947</u>
8. Total Present Value of Future Benefits	\$ 614,669,165



TABLE 5
STATE PATROL RETIREMENT SYSTEM
ACTUARIAL ACCRUED LIABILITY
AS OF JULY 1, 2021

1. Present Value of Future Benefits for Active Members	\$	250,011,418
2. Present Value of Future Normal Costs for Active Members		
(a) Retirement	\$	63,798,561
(b) Termination		4,662,651
(c) Disability		4,564,241
(d) Death		1,067,259
(e) Total	\$	74,092,712
3. Actuarial Accrued Liability for Active Members [1 - 2(e)]	\$	175,918,706
4. Actuarial Accrued Liability for Inactive Members	\$	364,657,747
5. Total Actuarial Accrued Liability [3 + 4]	\$	540,576,453
6. Actuarial Value of Assets	\$	489,208,407
7. Unfunded Actuarial Accrued Liability [5 - 6]	\$	51,368,046
8. Funded Ratio [6 / 5]		90.50%



TABLE 6
STATE PATROL RETIREMENT SYSTEM
ACTUARIAL BALANCE SHEET
AS OF JULY 1, 2021

ASSETS

Actuarial Value of Assets	\$ 489,208,407
Unfunded Actuarial Accrued Liability	51,368,046
Present Value of Future Normal Costs	<u>74,092,712</u>
Total Assets	\$ 614,669,165

LIABILITIES

Present Value of Future Benefits		
Active members		
Retirement	\$ 236,970,093	
Termination	3,688,910	
Disability	7,727,037	
Death	<u>1,625,378</u>	
Total		250,011,418
Inactive members		8,698,694
Retirees, disabilities and beneficiaries*		<u>355,959,053</u>
Total		\$ 614,669,165

* Includes DROP account balances.



TABLE 7
STATE PATROL RETIREMENT SYSTEM
ACTUARIAL GAIN/(LOSS)

Liabilities

1. Actuarial Accrued Liability as of July 1, 2020	\$ 510,757,085
2. Normal Cost for Plan Year Ending June 30, 2021	8,535,277
3. Benefit Payments During Plan Year Ending June 30, 2021	(26,256,542)
4. Interest at 7.50%	38,062,017
5. Assumption Changes	<u>6,936,227</u>
6. Expected Actuarial Accrued Liability as of July 1, 2021	\$ 538,034,064
7. Actuarial Accrued Liability as of July 1, 2021	\$ 540,576,453

Assets

8. Actuarial Value of Assets as of July 1, 2020	\$ 450,151,647
9. Contributions During Plan Year Ending June 30, 2021	14,245,632
10. Benefit Payments During Plan Year Ending June 30, 2021	(26,256,542)
11. Interest at 7.50%	<u>33,250,709</u>
12. Expected Actuarial Value of Assets as of July 1, 2021	\$ 471,391,446
13. Actuarial Value of Assets as of July 1, 2021	\$ 489,208,407

Gain / (Loss)

14. Actuarial Gain / (Loss) on Liabilities [6 - 7]	\$ (2,542,389)
15. Actuarial Gain / (Loss) on Assets [13 - 12]	17,816,961
16. Total Actuarial Gain / (Loss) for Plan Year Ending June 30, 2021 [14 + 15]	\$ 15,274,572



TABLE 8
STATE PATROL RETIREMENT SYSTEM
GAIN/(LOSS) ANALYSIS BY SOURCE

Liability Sources	<u>Gain/(Loss)</u>
Retirement	\$ (783,000)
Termination	713,000
Disability	133,000
Mortality	(7,000)
Salary	(770,000)
New Entrants/Rehires	(484,000)
COLA	(799,000)
Miscellaneous	<u>(545,000)</u>
Total Liability Gain/(Loss)	\$ (2,542,000)
Asset Gain/(Loss)	\$ 17,817,000
Net Actuarial Gain/(Loss)	\$ 15,275,000



TABLE 9
STATE PATROL RETIREMENT SYSTEM
PROJECTED BENEFIT PAYMENTS
AS OF JULY 1, 2021

<u>Plan Year</u> <u>Ending June 30</u>	<u>Current Active</u> <u>Members</u>	<u>Current In-Pay</u> <u>Members</u>	<u>Total</u>
2022	\$ 1,018,000	\$ 26,340,000	\$ 27,358,000
2023	1,706,000	26,685,000	28,391,000
2024	2,938,000	26,940,000	29,878,000
2025	4,861,000	27,193,000	32,054,000
2026	6,463,000	27,534,000	33,997,000
2027	7,782,000	27,801,000	35,583,000
2028	11,215,000	28,022,000	39,237,000
2029	12,387,000	28,347,000	40,734,000
2030	13,567,000	28,579,000	42,146,000
2031	14,936,000	28,734,000	43,670,000
2032	15,872,000	28,871,000	44,743,000
2033	17,770,000	28,970,000	46,740,000
2034	18,949,000	29,020,000	47,969,000
2035	19,765,000	29,061,000	48,826,000
2036	20,777,000	28,996,000	49,773,000
2037	21,467,000	28,872,000	50,339,000
2038	22,701,000	28,722,000	51,423,000
2039	23,345,000	28,497,000	51,842,000
2040	24,675,000	28,218,000	52,893,000
2041	26,806,000	27,884,000	54,690,000
2042	29,051,000	27,494,000	56,545,000
2043	30,544,000	27,046,000	57,590,000
2044	32,462,000	26,541,000	59,003,000
2045	34,794,000	25,996,000	60,790,000
2046	37,309,000	25,375,000	62,684,000
2047	38,493,000	24,696,000	63,189,000
2048	39,495,000	23,961,000	63,456,000
2049	40,934,000	23,172,000	64,106,000
2050	41,702,000	22,331,000	64,033,000
2051	42,270,000	21,441,000	63,711,000

Note: Cash flows are the expected future non-discounted payments to current members. These numbers exclude refund payouts to any current nonvested inactive members and assume future retirees elect the normal form of payment.



SECTION 5 – EMPLOYER CONTRIBUTIONS

The previous two sections were devoted to a discussion of the assets and liabilities of the System. A comparison of Tables 3 and 4 indicates that current assets fall short of meeting the present value of future benefits (total liability). This is expected in all but a completely closed fund, where no further contributions are anticipated. In an active system, there will almost always be a difference between the actuarial value of assets and total liabilities. This deficiency has to be made up by future contributions and investment returns. An actuarial valuation sets out a schedule of future contributions that will deal with this deficiency in an orderly fashion.

The method used to determine the incidence of the contributions in various years is called the actuarial cost method. Under an actuarial cost method, the contributions required to meet the difference between current assets and current liabilities are allocated each year between three elements: (1) the normal cost rate, (2) administrative expenses and (3) the unfunded actuarial accrued liability contribution rate.

The term "fully funded" is often applied to a system in which contributions at the normal cost rate are sufficient to pay for the benefits of existing employees as well as for those of new employees. More often than not, systems are not fully funded, either because of past benefit improvements that have not been completely funded or because of actuarial deficiencies that have occurred because experience has not been as favorable as anticipated by the actuarial assumptions. Under these circumstances, an unfunded actuarial accrued liability (UAAL) exists. Likewise, when the actuarial value of assets is greater than the actuarial accrued liability, a surplus exists.

Description of Contribution Rate Components

The Entry Age Normal (EAN) actuarial cost method is used for the valuation. Under that method, the normal cost for each year from entry age to assumed exit age is a constant percentage of the member's year by year projected compensation. The portion of the present value of future benefits not provided by the present value of future normal costs is the actuarial accrued liability. The unfunded actuarial accrued liability/(surplus) represents the difference between the actuarial accrued liability and the actuarial value of assets as of the valuation date. The unfunded actuarial accrued liability is calculated each year and reflects experience gains and losses.

In general, contributions are computed in accordance with a level-percent of payroll funding objective. The actuarial contribution rate, based on the July 1, 2021 actuarial valuation, will be used to determine the actuarial required employer contribution rate to the State Patrol Retirement System for the plan year ending June 30, 2022. Any additional State contributions are expected to be deposited on July 1, 2022 (State fiscal year end 2023). In this context, the term "contribution rate" means the percentage, which is applied to a particular active member payroll to determine the actual employer contribution amount (i.e., in dollars) for the group.

Contribution Rate Summary

In Table 10 the amortization payment related to the unfunded actuarial accrued liability, as of July 1, 2021, is developed. Table 11 develops the actuarial required contribution rate for the System and the amount of the required state contribution.

The actuarial contribution rates shown in this report are based on the actuarial assumptions and cost methods described in Appendix C.



SECTION 5 – EMPLOYER CONTRIBUTIONS

TABLE 10
STATE PATROL RETIREMENT SYSTEM
AMORTIZATION SCHEDULE FOR THE
UNFUNDED ACTUARIAL ACCRUED LIABILITY

Amortization Bases	Original Amount	July 1, 2021 Remaining Payments	Date of Last Payment	Outstanding Balance as of July 1, 2021	Annual Contribution*
2006 UAAL Base	\$ 13,632,330	15	7/1/2036	\$ 12,563,668	\$ 1,127,068
2007 UAAL Base	(2,328,213)	16	7/1/2037	(2,224,670)	(190,445)
2008 UAAL Base	7,528,427	17	7/1/2038	7,432,359	609,457
2009 UAAL Base	12,752,991	18	7/1/2039	12,968,502	1,022,046
2010 UAAL Base	17,735,331	19	7/1/2040	18,527,151	1,407,476
2011 UAAL Base	12,260,750	20	7/1/2041	13,126,513	963,792
2012 UAAL Base	19,767,597	21	7/1/2042	21,643,927	1,539,586
2013 Experience Base	13,785,867	22	7/1/2043	15,408,185	1,064,106
2014 Experience Base	(18,572,226)	23	7/1/2044	(20,530,631)	(1,379,257)
2015 Experience Base	(22,807,048)	24	7/1/2045	(24,891,800)	(1,629,582)
2016 Experience Base	(6,583,578)	25	7/1/2046	(7,082,603)	(452,575)
2017 Assumption Change Base	27,947,994	26	7/1/2047	29,592,335	1,848,404
2017 Experience Base	(6,040,886)	26	7/1/2047	(6,396,307)	(399,528)
2018 Experience Base	(7,711,191)	27	7/1/2048	(8,063,478)	(493,003)
2019 Experience Base	335,966	28	7/1/2049	346,515	20,764
2020 Experience Base	(2,126,062)	29	7/1/2050	(2,160,344)	(127,015)
2021 Assumption Change Base	6,936,227	25	7/1/2046	6,936,227	443,222
2021 Experience Base	(15,827,503)	25	7/1/2046	(15,827,503)	(1,011,371)
Total				\$ 51,368,046	\$ 4,363,145

* Contribution amount reflects mid-year timing.

- 1. Total UAAL Amortization Payments \$ 4,363,145
- 2. Projected Payroll for FY 2022 \$ 32,005,893
- 3. UAAL Amortization Payment Rate 13.63%

Note: Payments on each UAAL base are determined as a level-percent of payroll using a 3.15% payroll growth assumption.



TABLE 11

STATE PATROL RETIREMENT SYSTEM

ACTUARIAL REQUIRED CONTRIBUTION
FOR PLAN YEAR ENDING JUNE 30, 2022
and
DEVELOPMENT OF ADDITIONAL STATE CONTRIBUTION

1. Normal Cost	
(a) Amount	\$ 8,810,041
(b) Expected pay for current actives	29,514,156
(c) Normal Cost Rate as % of pay	29.85%
2. Administrative Expenses	0.26%
3. UAAL Amortization Rate (see Table 10)	13.63%
4. Total Actuarial Required Contribution Rate [1(c) + 2 + 3]	43.74%
5. Weighted Statutory Member Contribution Rate*	16.21%
6. Weighted Statutory Employer Contribution Rate*	16.21%
7. Additional Required State Contribution Rate [4 - 5 - 6, but not less than 0%]	11.32%
8. Projected Payroll for FY 2022	\$ 32,005,893
9. Additional Required State Contribution as of July 1, 2022 [7 * 8 * 1.073 ^{1/2}]	\$ 3,752,980
10. Total State Contributions	
(a) State statutory amount	\$ 5,188,155
(b) Additional State contribution as of July 1, 2022	<u>3,752,980</u>
(c) Total	\$ 8,941,135

*The statutory contribution rate is expressed as the weighted average of the Tier 1 and Tier 2 contribution rates, 16.00% and 17.00%, respectively.



SECTION 6 – RISK CONSIDERATIONS

Actuarial Standards of Practice are issued by the Actuarial Standards Board and are binding on credentialed actuaries practicing in the United States. These standards generally identify what the actuary should consider, document and disclose when performing an actuarial assignment. In September 2017, Actuarial Standard of Practice Number 51, *Assessment and Disclosure of Risk in Measuring Pension Obligations*, (ASOP 51) was issued as final with application to measurement dates on or after November 1, 2018. This ASOP, which applies to funding valuations, actuarial projections, and actuarial cost studies of proposed plan changes, was first applicable for the July 1, 2019 actuarial valuation for the Nebraska State Patrol Retirement System (System).

A typical retirement plan faces many different risks, but the greatest risk is the inability to make benefit payments when due. If plan assets are depleted, benefits may not be paid which could create legal and litigation risk or the plan could become “pay as you go”. The term “risk” is most commonly associated with an outcome with undesirable results. However, in the actuarial world, risk can be translated as uncertainty. The actuarial valuation process uses many actuarial assumptions to project how future contributions and investment returns will meet the cash flow needs for future benefit payments. Of course, we know that actual experience will not unfold exactly as anticipated by the assumptions and that uncertainty, whether favorable or unfavorable, creates risk. ASOP 51 defines risk as the potential of actual future measurements to deviate from expected results due to actual experience that is different than the actuarial assumptions.

The various risk factors for a given plan can have a significant impact – positive or negative – on the actuarial projection of liability and contribution rates.

There are a number of risks inherent in the funding of a defined benefit plan. These include:

- economic risks, such as investment return and price inflation;
- demographic risks such as mortality, payroll growth, aging population including impact of baby boomers, and retirement ages;
- contribution risk, i.e., the potential for contribution rates to be too high for the plan sponsor/employer to pay; and
- external risks such as the regulatory and political environment.

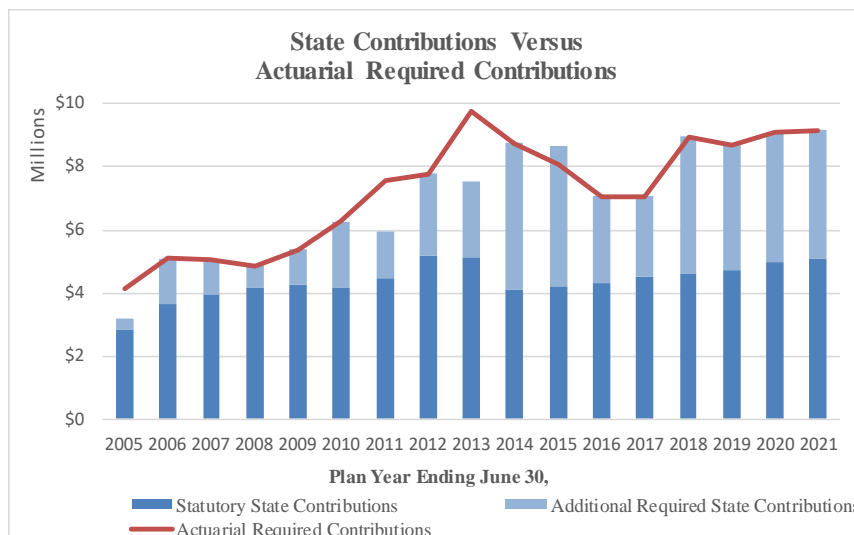
Although the external risks do exist, ASOP 51 does not require the actuary to opine on those risks, so no discussion is included here.

Actual vs Actuarial Contributions

The System is funded by statutory contribution rates of 16.00% of pay for Tier 1 members and 17.00% of pay for Tier 2 members, and matching contributions paid by the employer. State statutes require the State to make an additional contribution if the regular, payroll-related contributions by employees and the employer are insufficient to meet the actuarial required contribution amount for the plan year. The additional State contribution for each plan year is made on the July 1 following the plan year-end. There is a direct correlation between healthy, well-funded retirement systems and consistent contributions equal to the full actuarial contribution rate each year. As the following graph shows, the State has met the full actuarial required contribution requirement in 14 of the last 17 years.



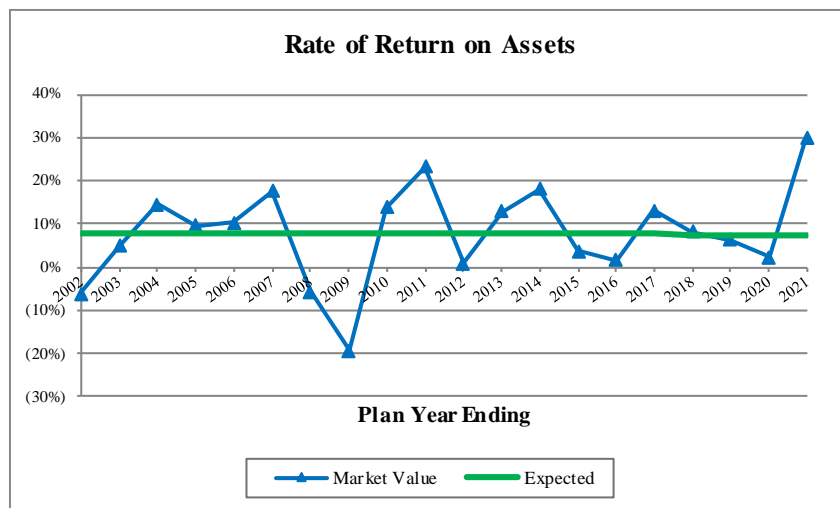
SECTION 6 – RISK CONSIDERATIONS



One of the positive factors regarding the funding of the State Patrol Retirement System is the State’s commitment to make contributions that are at least equal to the full actuarial required contribution. As a result, the funded ratio for the System has historically been strong.

Investment Return Risk

The most significant risk factor for most public retirement systems, including the Nebraska State Patrol Retirement System, is investment return because of the volatility of returns and the size of plan assets compared to payroll (see Table 12). A perusal of historical returns over 10-20 years reveals that the actual return each year is rarely close to the assumed return.



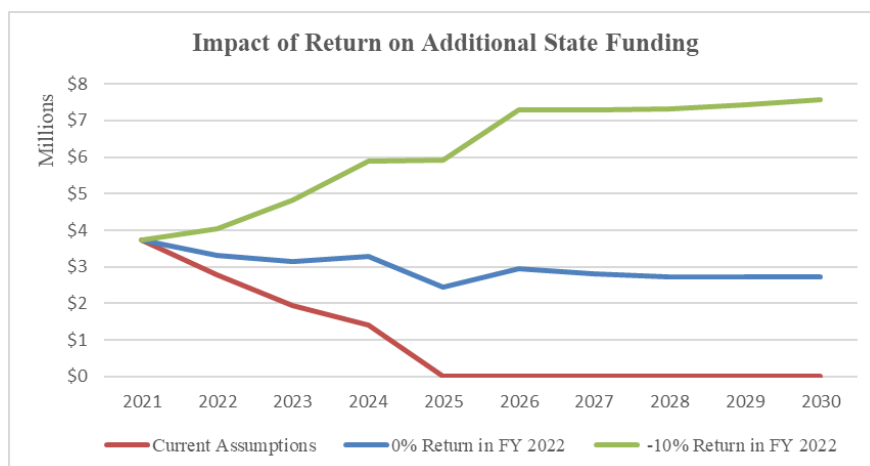
This is not unexpected, given the underlying capital market assumptions and the System’s asset allocation, but it creates significant contribution risk. As Table 12 illustrates, a return that varies from the 7.30% assumption by 10.0% (-2.70% or 17.30%) equates to 172% of payroll. Even with amortizing the actuarial experience loss over 25 years, the impact on the actuarial contribution rate is dramatic (11.02% once the experience is fully recognized).



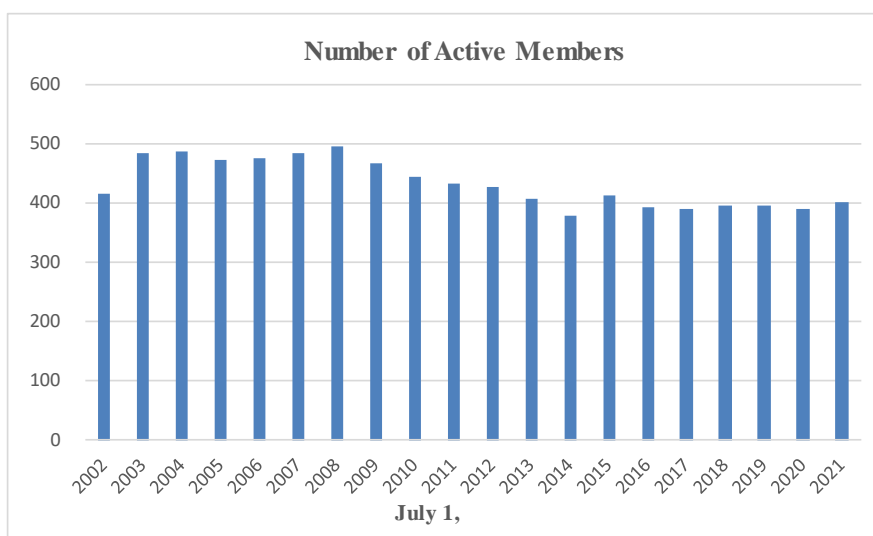
SECTION 6 – RISK CONSIDERATIONS

Contribution Risks

The actuarial required contribution, determined this year, based on the snapshot of the System taken on the valuation date of July 1, will change each year as the deferred investment experience is recognized and other experience (both investment and demographic) impacts the System. Therefore, the actuarial contribution rate is expected to change each year. To the extent the difference between the actual and expected experience is significant, the change in the actuarial contribution rate is also expected to change significantly. This volatility in the actuarial contribution rate results in potentially extreme volatility in the additional State contribution (see graph below) due to the fact it is the difference between the actuarial contribution rate and the statutory contribution rates. Any material difference in the actuarial contribution rate will impact the additional State contribution.



Finally, the unfunded actuarial accrued liability is amortized as a level percentage of payroll so the UAAL payment schedule reflects an increasing dollar amount of payments over time, in anticipation of increasing payroll. However, payroll generally does not grow as expected if the number of active members is not stable or increasing. When payroll does not grow as expected, the UAAL contribution rate will be higher than expected even if the dollar amount of the payment is the same as scheduled. The following graph shows the number of active members in the last twenty valuations:





SECTION 6 – RISK CONSIDERATIONS

While the valuation process captures differences between actual and expected number of active members (and payroll) each year and adjusts the actuarial contribution rate, a decline in the active member count will create pressure on the contribution rate and push more of the funding of the UAAL to the additional State contribution.

Demographic Risks

A key demographic risk for all retirement systems, including the Nebraska State Patrol Retirement System, is improvements in mortality (longevity) greater than anticipated. While the actuarial assumptions reflect small, continuous improvements in mortality experience over time and these assumptions are refined every experience study, the risk arises because there is a possibility of some sudden shift, perhaps due to a significant medical breakthrough that could quickly increase liabilities. Likewise, there is some possibility of a significant public health crisis that could result in a significant number of additional deaths in a short time period, as experienced with the COVID-19 pandemic. This type of event is also significant, although more easily absorbed. While either of these events could happen, it represents a small probability and thus represents much less risk than the volatility associated with investment returns.

The following exhibits summarize some historical information that helps indicate how certain key risk metrics have changed over time. Many are due to the maturing of the retirement system.



TABLE 12

STATE PATROL RETIREMENT SYSTEM
HISTORICAL ASSET VOLATILITY RATIOS

As a retirement system matures, the size of the market value of assets increases relative to the covered payroll of active members, on which the System is funded. The size of the plan assets relative to covered payroll, sometimes referred to as the asset volatility ratio, is an important indicator of the contribution risk for the System. The higher this ratio, the more sensitive a plan's contribution rate is to investment return volatility. In other words, it will be harder to recover from investment losses with increased contributions.

Actuarial Valuation Date	Market Value of Assets	Covered Payroll	Asset Volatility Ratio	Increase in ACR with a Return 10% Lower than Assumed*
July 1, 2002	\$179,067,600	\$18,846,776	9.50	6.07%
July 1, 2003	183,989,762	21,929,399	8.39	5.36%
July 1, 2004	206,369,362	22,640,907	9.11	5.82%
July 1, 2005	221,307,954	22,882,413	9.67	6.18%
July 1, 2006	241,017,483	24,057,960	10.02	6.40%
July 1, 2007	279,618,100	26,072,859	10.72	6.85%
July 1, 2008	259,479,803	26,979,643	9.62	6.15%
July 1, 2009	205,033,476	25,922,439	7.91	5.05%
July 1, 2010	229,574,640	26,765,816	8.58	5.48%
July 1, 2011	278,146,750	26,195,473	10.62	6.79%
July 1, 2012	278,311,367	25,794,219	10.79	6.89%
July 1, 2013	309,589,784	27,417,644	11.29	7.21%
July 1, 2014	357,316,892	25,933,848	13.78	8.81%
July 1, 2015	363,922,631	28,422,706	12.80	8.18%
July 1, 2016	361,155,486	27,806,977	12.99	8.30%
July 1, 2017	397,137,172	28,629,936	13.87	8.86%
July 1, 2018	420,683,030	29,795,799	14.12	9.02%
July 1, 2019	436,611,997	30,578,962	14.28	9.12%
July 1, 2020	435,782,874	31,112,989	14.01	8.95%
July 1, 2021	552,081,721	32,005,893	17.25	11.02%

Note: Years prior to July 1, 2013 were provided by the prior actuary.

*The impact of asset smoothing is not reflected in the impact on the Actuarial Contribution Rate (ACR). Current year assumptions are used for all years shown.

The assets at July 1, 2021 are 17 times payroll, so underperforming the investment return assumption by 10.00% (i.e., earn -2.70% for one year) creates an actuarial loss of about \$55 million, or 172% of payroll. While the actual impact in the first year is mitigated by the asset smoothing method and amortization of the UAAL, this illustrates the significant contribution risk associated with volatile investment returns.



TABLE 13
STATE PATROL RETIREMENT SYSTEM
HISTORICAL CASH FLOWS

The net cash flow of a system (contributions minus benefit payments and expenses), as a percentage of the beginning of year asset value, indicates the sensitivity of the system to short-term investment returns. Mature plans can have large amounts of benefit payments compared to contributions, particularly if they are well funded. In fact, this is one reason for prefunding retirement benefits – so a portion of investment return can help to pay plan benefits. When there is negative cash flow, investment losses in the short-term are compounded by the net withdrawal from plan assets leaving a smaller asset base to try to recover from the investment losses. Large negative cash flow can also create liquidity needs for the system.

Year End	Market Value of Assets (MVA)	Contributions	Benefit Payments	Net Cash Flow	Net Cash Flow as a Percent of MVA
6/30/2002	\$179,067,600	\$4,510,950	\$8,254,812	(\$3,743,862)	(2.09%)
6/30/2003	183,989,762	4,976,790	8,727,404	(3,750,614)	(2.04%)
6/30/2004	206,369,362	5,479,510	9,155,571	(3,676,061)	(1.78%)
6/30/2005	221,307,954	6,011,266	10,269,807	(4,258,541)	(1.92%)
6/30/2006	241,017,483	8,261,575	11,313,637	(3,052,062)	(1.27%)
6/30/2007	279,618,100	8,535,103	12,180,422	(3,645,319)	(1.30%)
6/30/2008	259,479,803	8,525,981	12,936,189	(4,410,208)	(1.70%)
6/30/2009	205,033,476	9,073,382	13,450,493	(4,377,111)	(2.13%)
6/30/2010	229,574,640	10,403,865	13,756,761	(3,352,896)	(1.46%)
6/30/2011	278,146,750	10,433,680	14,951,984	(4,518,304)	(1.62%)
6/30/2012	278,311,367	12,983,827	15,159,390	(2,175,563)	(0.78%)
6/30/2013	309,589,784	12,622,461	16,928,305	(4,305,844)	(1.39%)
6/30/2014	357,316,892	12,887,225	20,010,413	(7,123,188)	(1.99%)
6/30/2015	363,922,631	12,826,689	19,458,540	(6,631,851)	(1.82%)
6/30/2016	361,155,486	11,419,059	19,576,376	(8,157,317)	(2.26%)
6/30/2017	397,137,172	11,554,062	24,139,604	(12,585,542)	(3.17%)
6/30/2018	420,683,030	13,567,863	23,828,680	(10,260,817)	(2.44%)
6/30/2019	436,611,997	13,403,910	24,953,776	(11,549,866)	(2.65%)
6/30/2020	435,782,874	14,053,288	24,953,060	(10,899,772)	(2.50%)
6/30/2021	552,081,721	14,245,632	26,256,542	(12,010,910)	(2.18%)

Note: Years prior to 6/30/2013 were provided by the prior actuary.



TABLE 14

STATE PATROL RETIREMENT SYSTEM

LIABILITY MATURITY MEASUREMENTS

Most public sector retirement systems have been in operation for many years. As a result, they have aging plan populations, and in some cases declining active populations, resulting in an increasing ratio of retirees to active members (see Table 15) and a growing percentage of retiree liability (see table below). With more of the total liability residing with retirees, investment volatility has a greater impact on the funding of the system because it is more difficult to restore the system financially after losses occur when there is comparatively less payroll over which to spread costs.

Actuarial Valuation Date	Retiree Liability (a)	Total Actuarial Liability (b)	Retiree Percentage (a) / (b)
July 1, 2002	\$114,847,016	\$197,615,091	58.1%
July 1, 2003	122,452,596	210,930,784	58.1%
July 1, 2004	130,817,914	222,161,512	58.9%
July 1, 2005	137,890,496	236,026,471	58.4%
July 1, 2006	151,774,452	245,373,102	61.9%
July 1, 2007	162,565,102	265,846,597	61.1%
July 1, 2008	171,898,267	291,996,719	58.9%
July 1, 2009	186,078,948	305,291,065	61.0%
July 1, 2010	201,734,175	321,901,446	62.7%
July 1, 2011	210,595,076	339,554,456	62.0%
July 1, 2012	232,413,652	362,298,975	64.1%
July 1, 2013	246,649,393	386,875,100	63.8%
July 1, 2014	263,401,639	401,415,518	65.6%
July 1, 2015	272,309,342	410,210,579	66.4%
July 1, 2016	279,581,643	421,923,380	66.3%
July 1, 2017	303,829,524	465,066,035	65.3%
July 1, 2018	307,996,815	480,092,201	64.2%
July 1, 2019	315,463,480	496,519,265	63.5%
July 1, 2020	327,900,484	510,757,085	64.2%
July 1, 2021	355,959,053	540,576,453	65.8%

Note: Years prior to July 1, 2013 were provided by the prior actuary.



TABLE 15
STATE PATROL RETIREMENT SYSTEM
HISTORICAL MEMBER STATISTICS

Valuation Date July 1,	Number of Active Members	Number of Retired Members	Active/Retired
2002	415	280	1.48
2003	486	288	1.69
2004	489	301	1.62
2005	473	316	1.50
2006	477	331	1.44
2007	484	341	1.42
2008	496	352	1.41
2009	468	372	1.26
2010	444	390	1.14
2011	433	402	1.08
2012	427	422	1.01
2013	409	438	0.93
2014	378	453	0.83
2015	413	464	0.89
2016	393	471	0.83
2017	391	478	0.82
2018	395	478	0.83
2019	397	488	0.81
2020	392	503	0.78
2021	403	525	0.77

Note: Years prior to July 1, 2013 were provided by the prior actuary.

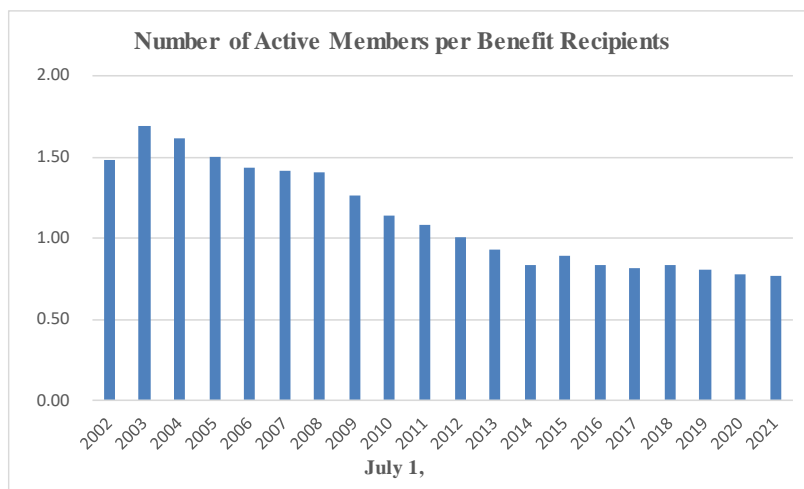




TABLE 16

STATE PATROL RETIREMENT SYSTEM

COMPARISON OF VALUATION RESULTS UNDER ALTERNATE
INVESTMENT RETURN ASSUMPTIONS

(\$ in Thousands)

This exhibit compares the key July 1, 2021 valuation results under five (5) different investment return assumptions to illustrate the impact of different assumptions on the funding of the System. Note that only the investment return assumption is changed, as identified in the heading below. All other assumptions are unchanged for purposes of this analysis.

Investment Return Assumption	6.80%	7.05%	7.30%	7.55%	7.80%
Contributions					
Normal Cost Rate	33.88%	31.78%	29.85%	28.06%	26.40%
Administrative Expenses	0.26%	0.26%	0.26%	0.26%	0.26%
UAAL Amortization Rate	<u>19.92%</u>	<u>16.77%</u>	<u>13.63%</u>	<u>10.51%</u>	<u>7.40%</u>
Total Actuarial Required Contribution	54.06%	48.81%	43.74%	38.83%	34.06%
Weighted Member Contribution Rate	(16.21%)	(16.21%)	(16.21%)	(16.21%)	(16.21%)
Weighted Employer Contribution Rate	<u>(16.21%)</u>	<u>(16.21%)</u>	<u>(16.21%)</u>	<u>(16.21%)</u>	<u>(16.21%)</u>
Additional Required State Contribution Rate	21.64%	16.39%	11.32%	6.41%	1.64%
Additional Required State Contribution	\$7,158	\$5,428	\$3,753	\$2,128	\$545
Actuarial Accrued Liability	\$576,030	\$557,834	\$540,576	\$524,195	\$508,632
Actuarial Value of Assets	<u>489,208</u>	<u>489,208</u>	<u>489,208</u>	<u>489,208</u>	<u>489,208</u>
Unfunded Actuarial Accrued Liability*	\$86,821	\$68,626	\$51,368	\$34,986	\$19,424
Funded Ratio	84.93%	87.70%	90.50%	93.33%	96.18%

Note: All other assumptions are unchanged for purposes of this sensitivity analysis.

*Numbers may not add due to rounding.



SECTION 7 – HISTORICAL FUNDING AND OTHER INFORMATION

This section of the report provides a historical perspective on the System’s funding and contribution practices, along with other information that may be of interest.



SECTION 7 – HISTORICAL FUNDING AND OTHER INFORMATION

TABLE 17
STATE PATROL RETIREMENT SYSTEM
HISTORICAL FUNDING INFORMATION
SCHEDULE OF FUNDING PROGRESS

Actuarial Valuation Date	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) (b)	Unfunded Actuarial Accrued Liability (UAAL) (b - a)	Funded Ratio (a / b)	Covered Payroll (c)	UAAL as a % of Covered Payroll [(b - a) / c]
June 30, 2003	\$214,657,454	\$210,930,784	(\$3,726,670)	101.8%	\$21,929,399	(17.0%)
June 30, 2004	216,422,556	222,161,512	5,738,956	97.4%	22,640,907	25.3%
June 30, 2005	219,831,273	236,026,471	16,195,198	93.1%	22,882,413	70.8%
June 30, 2006	231,740,772	245,373,102	13,632,330	94.4%	24,057,960	56.7%
June 30, 2007	254,662,819	265,846,597	11,183,778	95.8%	26,072,859	42.9%
June 30, 2008	273,393,928	291,996,719	18,602,791	93.6%	26,979,643	69.0%
June 30, 2009	274,119,906	305,291,065	31,171,159	89.8%	25,922,439	120.2%
June 30, 2010	273,306,925	321,901,446	48,594,521	84.9%	26,765,816	181.6%
June 30, 2011	279,192,669	339,554,456	60,361,787	82.2%	26,195,473	230.4%
June 30, 2012	282,810,785	362,298,975	79,488,190	78.1%	25,794,219	308.2%
June 30, 2013	294,468,029	386,875,100	92,407,071	76.1%	27,417,644	337.0%
June 30, 2014	325,966,725	401,415,518	75,448,793	81.2%	25,933,848	290.9%
June 30, 2015	356,446,470	410,210,579	53,764,109	86.9%	28,422,706	189.2%
June 30, 2016	374,205,616	421,923,380	47,717,764	88.7%	27,806,977	171.6%
June 30, 2017	395,149,596	465,066,035	69,916,439	85.0%	28,629,936	244.2%
June 30, 2018	417,588,175	480,092,201	62,504,026	87.0%	29,795,799	209.8%
June 30, 2019	433,655,500	496,519,265	62,863,765	87.3%	30,578,962	205.6%
June 30, 2020	450,151,647	510,757,085	60,605,438	88.1%	31,112,989	194.8%
June 30, 2021	489,208,407	540,576,453	51,368,046	90.5%	32,005,893	160.5%

Note: Information before 2013 was produced by the prior actuary.



TABLE 18
STATE PATROL RETIREMENT SYSTEM
HISTORICAL FUNDING INFORMATION
SCHEDULE OF CONTRIBUTIONS FROM THE EMPLOYER

Plan Year Ending	Actuarial Required Contributions	Percent Contributed
June 30, 2005	\$ 4,121,155	77%
June 30, 2006	5,081,930	100%
June 30, 2007	5,058,621	100%
June 30, 2008	4,855,700	100%
June 30, 2009	5,384,789	100%
June 30, 2010	6,260,122	100%
June 30, 2011	7,563,126	79%
June 30, 2012	7,774,506	100%
June 30, 2013	9,768,585	77%
June 30, 2014	8,752,627	100%
June 30, 2015	8,073,824	100%
June 30, 2016	7,053,408	100%
June 30, 2017	7,053,110	100%
June 30, 2018	8,952,649	100%
June 30, 2019	8,693,805	100%
June 30, 2020	9,083,079	100%
June 30, 2021	9,163,828	100%

Note: Contribution information is consistent with that shown in the GASB 67 report prepared for the System.



APPENDIX A – MEMBERSHIP DATA

MEMBER DATA RECONCILIATION

	Active Members	Members in DROP	Inactive Vested	Inactive Non-vested	Retirees and Beneficiaries	Disabled Members	Total
As of July 1, 2020	392	30	28	8	458	15	931
Changes in status							
a) Retirement	(7)	(10)	(1)	0	18	0	0
b) DROP	(15)	15	0	0	0	0	0
c) Death	0	0	0	0	(8)	0	(8)
d) Non-vested terminations	(3)	0	0	3	0	0	0
e) Vested terminations	(4)	0	4	0	0	0	0
f) Contribution refund	(1)	0	(1)	(2)	0	0	(4)
g) Beneficiaries in receipt	0	0	0	0	7	0	7
h) Disability retirements	0	0	0	0	0	0	0
i) Return to active service	0	0	0	0	0	0	0
j) Expired benefits	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total changes in status	(30)	5	2	1	17	0	(5)
New entrants	41	0	0	0	0	0	41
Data Corrections	0	0	0	0	0	0	0
Net Change	11	5	2	1	17	0	36
As of July 1, 2021	403	35	30	9	475	15	967



APPENDIX A – MEMBERSHIP DATA

SUMMARY OF MEMBERSHIP DATA

A. ACTIVE MEMBERS	July 1, 2021	July 1, 2020	% Change
1. Number of Active Members			
(a) Before assumed retirement age	400	387	3.4%
(b) Beyond assumed retirement age	<u>3</u>	<u>5</u>	(40.0%)
(c) Total	403	392	2.8%
2. Annual Reported Salary			
(a) Before assumed retirement age	\$ 30,086,231	\$ 29,043,985	3.6%
(b) Beyond assumed retirement age	<u>290,672</u>	<u>418,058</u>	(30.5%)
(c) Total	\$ 30,376,903	\$ 29,462,043	3.1%
3. Accumulated Contributions	\$ 49,296,108	\$ 50,128,422	(1.7%)
4. Active Member Averages			
(a) Age	39.7	40.6	(2.2%)
(b) Service	12.7	13.6	(6.6%)
(c) Compensation	\$ 75,377	\$ 75,158	0.3%
(d) Accumulated contributions	\$ 122,323	\$ 127,879	(4.3%)
B. INACTIVE MEMBERS			
1. Number of Inactive Members			
(a) System nonvested (refund only)	9	8	12.5%
(b) System vested	<u>30</u>	<u>28</u>	7.1%
(c) Total	39	36	8.3%
2. Accumulated Member Contributions	\$ 3,841,250	\$ 3,555,207	8.0%
3. Inactive Members Averages			
(a) Age (vested members only)	46.9	46.8	0.2%
(b) Accumulated member contributions	\$ 98,494	\$ 98,756	(0.3%)
C. RETIREES, DISABLEDS, AND BENEFICIARIES			
1. Number of Members			
(a) Retired	364	352	3.4%
(b) Disabled	15	15	0.0%
(c) Beneficiaries	111	106	4.7%
(d) DROP	<u>35</u>	<u>30</u>	16.7%
(e) Total	525	503	4.4%
2. Annual Benefits			
(a) Retired	\$ 20,298,619	\$ 19,030,320	6.7%
(b) Disabled	549,252	535,855	2.5%
(c) Beneficiaries	3,168,549	2,956,589	7.2%
(d) DROP	<u>2,424,893</u>	<u>2,045,348</u>	18.6%
(e) Total	\$ 26,441,313	\$ 24,568,112	7.6%
3. Market Value of DROP Account Balances	\$ 4,311,477	\$ 4,051,884	6.4%

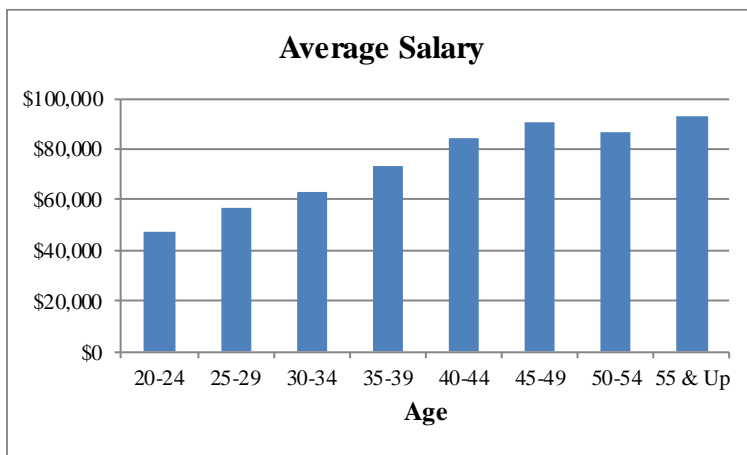
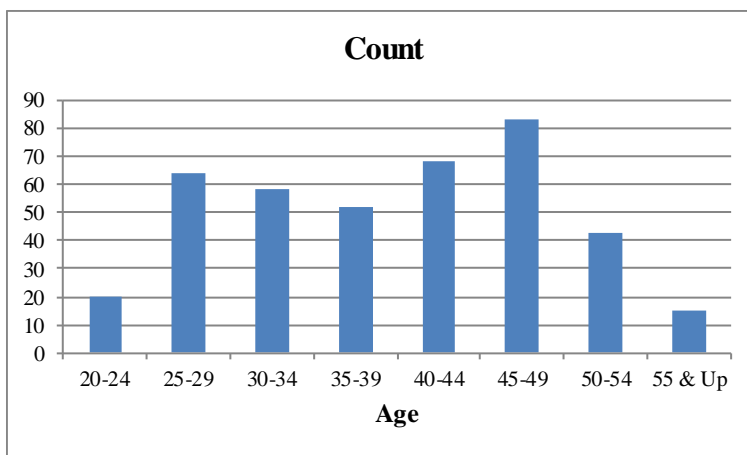


APPENDIX A – MEMBERSHIP DATA

**ACTIVE MEMBERS
AS OF JULY 1, 2021**

Total

Age	Count			Reported FY 2021 Earnings		
	Male	Female	Total	Male	Female	Total
20-24	17	3	20	\$ 846,833	\$ 93,718	\$ 940,551
25-29	60	4	64	3,419,027	239,664	3,658,691
30-34	51	7	58	3,211,638	425,250	3,636,888
35-39	48	4	52	3,561,667	246,147	3,807,814
40-44	63	5	68	5,291,999	417,345	5,709,344
45-49	81	2	83	7,359,589	146,488	7,506,077
50-54	42	1	43	3,632,608	94,271	3,726,879
55 & Up	14	1	15	1,316,530	74,129	1,390,659
Total	376	27	403	\$ 28,639,891	\$ 1,737,012	\$ 30,376,903



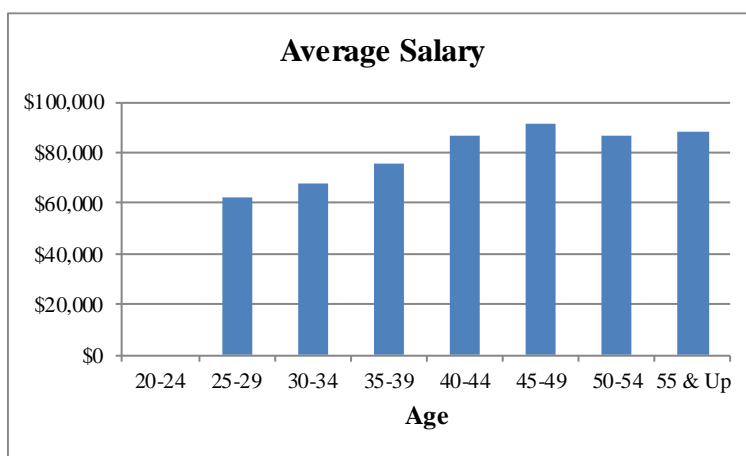
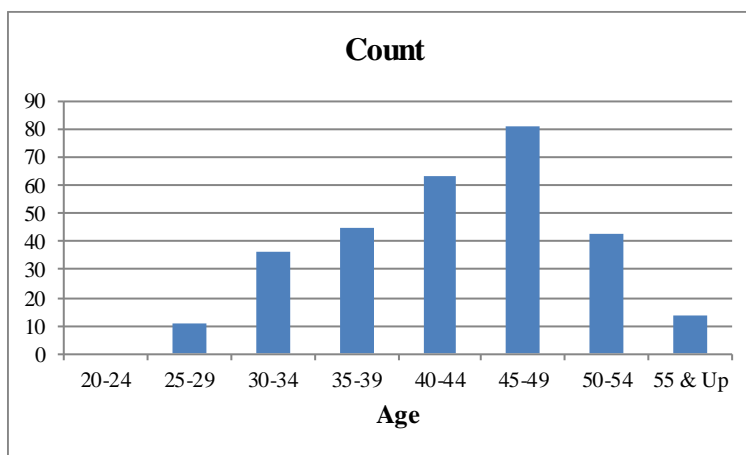


APPENDIX A – MEMBERSHIP DATA

**ACTIVE MEMBERS
AS OF JULY 1, 2021**

Tier 1

Age	Count			Reported FY 2021 Earnings		
	Male	Female	Total	Male	Female	Total
20-24	0	0	0	\$ 0	\$ 0	\$ 0
25-29	11	0	11	686,803	0	686,803
30-34	31	5	36	2,112,935	315,214	2,428,149
35-39	42	3	45	3,208,033	196,364	3,404,397
40-44	59	4	63	5,077,775	358,665	5,436,440
45-49	79	2	81	7,240,863	146,488	7,387,351
50-54	42	1	43	3,632,608	94,271	3,726,879
55 & Up	13	1	14	1,157,199	74,129	1,231,328
Total	277	16	293	\$ 23,116,216	\$ 1,185,131	\$ 24,301,347



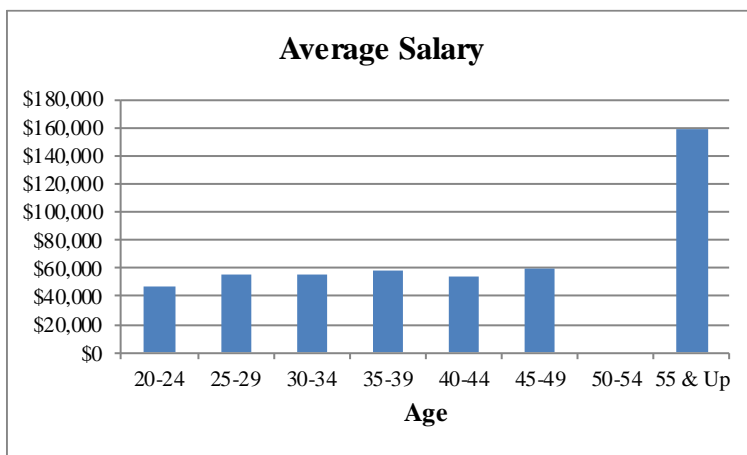
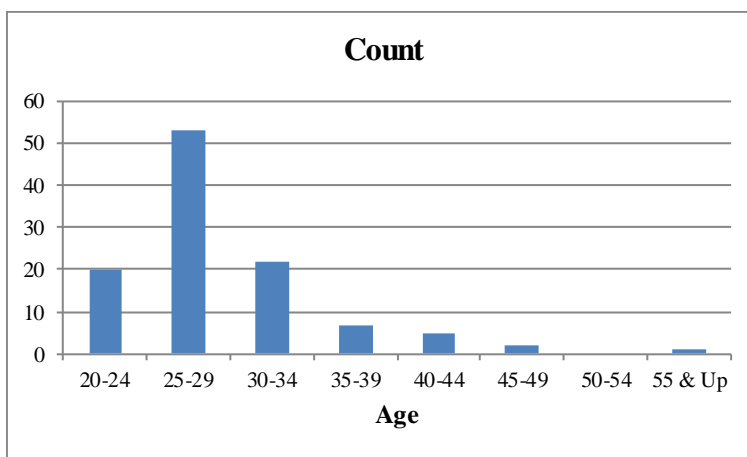


APPENDIX A – MEMBERSHIP DATA

**ACTIVE MEMBERS
AS OF JULY 1, 2021**

Tier 2

Age	Count			Reported FY 2021 Earnings		
	Male	Female	Total	Male	Female	Total
20-24	17	3	20	\$ 846,833	\$ 93,718	\$ 940,551
25-29	49	4	53	2,732,224	239,664	2,971,888
30-34	20	2	22	1,098,703	110,036	1,208,739
35-39	6	1	7	353,634	49,783	403,417
40-44	4	1	5	214,224	58,680	272,904
45-49	2	0	2	118,726	0	118,726
50-54	0	0	0	0	0	0
55 & Up	1	0	1	159,331	0	159,331
Total	99	11	110	\$ 5,523,675	\$ 551,881	\$ 6,075,556





APPENDIX A – MEMBERSHIP DATA

**AGE AND SERVICE DISTRIBUTION
AS OF JULY 1, 2021**

Age		0-4	5-9	10-14	15-19	20-24	Over 25	Total
20-24	Number	20	0	0	0	0	0	20
	Total Salary	\$ 940,551	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 940,551
	Average Sal.	\$ 47,028	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 47,028
25-29	Number	53	11	0	0	0	0	64
	Total Salary	\$ 2,971,888	\$ 686,803	\$ 0	\$ 0	\$ 0	\$ 0	\$ 3,658,691
	Average Sal.	\$ 56,073	\$ 62,437	\$ 0	\$ 0	\$ 0	\$ 0	\$ 57,167
30-34	Number	22	32	4	0	0	0	58
	Total Salary	\$ 1,208,739	\$ 2,115,935	\$ 312,214	\$ 0	\$ 0	\$ 0	\$ 3,636,888
	Average Sal.	\$ 54,943	\$ 66,123	\$ 78,054	\$ 0	\$ 0	\$ 0	\$ 62,705
35-39	Number	7	10	27	8	0	0	52
	Total Salary	\$ 403,417	\$ 640,386	\$ 2,125,261	\$ 638,750	\$ 0	\$ 0	\$ 3,807,814
	Average Sal.	\$ 57,631	\$ 64,039	\$ 78,713	\$ 79,844	\$ 0	\$ 0	\$ 73,227
40-44	Number	5	4	12	42	5	0	68
	Total Salary	\$ 272,905	\$ 281,688	\$ 971,400	\$ 3,765,556	\$ 417,795	\$ 0	\$ 5,709,344
	Average Sal.	\$ 54,581	\$ 70,422	\$ 80,950	\$ 89,656	\$ 83,559	\$ 0	\$ 83,961
45-49	Number	2	1	2	34	40	4	83
	Total Salary	\$ 118,725	\$ 67,699	\$ 146,357	\$ 2,954,707	\$ 3,836,089	\$ 382,500	\$ 7,506,077
	Average Sal.	\$ 59,363	\$ 67,699	\$ 73,179	\$ 86,903	\$ 95,902	\$ 95,625	\$ 90,435
50-54	Number	0	0	3	13	26	1	43
	Total Salary	\$ 0	\$ 0	\$ 225,245	\$ 1,068,480	\$ 2,328,966	\$ 104,188	\$ 3,726,879
	Average Sal.	\$ 0	\$ 0	\$ 75,082	\$ 82,191	\$ 89,576	\$ 104,188	\$ 86,672
55 & Up	Number	1	0	0	8	6	0	15
	Total Salary	\$ 159,331	\$ 0	\$ 0	\$ 748,764	\$ 482,564	\$ 0	\$ 1,390,659
	Average Sal.	\$ 159,331	\$ 0	\$ 0	\$ 93,596	\$ 80,427	\$ 0	\$ 92,711
Total	Number	110	58	48	105	77	5	403
	Total Salary	\$ 6,075,556	\$ 3,792,511	\$ 3,780,477	\$ 9,176,257	\$ 7,065,414	\$ 486,688	\$ 30,376,903
	Average Sal.	\$ 55,232	\$ 65,388	\$ 78,760	\$ 87,393	\$ 91,759	\$ 97,338	\$ 75,377



APPENDIX A – MEMBERSHIP DATA

**MEMBERS PARTICIPATING IN DROP
AS OF JULY 1, 2021**

<u>Age</u>	<u>Count</u>			<u>Annual Benefits</u>		
	<u>Male</u>	<u>Female</u>	<u>Total</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>
49 & Under	0	0	0	\$ 0	\$ 0	\$ 0
50-51	9	0	9	607,593	0	607,593
52-53	12	3	15	889,238	200,045	1,089,283
54-55	7	0	7	442,422	0	442,422
56-57	4	0	4	285,595	0	285,595
58-59	0	0	0	0	0	0
60 & Up	0	0	0	0	0	0
Total	32	3	35	\$ 2,224,848	\$ 200,045	\$ 2,424,893



APPENDIX A – MEMBERSHIP DATA

**INACTIVE VESTED MEMBERS
AS OF JULY 1, 2021**

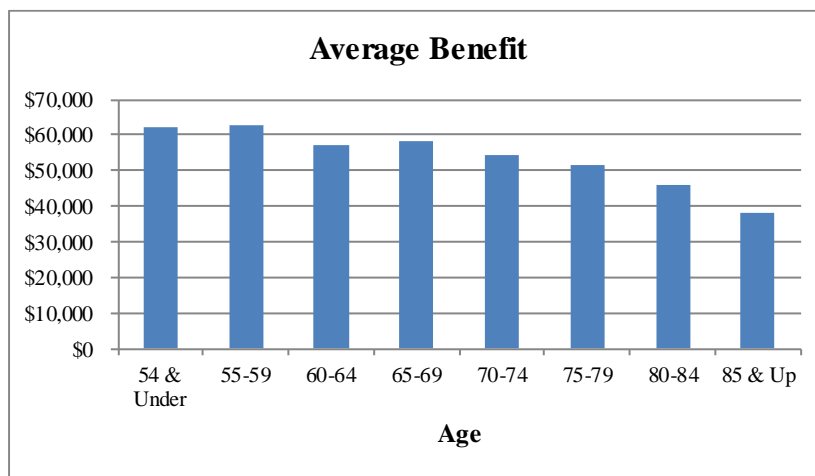
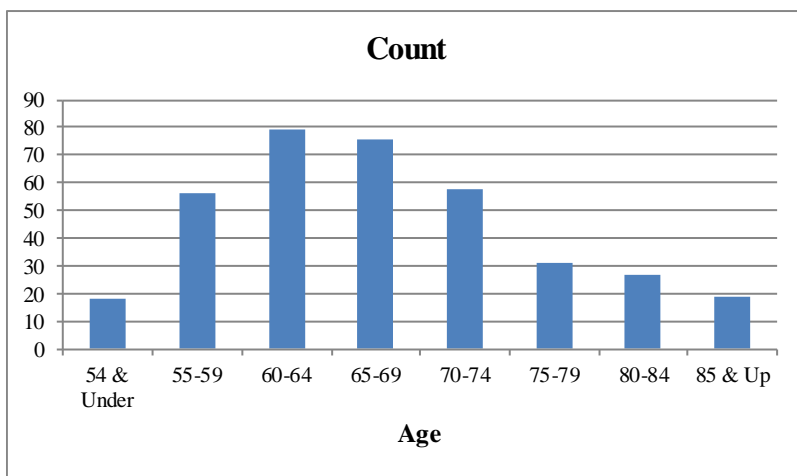
<u>Age</u>	<u>Count</u>			<u>Annual Benefits</u>		
	<u>Male</u>	<u>Female</u>	<u>Total</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>
20-24	0	0	0	\$ 0	\$ 0	\$ 0
25-29	0	0	0	0	0	0
30-34	1	0	1	18,932	0	18,932
35-39	1	0	1	23,131	0	23,131
40-44	9	0	9	257,573	0	257,573
45-49	10	1	11	277,949	27,733	305,682
50-54	7	0	7	207,585	0	207,585
55 & Up	1	0	1	28,477	0	28,477
Total	29	1	30	\$ 813,647	\$ 27,733	\$ 841,380



APPENDIX A – MEMBERSHIP DATA

**RETIRED MEMBERS
AS OF JULY 1, 2021**

Age	Count			Annual Benefits		
	Male	Female	Total	Male	Female	Total
54 & Under	18	0	18	\$ 1,121,168	\$ 0	\$ 1,121,168
55-59	53	3	56	3,340,201	178,452	3,518,653
60-64	70	9	79	3,965,677	536,620	4,502,297
65-69	75	1	76	4,394,781	30,487	4,425,268
70-74	57	1	58	3,126,265	22,311	3,148,576
75-79	30	1	31	1,542,203	64,473	1,606,676
80-84	27	0	27	1,247,309	0	1,247,309
85 & Up	19	0	19	728,672	0	728,672
Total	349	15	364	\$19,466,276	\$832,343	\$20,298,619

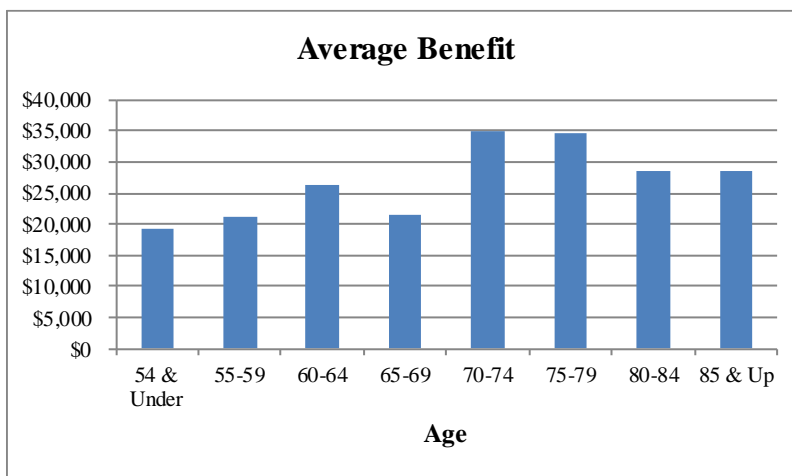
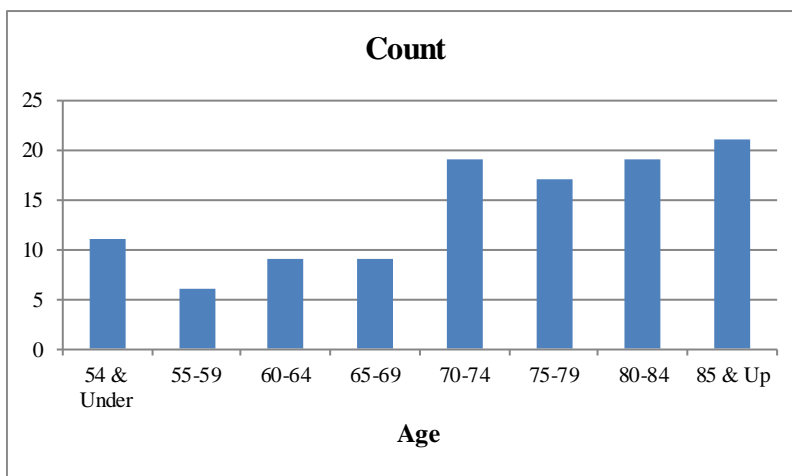




APPENDIX A – MEMBERSHIP DATA

**BENEFICIARIES
AS OF JULY 1, 2021**

Age	Count			Annual Benefits		
	Male	Female	Total	Male	Female	Total
54 & Under	1	10	11	\$ 22,136	\$ 190,834	\$ 212,970
55-59	0	6	6	0	127,524	127,524
60-64	0	9	9	0	237,526	237,526
65-69	0	9	9	0	194,731	194,731
70-74	0	19	19	0	664,042	664,042
75-79	0	17	17	0	586,563	586,563
80-84	1	18	19	32,571	511,528	544,099
85 & Up	0	21	21	0	601,094	601,094
Total	2	109	111	\$ 54,707	\$ 3,113,842	\$ 3,168,549





APPENDIX A – MEMBERSHIP DATA

**DISABLED MEMBERS
AS OF JULY 1, 2021**

Age	Count			Annual Benefits		
	<u>Male</u>	<u>Female</u>	<u>Total</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>
54 & Under	6	1	7	\$ 213,701	\$ 30,906	\$ 244,607
55-59	0	0	0	0	0	0
60-64	0	1	1	0	37,579	37,579
65-69	3	0	3	111,028	0	111,028
70-74	1	0	1	39,906	0	39,906
75-79	2	0	2	82,058	0	82,058
80-84	0	0	0	0	0	0
85 & Up	1	0	1	34,074	0	34,074
Total	13	2	15	\$ 480,767	\$ 68,485	\$ 549,252



APPENDIX B – SUMMARY OF PLAN PROVISIONS

Member	Any member of the Nebraska State Patrol, permanent force.
Participation Date	Date of becoming a member.
Benefit Tiers	<p>Tier 1 refers to participants who joined the plan prior to July 1, 2016.</p> <p>Tier 2 refers to participants who joined the plan on or after July 1, 2016, as well as Tier 1 participants who took a refund and returned to the plan on or after July 1, 2016.</p>
Definitions	
<i>Covered pay</i>	Gross annual earnings subject to contributions.
<i>Final average compensation</i>	<p>For Tier 1 participants, it is the average of the highest three 12-month periods of covered pay, ending on the earlier of the participant's termination date or retirement date.</p> <p>For Tier 2 participants, it is the average of the highest five 12-month periods of covered pay, ending on the earlier of the participant's termination date or retirement date.</p>
<i>Salary caps</i>	For Tier 2 participants only, increases in compensation during the final five plan years of employment will be capped at 8% per year.
<i>Pension service</i>	Length of service includes all service with the Nebraska State Patrol, permanent force, computed to the nearest one-twelfth year, plus declared emergency service in the armed forces.
<i>Fiscal year</i>	Twelve month period ending June 30.
<i>Member and employer contributions</i>	<p>Tier 1 participants contribute 16.0% of covered pay. Such contributions are credited with interest based on the 1-year treasury yield curve on July 1 of each year, as determined by State Statutes. Employer contributions on Tier 1 Covered Pay are 16.0% of monthly salary. (Prior to July 1, 2013, employee and employer contribution rates for Tier 1 members were 19.0% of pay.).</p> <p>Tier 2 participants contribute 17.0% of covered pay. Such contributions are credited with interest based on the 1-year treasury yield curve on July 1 of each year, as determined by State Statutes. Employer contributions on Tier 2 Covered Pay are 17.0% of monthly salary.</p> <p>The State makes any additional contributions that are actuarially required.</p>



APPENDIX B – SUMMARY OF PLAN PROVISIONS

Pension benefit 3.0% of Final Average Compensation times Pension Service. The benefit is subject to a maximum of 75% of Final Average Compensation. Effective July 1, 2001, an automatic annual cost-of-living adjustment (COLA) equal to the CPI-W index is granted to each participant who has been retired for at least one full fiscal year.

For Tier 1 participants, the COLA is capped at 2.5%, unless the benefit drops below 60% of the purchasing power of the original benefit. For Tier 2 participants, the COLA is capped at 1.0% and there is no purchasing power floor.

Normal Retirement Date (NRD) First of month coinciding with or next following (a) the completion of 25 years of service and attaining age 50, (b) the completion of ten years of service and attaining age 55, or (c) attaining age 60 regardless of service.

Eligibility for Benefits

Deferred vested Termination for reasons other than death, disability, or retirement after completing at least six years of pension service.

Disability retirement Retirement by reason of disability as defined by State Statutes.

Early retirement Retirement before NRD and on or after both attaining age 50 and completing ten years of pension service.

Normal retirement Retire on NRD.

Postponed retirement Retire after NRD.

Post-retirement death benefit Death after retirement with surviving spouse or dependent children under age 19. For non-disability retirement, the surviving spouse must have been married to the member at the date of retirement.

Pre-retirement death benefit Death prior to retirement.

Monthly Benefits Paid Upon the Following Events

Normal retirement Pension benefit determined as of NRD.

Early retirement Pension benefit determined as of early retirement date, reduced by 5/9% for each month that commencement (which must be after age 50 and ten years of service) of payment precedes the earlier of age 55 or completion of 25 years of service. No reduction is made after 25 years of service.

Postponed retirement Monthly pension benefit determined as of actual retirement date.



APPENDIX B – SUMMARY OF PLAN PROVISIONS

Termination with deferred vested benefit

Refund of contributions with regular interest or a percentage of the pension benefit determined as of termination date, reduced by 5/9% for each month that commencement (which must be after age 50 and ten years of service) of payment precedes the earlier of age 55 or completion of 25 years of service. This percentage is based upon completed years of pension service as follows:

<u>Years</u>	<u>Vested Percentage</u>
5 and under	0%
6	20
7	40
8	60
9	80
10 or more	100

Disability retirement

A monthly benefit equal to 50% of current monthly salary at the date of disablement for members with less than 17 years of service.

For members with more than 17 years of service, a monthly benefit equal to the product of 3% of final monthly salary, times total years of service subject to a maximum of 75% of Final Average Compensation.

Pre-retirement death benefits

Surviving spouse or dependent children under age 19:

Benefit is computed as if member retired for disability on the date of death. This benefit is payable to the surviving spouse as long as spouse has dependent children under age 19. If spouse dies or remarries, 75% of this benefit continues to children until the youngest attains age 19. If there are no dependent children under age 19, 75% of this benefit is payable to the surviving spouse until death or remarriage.

No surviving spouse or dependent children under age 19:

A lump sum equal to the member’s contributions plus regular interest.

Post-retirement death benefits

100% of member’s annuity is payable to the surviving spouse provided spouse has dependent children under 19. If there is no surviving spouse or spouse dies or remarries, 75% of member’s annuity continues to children until the youngest attains age 19. If there are no dependent children under age 19, 75% of member’s annuity continues to surviving spouse.

Forms of payment

Normal form is 75% Joint and Survivor benefit. Members may also elect a refund of contributions. If there is no surviving spouse or dependent children under age 19, the member’s accumulated contributions with interest are paid to the beneficiary or estate.



APPENDIX B – SUMMARY OF PLAN PROVISIONS

Deferred Retirement Option Plan (DROP)

A Tier 1 member may elect to participate in the DROP after they attain age 50 with 25 years of service. A member can continue to work while participating in the DROP, but must terminate employment within 5 years of entry into the DROP. The member's retirement benefits would be calculated as of the DROP entry date. The monthly payments that begin at entry into the DROP are accumulated until the member terminates service, at which time the DROP accumulated benefits and investment income can be paid as a lump sum, rollover or annuity. The COLA for retirees would not apply to the member during participation in the DROP and both the member and employer contributions cease upon entry into the DROP.

Tier 2 members cannot participate in DROP.

Benefits Reflected in Valuation

All benefits were valued, including future cost of living increases granted by statute.

Plan Provisions Effective After July 1, 2021

No future changes in plan provisions were recognized in determining the funded status or in determining the actuarial soundness of statutory contribution levels.

Changes in Plan Provisions Since the Prior Year

There have been no changes to plan provisions since the prior year.



A. ACTUARIAL METHODS

- 1. Calculation of Normal Cost and Actuarial Accrued Liability:** The method used to determine the normal cost and actuarial accrued liability was the Entry Age Actuarial Cost Method described below.

Entry Age Actuarial Cost Method

Projected pension and preretirement spouse's death benefits were determined for all active members who had not reached age 60 or 25 years of service. Cost factors designed to produce annual costs as a level percentage of each member's expected compensation in each year from the assumed entry age to the assumed retirement age were applied to the projected benefits to determine the normal cost (the portion of the total cost of the plan allocated to the current year under the method). The normal cost is determined by summing intermediate results for active members who had not reached age 60 or 25 years of service and determining an average normal cost rate which is then related to the total payroll of active members who had not reached age 60 or 25 years of service. The actuarial assumptions shown in Appendix C were used in determining the projected benefits and cost factors. The actuarial accrued liability for active members (the portion of the total cost of the plan allocated to prior years under the method) was determined as the excess of the actuarial present value of projected benefits over the actuarial present value of future normal costs.

The actuarial accrued liability for retired members and their beneficiaries currently receiving benefits, active members who either reached age 60 or 25 years of service, terminated vested members and disabled members not yet receiving benefits was determined as the actuarial present value of the benefits to be paid. No future normal costs are payable for these members.

The actuarial accrued liability under this method at any point in time is the theoretical amount of the fund that would have been accumulated had annual contributions equal to the normal cost been made in prior years (it does not represent the liability for benefits accrued to the valuation date). The unfunded actuarial accrued liability is the excess of the actuarial accrued liability over the actuarial value of plan assets measured on the valuation date. Under the Entry Age Normal method, experience gains or losses, i.e., decreases or increases in actuarial accrued liabilities attributable to deviations in experience from the actuarial assumptions, adjust the unfunded actuarial accrued liability.

The unfunded actuarial accrued liability is amortized using the "layered" approach. The unfunded actuarial accrued liability as of July 1, 2006 was the initial or legacy amortization base, amortized over a closed 30-year period. Changes in the unfunded actuarial accrued liability due to assumption changes or actuarial experience gains/losses are amortized over separate 25-year amortization bases, each with their own individual payment schedules, beginning June 30, 2021 and after. If the UAAL is less than or equal to zero, then all prior bases shall be considered fully funded and the UAAL shall be amortized over a 25-year period as of the actuarial valuation date. The UAAL amortization payment schedules are determined using the level percent of payroll methodology, where payments escalate annually with the assumed increase in payroll growth.



APPENDIX C – SUMMARY OF ACTUARIAL ASSUMPTIONS

2. Calculation of the Actuarial Value of Assets: The actuarial value of assets is based on a five-year smoothing method and is determined by spreading the effect of each year's investment return in excess of or below the expected return. The market value of assets as the valuation date is reduced by the sum of the following:

- i. 80% of the return to be spread during the first year preceding the valuation date,
- ii. 60% of the return to be spread during the second year preceding the valuation date,
- iii. 40% of the return to be spread during the third year preceding the valuation date, and
- iv. 20% of the return to be spread during the fourth year preceding the valuation date.

The return to be spread is the difference between (1) the actual investment return on market value of assets and (2) the expected return of actuarial value of assets. Effective July 1, 2000, the expected return on actuarial value of assets includes interest on the previous year's unrecognized return.

B. VALUATION PROCEDURES

Data Procedures

Salaries for first year members are annualized by NPERS and reflected in the Calculated Salary field in the census data. This is used in the valuation process for new members. For continuing active members, the Accumulated Salary field from the data, representing the actual salary earned in the prior fiscal year, is used in the valuation process.

When multiple records are received, the record with the oldest beneficiary date of birth is valued.

Other Valuation Procedures

The compensation amounts used in the projection of benefits and liabilities for active members were prior plan year compensations. Salary increases are assumed to apply to annual amounts.

Projected benefits were limited by the dollar limitation required by the Internal Revenue Code Section 415 as it applies to governmental plans and compensation limited by Section 401(a)(17).

Decrements are assumed to occur mid-year, except that immediate retirement is assumed for those who are at or above the age at which retirement rates are 100%. Standard adjustments are made for multiple decrements.

No actuarial accrued liability is included for participants who terminated without being vested prior to the valuation date, except those who are owed a refund of contributions.



APPENDIX C – SUMMARY OF ACTUARIAL ASSUMPTIONS

Changes in Methods and Procedures Since the Prior Year

At their meeting on December 21, 2020, the Public Employees Retirement Board adopted a new set of actuarial assumptions, based on the recommendations in the 2020 experience study. Following this, Legislative Bill 17 was passed by the 2021 Nebraska Legislature which changed the UAAL amortization method to use a 25-year period instead of a 30-year period for UAAL bases established on or after July 1, 2021.



APPENDIX C – SUMMARY OF ACTUARIAL ASSUMPTIONS

ECONOMIC ASSUMPTIONS

- 1. Investment Return 7.30% per annum, compounded annually, net of expenses.
Note: The assumption will decrease by 0.10% per year until reaching the ultimate rate of 7.00% in the 2024 valuation.

- 2. Inflation 2.65% per annum, compounded annually.
Note: The assumption will decrease by 0.10% per year until reaching the ultimate rate of 2.35% in the 2024 valuation.

- 3. Salary Increase Rates vary by service as follows:

Rates by Service				
Years	Inflation	Productivity	Merit	Total
1	2.65%	0.50%	5.50%	8.65%
2	2.65	0.50	4.50	7.65
3	2.65	0.50	3.60	6.75
4	2.65	0.50	3.00	6.15
5	2.65	0.50	2.60	5.75
6	2.65	0.50	2.30	5.45
7	2.65	0.50	2.05	5.20
8	2.65	0.50	1.85	5.00
9	2.65	0.50	1.65	4.80
10	2.65	0.50	1.60	4.75
11	2.65	0.50	1.56	4.71
12	2.65	0.50	1.53	4.68
13-25	2.65	0.50	1.50	4.65
26	2.65	0.50	1.20	4.35
27	2.65	0.50	0.90	4.05
28	2.65	0.50	0.60	3.75
29	2.65	0.50	0.30	3.45
30+	2.65	0.50	0.00	3.15

- 4. Payroll Growth 3.15% per annum.
Note: The assumption will decrease by 0.10% per year until reaching the ultimate rate of 2.85% in the 2024 valuation.

- 5. Interest on Employee Contributions 2.50% per annum, compounded annually.

- 6. Increases on Compensation And Benefit Limits 2.65% per annum on the 401(a)(17) compensation limit and the 415 benefit limit.
Note: The assumption will decrease by 0.10% per year until reaching the ultimate rate of 2.35% in the 2024 valuation.



APPENDIX C – SUMMARY OF ACTUARIAL ASSUMPTIONS

DEMOGRAPHIC ASSUMPTIONS

1. Mortality

- a. Healthy lives - Active members Pub-2010 General Members (Above Median) Employee Mortality Table (100% of male rates, 95% of female rates), both male and female rates set back one year, projected generationally using MP-2019 modified to 75% of the ultimate rates.
- b. Healthy lives – Retired members Pub-2010 General Members (Above Median) Retiree Mortality Table (100% of male rates, 95% of female rates), both male and female rates set back one year, projected generationally using MP-2019 modified to 75% of the ultimate rates.
- c. Healthy lives – Beneficiaries Pub-2010 General Members (Above Median) Contingent Survivor Mortality Table (100% of male rates, 95% of female rates), both male and female rates set back one year, projected generationally using MP-2019 modified to 75% of the ultimate rates.
- d. Disabled lives Pub-2010 Non-Safety Disabled Retiree Mortality Table (static table).
- e. Healthy mortality rates and projection scale are shown below at sample ages:

Pre-retirement Mortality		
Mortality Rate (Base Rates)		
Sample Age	Males	Females
20	0.04%	0.01%
30	0.04	0.01
40	0.07	0.03
50	0.11	0.06
60	0.27	0.16

Post-retirement Mortality		
Mortality Rate (Base Rates)		
Sample Age	Males	Females
50	0.11%	0.06%
60	0.53	0.35
70	1.17	0.80
80	3.60	2.60
90	11.73	9.07



APPENDIX C – SUMMARY OF ACTUARIAL ASSUMPTIONS

Projection Scale – Post-retirement Mortality						
Sample Age	Scale (2020)		Scale (2030)		Scale (2040)	
	Males	Females	Males	Females	Males	Females
50	0.0004	0.0030	0.0026	0.0036	0.0075	0.0075
60	0.0004	-0.0041	0.0063	0.0069	0.0075	0.0075
70	0.0017	0.0052	0.0069	0.0063	0.0075	0.0075
80	0.0067	0.0061	0.0066	0.0070	0.0075	0.0075
90	0.0048	0.0032	0.0067	0.0067	0.0069	0.0069

f. Disabled mortality rates are shown below at sample ages:

Sample Age	Males	Females
30	0.35%	0.26%
40	0.65	0.63
50	1.61	1.48
60	2.50	1.96
70	3.90	2.86
80	7.35	6.01

2. Retirement

Retirement is assumed to occur upon attaining certain age and service requirements. The retirement assumption varies depending on benefit eligibility and age at retirement.

Early/Normal Retirement Eligibility	Age and Service Requirements	Retirement Assumption
Reduced	Age 50 Service: 10 years	1% at each age
Unreduced	Age 55 Service: 10 years	10% at each age
Unreduced (Eligible for DROP)	Age 50 Service: 25 years	100% at each age
Unreduced (Mandatory)	Age 60	100% at each age



APPENDIX C – SUMMARY OF ACTUARIAL ASSUMPTIONS

3. Termination

Rates vary by service. Sample rates are as follows:

Rates by Service	
Years	Rate
<1	4.00%
1	3.75
5	2.75
10	2.00
15	1.25
20+	0.00

4. Disability

Rates vary by age. Sample rates are as follows:

Rates by Age	
Age	Rate
25	0.08%
30	0.10
35	0.13
40	0.20
45	0.31
50	0.52
55	0.91
60	1.36

OTHER ASSUMPTIONS

1. Form of Payment

75% Joint & Survivor Annuity. Deferred vesteds are assumed to take the greater of the present value of an annuity at earliest unreduced eligibility or a refund of contributions.

2. Marital Status

- a. Percent married
- b. Spouse’s age

100% married
Females assumed to be three years younger than males.

3. Children

All members are assumed to have one dependent child at death or retirement. The child is assumed to be 28 years younger than the member and is assumed to always survive until age 19.

4. Administrative Expense

0.26% of payroll

5. Commencement Age for Deferred Vested Benefit

Age 55

6. Cost of Living Adjustments

2.15% per annum, compounded annually for Tier 1 members.
Note: The assumption will decrease by 0.05% per year until reaching the ultimate rate of 2.00% in the 2024 valuation.
1.00% per annum, compounded annually for Tier 2 members.



APPENDIX C – SUMMARY OF ACTUARIAL ASSUMPTIONS

- | | |
|-----------------------|---|
| 7. DROP Participation | All members elect the DROP at the earliest possible date and remain in the DROP for 4 years or to age 60, if earlier. No COLA is received during DROP. |
| 8. State Contribution | Additional State contributions for the current plan year are assumed to be contributed in a lump sum on the July 1 following the plan year end. These amounts from the prior plan year are treated as a contribution receivable on the plan's financial statements. |

Changes in Assumptions since the Prior Year

At their meeting on December 21, 2020, the Public Employees Retirement Board adopted a new set of actuarial assumptions based on the recommendations in the 2020 experience study. Changes to the set of economic assumptions are phased in over four years. Below is a summary of the key assumption changes:

- Price inflation assumption was lowered from 2.75% to 2.65%.
- Investment return assumption was lowered from 7.50% to 7.30%.
- Interest on employee contributions was lowered from 3.00% to 2.50%.
- COLA assumption for Tier 1 members was lowered from 2.25% to 2.15%.
- General wage inflation assumption was lowered from 3.50% to 3.15%.
- Salary merit increases were adjusted to better reflect observed experience.
- An explicit assumption for administrative expenses was adopted as a component of the actuarial contribution rate and was set to 0.26% of pay.
- Retirement rates were adjusted to better reflect observed experience.
- Mortality assumption for non-disabled participants was changed to the Pub-2010 General Members (Above Median) Mortality Tables (100% of male rates, 95% female rates), set back one-year, projected generationally using MP-2019 modified to 75% of ultimate rates.
- Mortality assumption for disabled participants was changed to the Pub-2010 Non-Safety Disabled Retiree Mortality Table (static).



APPENDIX D – GLOSSARY OF TERMS

Actuarial Accrued Liability	The difference between the actuarial present value of system benefits and the actuarial value of future normal costs. Also referred to as “accrued liability” or “actuarial liability”.
Actuarial Assumptions	Estimates of future 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.
Accrued Service	Service credited under the system which was rendered before the date of the actuarial valuation.
Actuarial Equivalent	A single amount or series of amounts of equal actuarial value to another single amount or series of amounts, computed on the basis of appropriate assumptions.
Actuarial Cost Method	A mathematical budgeting procedure for allocating the dollar amount of the actuarial present value of retirement system benefit between future normal cost and actuarial accrued liability. Sometimes referred to as the “actuarial funding method”.
Experience Gain (Loss)	The difference between actual experience and actuarial assumptions anticipated experience during the period between two actuarial valuation dates.
Actuarial Present Value	The amount of funds currently required to provide a payment or series of payments in the future. It is determined by discounting future payments at predetermined rates of interest and by probabilities of payment.
Amortization	Paying off an interest-discounted amount with periodic payments of interest and principal, as opposed to paying off with lump sum payment.
Normal Cost	The actuarial present value of retirement system benefits allocated to the current year by the actuarial cost method.
Unfunded Actuarial Accrued Liability	The difference between actuarial accrued liability and the valuation assets. Sometimes referred to as “unfunded actuarial liability” or “unfunded accrued liability.”