2019 Actuarial Valuation Report on the Municipal Employees' Retirement System

Actuarial Valuation as of
June 30, 2019
Issued January 2020

LOUISIANA LEGISLATIVE AUDITOR
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ON BEHALF OF THE ACTUARY FOR THE LEGISLATIVE AUDITOR
LOWELL P. GOOD, ASA, EA, MAAA

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2019 ACTUARIAL VALUATION REPORT

MUNICIPAL EMPLOYEES' RETIREMENT SYSTEM

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LOUISIANA LEGISLATIVE AUDITOR
DARYL G. PURPERA, CPA, CFE

January 15, 2020

Mr. Warren D. Ponder
Executive Director
Municipal Employees' Retirement System of Louisiana
7937 Office Park Boulevard
Baton Rouge, Louisiana 70809

Dear Mr. Ponder:

This report provides the results of our actuarial valuation of the Municipal Employees' Retirement System as of June 30, 2019. The report contains our findings, conclusions, and recommendations.

I would like to thank you, your staff, and the board's actuary for your cooperation and assistance with this actuarial valuation.

Sincerely,

Daryl G. Purpera, CPA, CFE
Legislative Auditor

DGP:NE:ch

MERS 2019 VALUATION BY LLA

SUMMARY AND CONCLUSIONS

This actuarial valuation report was prepared by the Louisiana Legislative Auditor (LLA) and is hereby submitted to the Public Retirement Systems' Actuarial Committee (PRSAC) for its consideration

PUBLIC DOCUMENT

This valuation report is a public document. This report has been prepared for the following users:

Potential Users*	Definitions*	Identified Persons
Principal	A client or employer of the actuary.	The Legislative Auditor.
Intended Users	Any person who the actuary identifies as able to rely on the findings of the report.	The Louisiana Legislature and staff, PRSAC and MERS.
Other Users	Any recipient of the report who is not an intended user.	Other interested government entities or employees and the public.

* As defined by the Actuarial Standards of Practice (ASOP) No. 41.

SUMMARY OF CHANGES IN ASSUMPTIONS AND METHODS

This actuarial valuation implements a few significant changes as compared to the last PRSAC-accepted valuation for the Municipal Employees' Retirement System (MERS or System) which was dated December 11, 2018, and prepared by G. S. Curran & Company, Ltd.

- This valuation implements the changes in various demographic assumptions that result from the recent experience study and which were recommended by the System's actuary and adopted by the retirement board. We accept those changes. Refer to Appendix A for more details.

- This valuation lowers the inflation assumption to 2.20% from the 2.60% assumption in the last PRSAC-accepted valuation, based on current consensus averages among reputable sources. Refer to Appendix B for more details.

- This valuation lowers the investment return assumption to 6.40% from the 7.275% assumption in the last PRSAC-accepted valuation, based on current consensus averages among 14 reputable sources and considering MERS' own asset allocation and cash flow expectations. Refer to Appendices C and D for more details.

- This valuation recognizes the expected costs of the System's future gain-sharing cost-of-living (COLA) benefits, while the last PRSAC-accepted valuation did not include the expected costs of the System's future gain-sharing cost-of-living (COLA) benefits. Refer to Appendix E for more details.

SUMMARY OF VALUATION RESULTS – PLAN A

Valuation Date		June 30, 2019	June 30, 2018
Census Summary:	Active Members	4,795	4,888
	Retired Members and Survivors	3,552	3,468
	Terminated Due a Deferred Benefit	199	185
	Terminated Due a Refund	2,994	2,994
Payroll:		$ 181,786,660	$ 181,786,660
Benefits in Payment:		$ 66,521,523	$ 63,184,393
Present Value of Future Benefits:		$ 1,536,454,034	$ 1,335,318,466
Actuarial Accrued Liability (EAN):		$ 1,352,263,542	$ 1,129,080,666
Frozen Unfunded Actuarial Accrued Liability:		$ 65,648,756	$ 68,334,864
Funding Deposit Account Credit Balance:		$ 9,346,575	$ 8,712,724
Actuarial Value of Assets (AVA):		$ 806,503,031	$ 797,679,469
Market Value of Assets (MVA):		$ 765,059,686	$ 734,226,194
Ratio of AVA to Actuarial Accrued Liability (EAN):		59.64%	70.65%
		Fiscal 2019	Fiscal 2018
Market Rate of Return:		4.90%	6.1%
Actuarial Rate of Return:		1.70%	2.8%
		Fiscal 2020	Fiscal 2019
Employers' Normal Cost (Mid-year):		$ 74,455,710	$ 48,573,047
Amortization Cost (Mid-Year):		$ 7,410,476	$ 7,393,261
Estimated Administrative Cost:		$ 1,898,365	$ 1,374,875
Projected Ad Valorem Tax Contributions:		$ 6,460,959	$ 6,180,051
Projected Revenue Sharing Funds:		$ 113,397	$ 113,209
Net Direct Employer Actuarially Required Contributions:		$ 77,190,195	$ 51,047,923
Projected Payroll:		$ 187,660,646	$ 185,436,456
Board Approved Employee Contribution Rate:		9.50%	9.50%
Board Approved Net Direct Employer Contribution Rate:		27.75%	26.00%
Actuarially Required Net Direct Employer Contribution Rate:		41.13%	27.53%
		Fiscal 2021	Fiscal 2020
Minimum Recommended Net Direct Employer Cont. Rate:		42.75%	27.75%

SUMMARY OF VALUATION RESULTS – PLAN B

Valuation Date		June 30, 2019	June 30, 2018
Census Summary:	Active Members	2,063	2,128
	Retired Members and Survivors	1,076	1,050
	Terminated Due a Deferred Benefit	97	92
	Terminated Due a Refund	2,994	1,419
Payroll:		$ 74,696,846	$ 74,696,846
Benefits in Payment:		$ 12,223,992	$ 11,522,493
Present Value of Future Benefits:		$ 342,443,284	$ 293,683,688
Actuarial Accrued Liability (EAN):		$ 295,591,707	$ 241,302,909
Frozen Unfunded Actuarial Accrued Liability:		$ -	$ -
Funding Deposit Account Credit Balance:		$ 1,633,823	$ 1,523,023
Actuarial Value of Assets (AVA):		$ 180,085,046	$ 175,032,415
Market Value of Assets (MVA):		$ 170,871,104	$ 161,284,802
Ratio of AVA to Actuarial Accrued Liability (EAN):		60.92%	72.54%
		Fiscal 2019	Fiscal 2018
Market Rate of Return:		4.80%	6.0%
Actuarial Rate of Return:		1.90%	2.7%
		Fiscal 2020	Fiscal 2019
Employers' Normal Cost (Mid-year):		$ 18,515,083	$ 12,513,679
Amortization Cost (Mid-Year):		$ -	$ -
Estimated Administrative Cost:		$ 778,175	$ 564,941
Projected Ad Valorem Tax Contributions:		$ 2,648,467	$ 2,539,407
Projected Revenue Sharing Funds:		$ 46,483	$ 46,518
Net Direct Employer Actuarially Required Contributions:		$ 16,598,308	$ 10,492,695
Projected Payroll:		$ 76,952,056	$ 76,396,822
Board Approved Employee Contribution Rate:		5.00%	5.00%
Board Approved Net Direct Employer Contribution Rate:		14.00%	14.00%
Actuarially Required Net Direct Employer Contribution Rate:		21.57%	13.73%
		Fiscal 2021	Fiscal 2020
Minimum Recommended Net Direct Employer Cont. Rate:		22.50%	13.75%

DISCUSSION OF CHANGES IN ASSUMPTIONS AND METHODS

In preparing this actuarial valuation, we accepted almost all the actuarial assumptions developed by MERS' actuary and adopted by its board of trustees, while we changed other actuarial assumptions. Following is a brief summary of the principles we applied in adopting different assumptions used in this actuarial valuation as compared to the System's 2019 valuation.

1. The economic assumptions as to future inflation and future investment returns:
   a. Should be an unbiased expectation of the future from independent experts,
   b. Should not be unduly influenced by perceptions of what the contributing entity(ies) can afford in current annual budget negotiations,
   c. Should explicitly reflect the System's own asset allocation,
   d. Should explicitly reflect the System's own projected benefit cash flow, and
   e. Should lie within the mainstream of forward-looking forecasts from experts.

2. All material benefits that are reasonably expected to be paid in the future should be measured actuarially, including expected future cost-of-living (COLA) benefits, using actuarial methods that are:
   a. *Explicit:* Separately identify the cost of COLA benefits, and should not be implicitly buried or conflated within the return assumption, and
   b. *Transparent:* Clear and meaningful; should not be misleading or confusing to the public.

These changes in assumptions do not change the cost of the retirement program. They change the contribution timing or incidence (i.e., under these new assumptions, current and future generations of taxpayers are more equitably paying their respective fair shares, actuarially speaking).

The improvements in these two actuarial assumptions/methods (compared to the System's assumptions) enhance the benefit security of plan members by ensuring the contribution requirements have a stronger actuarial basis. Furthermore, these improvements enhance the integrity of the financial disclosures issued by all participating governmental entities, by ensuring the balance sheet liabilities reflect all expected benefits, and are a more transparent and fair representation of the pension obligation.

The following sections provide a brief explanation of the new assumptions and methods and the rationale behind them.

Demographic Assumptions (Rates of Mortality, Turnover, Retirement, etc.)

This valuation revised the various rates of mortality, turnover, retirement and other demographic assumptions from those used in the 2018 valuation and adopted by PRSAC. The valuation accepted the demographic assumptions adopted by the System for its 2019 valuation.

The System's most recent experience study covered the period July 1, 2013, through June 30, 2018. The results are presented in a report prepared by MERS' actuary (dated September 5, 2019). The LLA carefully reviewed the report for reasonableness and found it to produce appropriately revised demographic assumptions.

All these new demographic assumptions were adopted by the MERS' board of trustees for use in the actuary's June 30, 2019, actuarial valuation report.

Refer to Appendix A for more information concerning the demographic changes.

Economic Assumptions (Inflation and Investment Return)

MERS' actuarial calculations and disclosures as of June 30, 2018, and as of June 30, 2019, were developed by its actuary using an investment return assumption of 7.275% and of 7.0%, respectively.

Based on its review of many independent national experts in the forecasting of inflation and investment returns, the LLA has determined that 6.40% is the *most appropriate* return assumption and it is used for all purposes in this actuarial valuation. The LLA determined the *most appropriate* inflation assumption to be 2.20%.

Refer to the following Appendices for an understanding of how these revised economic assumptions were derived and why they constitute an improvement:

- Appendix B – Basis for Inflation Assumption
- Appendix C – Basis for Net Investment Return Assumption
- Appendix D – Horizon for the Net Investment Return Assumption
- Appendix G – Press Clippings for Other Retirement Systems Lowering Their Return Assumptions (2015-2019).

Tables on pages 6 and 7 present the effect of these changes in the economic assumptions (as well as other changes) on the unfunded accrued liability as of June 30, 2019, and on the minimum recommended net direct employer contribution rate for fiscal year (FYE) 2021.

Assumption for Gain-sharing COLA Benefits

This actuarial valuation employs an explicit method of recognizing the expected cost of future gain-sharing COLA benefits of the plan. The future gain-sharing COLA benefits are actuarially equivalent to an annual fixed COLA of approximately 0.45% for eligible retirees prior to age 65 and 0.65% thereafter. This was approximated using stochastic (simulation) modeling techniques. The System's gain-sharing COLA program is complex and must be approximated within an actuarial valuation.

The System and its actuary do not recognize any future expected permanent benefit increase. It is the opinion of the LLA that not recognizing the future expected permanent benefit increases fails to measure the cost of the plan's COLA program properly, and understates the costs and liabilities. Future COLAs are likely to be permitted by the statutory template (as predictably as disabilities or turnover) and reasonably likely to be granted by the board of trustees. Therefore, they should be actuarially measured, just as other future benefits which are likely to be provided. It is the opinion, of the LLA, that when certain benefits are judged to be reasonably likely to be paid in the future and are actuarially measurable and material, it would be inappropriate to treat them as pay-as-you-go benefit, i.e., financing the payment of COLAs after the have been granted.

Refer to Appendix E for an understanding of *how* and *why* this change in assumption (or method) was derived and implemented, and why it is an improvement.

The tables on pages 6 and 7 present the effect of advance-recognizing gain-sharing COLA benefits (as well as other changes) on the minimum recommended net direct employer contribution rate for FYE 2021.

BRIEF SUMMARY OF THE EFFECTS OF ASSUMPTION/METHOD CHANGES

PLAN A

The following table presents the associated minimum recommended net direct employer contribution rate for FYE 2021 for each of the new assumptions/methods described above. The entries below isolate the effect of each new assumption/method individually and cumulatively.

The Effects of Changes in Assumptions and Methods	Minimum Recommended Net Direct Employer Contribution Rate for FYE 2021 (as Pct of Projected Covered Pay)
(1) As Prepared by the System Actuary *(benchmark values)*	29.5%
(2) Change in Method for Actuarial Valuation System *(effect of change in Actuarial Valuation System against benchmark)*	30.8%
a. Effect of this Change: (2)-(1)	1.3%
(3) Change in Economic Assumptions *(combined effect of all changes above and in Investment Return and Inflation Assumptions against benchmark)*	36.8%
a. Effect of this Additional Change: (3)-(2)	6.0%
(4) Change in Assumption (Method) for Gain-sharing COLA Benefits *(combined effect of all changes above and in Method for Gain-sharing COLA against benchmark)*	42.8%
a. Effect of this Additional Change: (4)-(3)	6.0%
b. Combined Effect of All Changes: 2a+3a+4a = (4)-(1)	13.3%

Source: Developed by LLA's actuary.

(1) Benchmark values have been developed by the System actuary using assumptions adopted by the Board for the 6/30/2019 actuarial valuation.

(2) Change in method for actuarial valuation system.

(3) Change in inflation and net investment return assumption used in the 6/30/2019 actuarial valuation: for annual rate of inflation, from MERS' rate of 2.50% to LLA's rate of 2.20%; and for annual rate of net investment return, from MERS' rate of 7.00% to LLA's rate of 6.40% per annum.

(4) Change in assumption (method) for gain-sharing COLA makes a revision from the current MERS' no COLA recognition to LLA's equivalent 0.45% COLA until age 65 and 0.65% COLA thereafter approximating all future

BRIEF SUMMARY OF THE EFFECTS OF ASSUMPTION/METHOD CHANGES

PLAN B

The following table presents the associated minimum recommended net direct employer contribution rate for FYE 2021, for each of the new assumptions/methods described above. The entries below isolate the effect of each new assumption/method individually and cumulatively.

The Effects of Changes in Assumptions and Methods	Minimum Recommended Net Direct Employer Contribution Rate for FYE 2021 (as Pct of Projected Covered Pay)
(1) As Prepared by the System Actuary *(benchmark values)*	15.5%
(2) Change in Method for Actuarial Valuation System *(effect of change in Actuarial Valuation System against benchmark)*	15.8%
a. Effect of this Change: (2)-(1)	0.3%
(3) Change in Economic Assumptions *(combined effect of all changes above and in Investment Return and Inflation Assumptions against benchmark)*	19.3%
a. Effect of this Additional Change: (3)-(2)	3.5%
(4) Change in Assumption (Method) for Gain-sharing COLA Benefits *(combined effect of all changes above and in Method for Gain-sharing COLA against benchmark)*	22.5%
a. Effect of this Additional Change: (4)-(3)	3.3%
b. Combined Effect of All Changes: 2a+3a+4a = (4)-(1)	7.0%

Source: Developed by LLA's actuary.

(1) Benchmark values have been developed by the System actuary using assumptions adopted by the Board for the 6/30/2019 actuarial valuation.

(2) Change in method for actuarial valuation system.

(3) Change in inflation and net investment return assumption used in the 6/30/2019 actuarial valuation: for annual rate of inflation, from MERS' rate of 2.50% to LLA's rate of 2.20%; and for annual rate of net investment return, from MERS' rate of 7.00% to LLA's rate of 6.40% per annum.

(4) Change in assumption (method) for gain-sharing COLA makes a revision from the current MERS' no COLA recognition to LLA's equivalent 0.45% COLA until age 65 and 0.65% COLA thereafter approximating all future

QUALIFICATIONS, DISCLOSURES, AND CERTIFICATION

This valuation has been prepared as of June 30, 2019, based on plan provisions for MERS as documented in Title 11 of Louisiana Revised Statutes (R.S.), Sections 1001 through 1206.

This report was prepared at the request of the LLA and is intended for use by PRSAC and those designated or approved by the LLA and PRSAC. This report may be provided to parties other than PRSAC only in its entirety and only with the permission of the LLA. Neither the LLA nor GRS is responsible for unauthorized use of this report.

The purposes of the valuation are to measure the System's funding progress, to determine the unfunded actuarial liability as of June 30, 2019, and to determine the actuarially determined contribution rate for the fiscal year ending June 30, 2021. This report should not be relied on for any purpose other than the purposes described herein. Determinations of financial results associated with the benefits described in this report for purposes other than those identified above may be significantly different.

The contribution rates shown on pages 2 and 3 may be considered minimum contribution rates that comply with the statutes' funding policy. Users of this report should be aware that contributions made at these rates do not guarantee benefit security. Given the importance of benefit security to any retirement system, we suggest that contributions to MERS in excess of those presented in this report be considered.

The contribution rates in this report are determined using the actuarial assumptions and methods, policies and plan provisions disclosed in Section II of this report. This report does not include a robust assessment of the risks of future experience not meeting the actuarial assumptions, as the assessment of these risks was outside the scope of this assignment. We encourage a review and assessment of investment and other significant risks that may have a material effect on the System's financial condition. Refer to Appendix F for further discussion on risk.

The findings in this report are based on census and financial data and other information through June 30, 2019. 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 System's funded status); and changes in plan provisions or applicable law. The scope of an actuarial valuation does not include an analysis of the potential range of such future measurements.

This valuation assumed the continuing ability of the participating employers to make the contributions necessary to fund this plan. A determination regarding whether or not the plan sponsors are actually able to do so is outside our scope of expertise and was not performed.

The valuation was based upon information furnished by the System and its actuary concerning plan benefits, financial transactions, plan provisions, active members, terminated members, retirees, and beneficiaries. We checked for internal reasonability and year-to-year consistency, but did not audit the data. We are not responsible for the accuracy or completeness of the information provided by the System or its actuary.

Summary and Conclusions

This report has been prepared by actuaries who have substantial experience valuing public employee retirement systems. To the best of our knowledge, the information contained in this report is accurate and fairly presents the actuarial position of the System as of the valuation date. All calculations have been made in conformity with generally accepted actuarial principles and practices, with the Actuarial Standards of Practice issued by the Actuarial Standards Board, and with applicable statutes.

This valuation report was prepared jointly by James J. Rizzo, Senior Consultant and Actuary employed by Gabriel, Roeder, Smith & Company (GRS), and by Piotr Krekora, Consultant and Actuary also employed by GRS. GRS serves as staff for the LLA Actuarial Services section. Both Mr. Rizzo and Mr. Krekora are members of the American Academy of Actuaries. These actuaries meet the Academy's Qualification Standards to render the actuarial opinions contained herein. The signing actuaries are independent of the plan sponsor and the System.

This actuarial valuation and contribution determination were prepared and completed by us or under our direct supervision, and we acknowledge responsibility for the results. To the best of our knowledge, the results are complete and accurate. In our opinion, the techniques and assumptions used are reasonable, meet the requirements and intent of relevant Louisiana Statutes, and are based on generally accepted actuarial principles and practices.

There is no benefit or expense to be provided by the System and/or paid from the System's assets for which liabilities or current costs have not been established or otherwise taken into account in the valuation. All known events or trends which may require a material increase in plan costs or required contribution rates have been considered in the valuation.

The authors of this report will be pleased to review this valuation with PRSAC and to answer any questions pertaining to the valuation.

Respectfully submitted,

On behalf of the ACTUARY FOR THE LOUISIANA LEGISLATIVE AUDITOR

Gabriel, Roeder, Smith & Company

By: James J. Rizzo, ASA, MAAA

By: Piotr Krekora, ASA, MAAA, PhD

Date: January 14, 2020

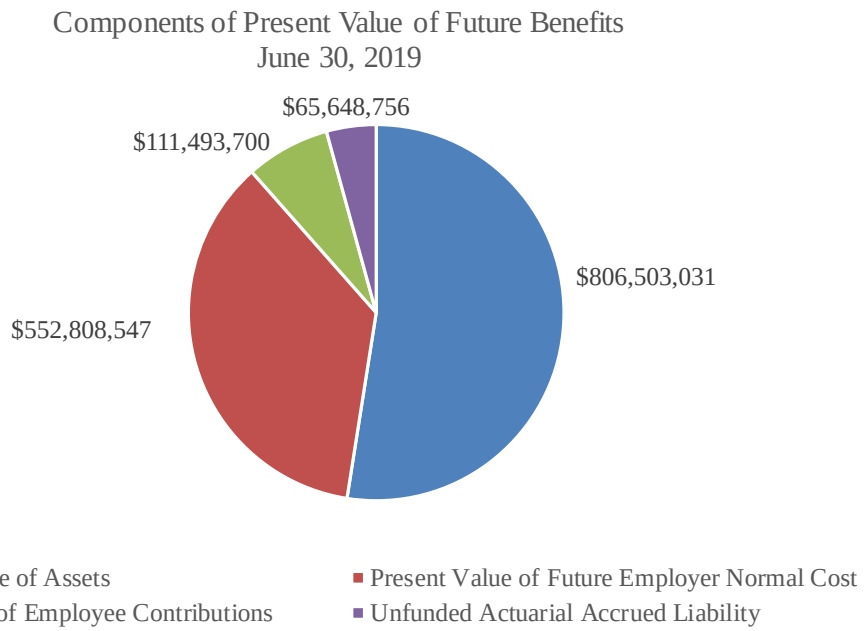
SECTION I:
DEVELOPMENT OF EMPLOYER CONTRIBUTIONS

1. Analysis of Actuarially Required Contributions – Plan A

1. Present Value of Future Benefits	$	1,536,454,034
2. Funding Deposit Account Credit Balance	$	9,346,575
3. Frozen Unfunded Actuarial Accrued Liability	$	65,648,756
4. Actuarial Value of Assets	$	806,503,031
5. Present Value of Future Employee Contributions	$	111,493,700
6. Present Value of Future Employer Normal Costs (1 + 2 - 3 - 4 - 5)	$	562,155,122
7. Present Value of Future Salaries	$	1,311,690,589
8. Employer Normal Cost Accrual Rate (6 / 7)		42.857296%
9. Projected Fiscal 2020 Salary for Current Membership	$	168,412,774
10. Employer Normal Cost as of July 1, 2019 (8 x 9)	$	72,181,715
11. Employer Normal Cost Interest Adjusted for Mid-year Payment	$	74,455,710
12. Amortization Payment on Frozen Unfunded Accrued Liability with Payments Increasing at 4.25% per year	$	7,184,148
13. Amortization Payment Interest Adjusted for Mid-year Payment	$	7,410,476
14. Total Employer Normal Cost & Amortization Payment (11 + 13)	$	81,866,186
15. Estimated Administrative Cost for Fiscal 2020	$	1,898,365
16. Gross Employer Actuarially Required Contribution for Fiscal 2020 (14 + 15)	$	83,764,551
17. Projected Ad Valorem Tax Contributions for Fiscal 2020	$	6,460,959
18. Projected Revenue Sharing Funds for Fiscal 2020	$	113,397
19. Employer's Minimum Net Direct Actuarially Required Contribution for Fiscal 2020 (16 - 17 - 18)	$	77,190,195
20. Projected Payroll for Fiscal 2021	$	187,660,646
21. Employer's Minimum Net Direct Actuarially Required Contribution as a % of Projected Payroll for Fiscal 2020 (19 / 20)		41.13%
22. Board Approved Employer Contribution Rate for 2020		27.75%
23. Contribution Shortfall (Excess) as a Percentage of Payroll (21 - 22)		13.38%
24. Increase (Reduction) to Following Year Payment for Contribution Shortfall (Excess)		1.72%
25. Minimum Recommended Net Direct Employer Contribution Rate for Fiscal 2021 (21 + 24, Rounded to the nearest 0.25%)		42.75%

2. Present Value of Future Benefits – Plan A

PRESENT VALUE OF FUTURE BENEFITS FOR ACTIVE MEMBERS		
Retirement Benefits	$ 655,846,211	
Survivor Benefits	11,325,850	
Disability Benefits	14,462,403	
Vested Termination Benefits (including Refunds of Contributions)	84,926,043	
TOTAL Present Value of Future Benefits for Active Members		$ 766,560,507
PRESENT VALUE OF FUTURE BENEFITS FOR TERMINATED MEMBERS		
Terminated Vested Members Due Benefits at Retirement	$ 23,182,662	
Terminated Members with Reciprocals Due Benefits at Retirement	1,236,145	
Terminated Members Due a Refund	4,787,245	
TOTAL Present Value of Future Benefits for Active Members		$ 29,206,052
PRESENT VALUE OF FUTURE BENEFITS FOR RETIREES		
Regular Retirees	$ 634,346,754	
Disability Retirees	15,222,510	
Survivors & Widows	69,934,684	
DROP Account Balances Payable to Retirees	21,183,527	
TOTAL Present Value of Future Benefits for Retirees & Survivors		$ 740,687,475
TOTAL Present Value of Future Benefits		$ 1,536,454,034



3a. Market Value of Assets – Plan A

CURRENT ASSETS:			
Cash in Banks	$	8,786,908	
Contributions and Taxes Receivable		5,127,022	
Accrued interest and dividends		194,227	
Investment Receivable		5,000,432	
Due from Other Funds		4,999,137	
Other Current Assets		6,443	
TOTAL CURRENT ASSETS			$ 24,114,169
Property Plant & Equipment			$ 1,578,823
INVESTMENTS:			
Cash Equivalents	$	18,798,188	
Equities		394,789,228	
Fixed Income		284,759,960	
Real Estate		20,608,384	
Alternative Investments		22,278,667	
TOTAL INVESTMENTS			$ 741,234,427
TOTAL ASSETS			$ 766,927,419
CURRENT LIABILITIES			
Accounts Payable	$	137,165	
Refunds Payable		226,788	
Due to Other Plans		(385,610)	
Other Current Liabilities		1,557,326	
Other Post-Employment Benefits		332,064	
TOTAL CURRENT LIABILITIES			$ 1,867,733
MARKET VALUE OF ASSETS			$ 765,059,686

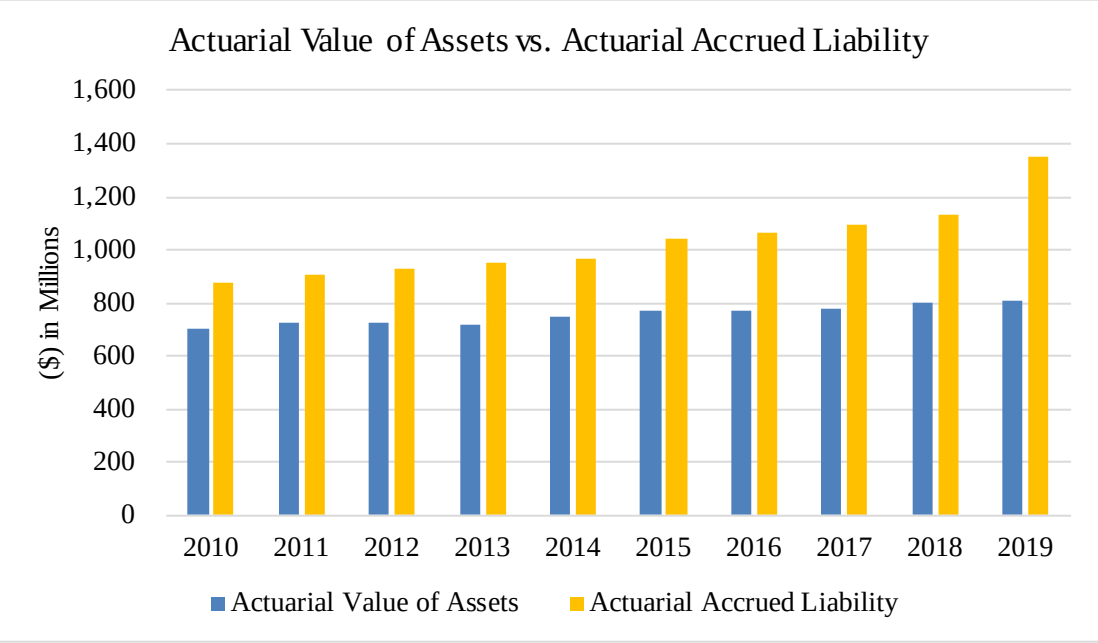
3b. Actuarial Value of Assets – Plan A

Excess/(Shortfall) of invested income for current and previous 4 years: *

Fiscal Year 2019	$	(17,395,262)
Fiscal Year 2018		(9,067,158)
Fiscal Year 2017		(18,915,901)
Fiscal Year 2016		(72,602,401)
Fiscal Year 2015		(79,045,238)
Total for five years	$	(197,025,960)

Deferral of Excess/(Shortfall) of invested income:

Fiscal Year 2019 (80%)	$	(13,916,210)
Fiscal Year 2018 (60%)		(5,440,295)
Fiscal Year 2017 (40%)		(7,566,360)
Fiscal Year 2016 (20%)		(14,520,480)
Fiscal Year 2015 (0%)		-
Total deferred for year	$	(41,443,345)
Market value of plan net assets, end of year	$	765,059,686
Preliminary actuarial value of plan assets, end of year	$	806,503,031
Actuarial value of assets corridor		
85% of market value, end of year	$	650,300,733
115% of market value, end of year	$	879,818,639
Net Valuation Assets, end of year	$	806,503,031

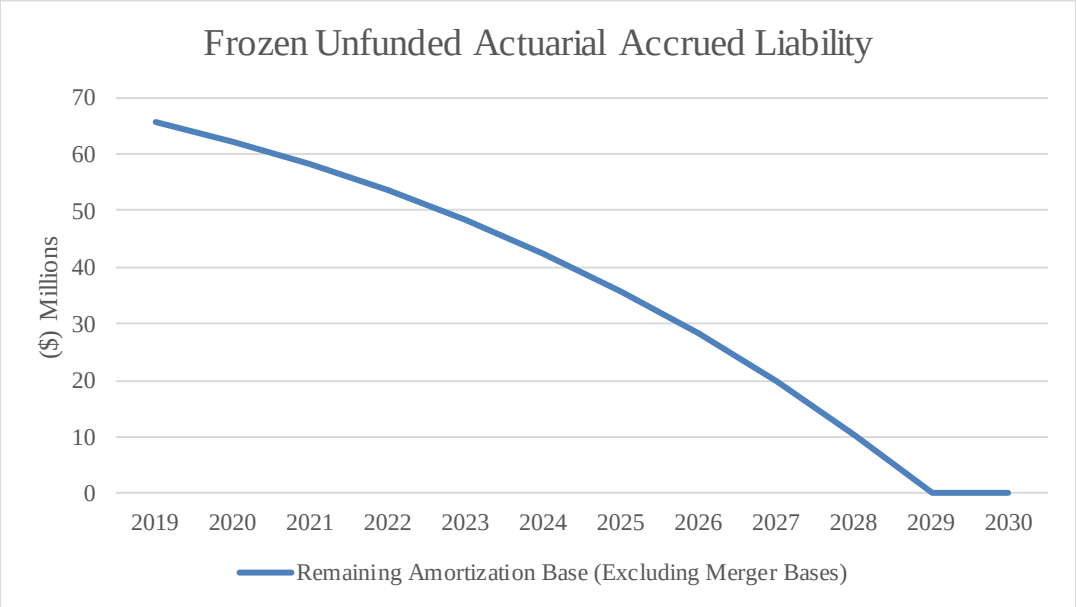


4. Present Value of Future Contributions – Plan A

Employee Contributions to the Annuity Savings Fund	$	111,493,700
Employer Normal Contributions to the Pension Accumulation Fund		562,155,122
Employer Amortization Payments to the Pension Accumulation Fund		65,648,756
Funding Deposit Account Debit (Credit) Balance		(9,346,575)
TOTAL PRESENT VALUE OF FUTURE CONTRIBUTIONS	$	729,951,003

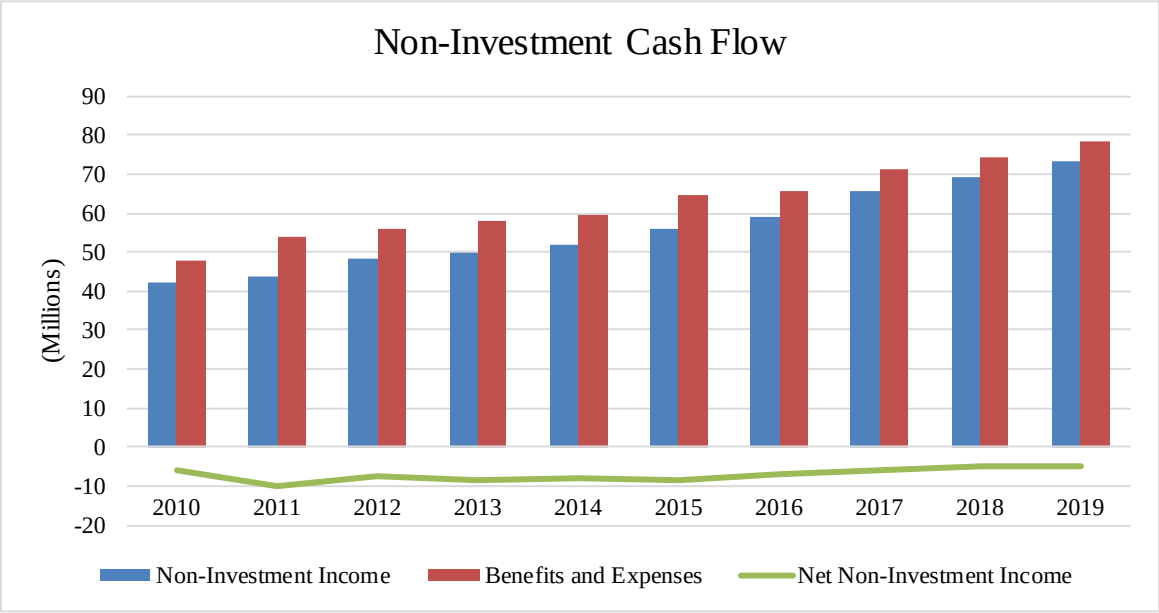
5. Change in Frozen Unfunded Actuarial Accrued Liability – Plan A

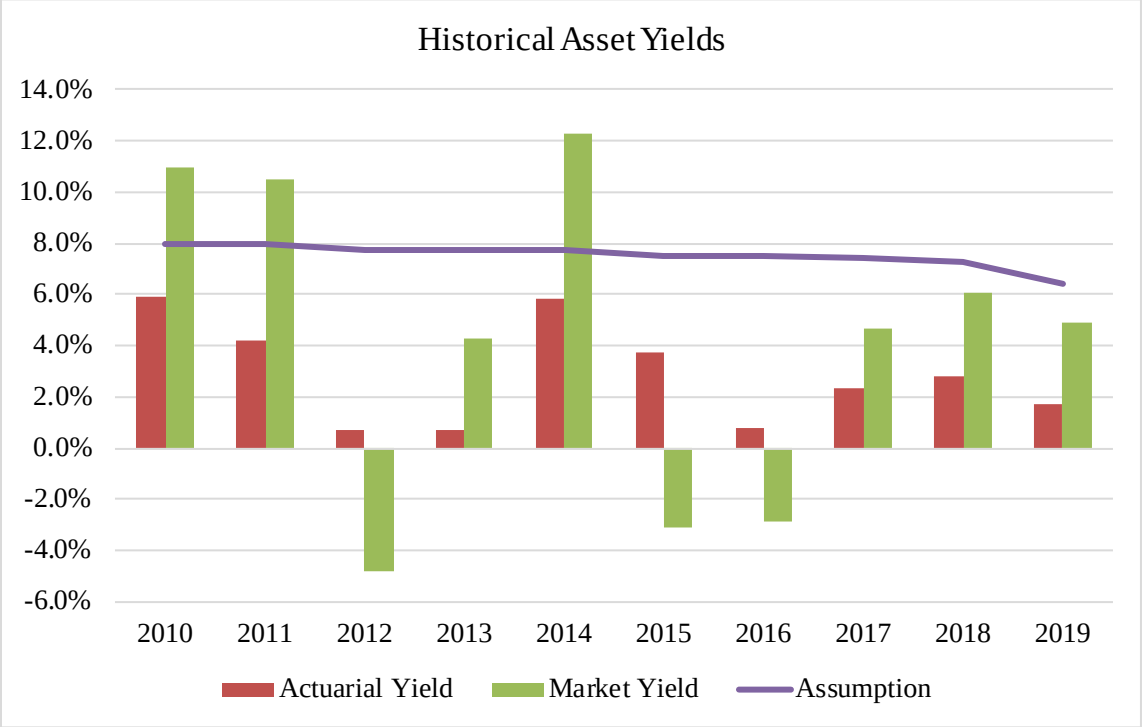
PRIOR YEAR FROZEN UNFUNDED ACCRUED LIABILITY		$ 68,334,864
Interest on Frozen Unfunded Accrued Liability	$ 4,971,361	
TOTAL Interest Adjusted Cost Elements		$ 4,971,361
Amortization Payment on the Unfunded Accrued Liability	7,138,168	
Interest Adjusted Amortization Payments	519,301	
Credited Withdrawals from Funding Deposit Account	-	
TOTAL Reductions to UAL		$ 7,657,469
NET Change in Frozen Unfunded Accrued Liability		$ (2,686,108)
CURRENT YEAR FROZEN UNFUNDED ACCRUED LIABILITY		$ 65,648,756



6. Analysis of Change in Assets – Plan A

Actuarial Value of Assets (June 30, 2018)		$ 797,679,469
Prior Period Adjustment		$ -
Actuarial Value of Assets (June 30, 2018)		$ 797,679,469
INCOME:		
Member Contributions	$ 16,783,858	
Employer Contributions	48,946,089	
Irregular Contributions	6,417,100	
Transfers from Other Systems	1,139,538	
Total Contributions		$ 73,286,585
INVESTMENTS:		
Net Appreciation of Investments	$ 35,727,695	
Interest & Dividends	2,384,748	
Investment Expense	(2,271,691)	
Net Investment Income		35,840,752
TOTAL Income		109,127,337
EXPENSES:		
Retirement Benefits	$ 64,787,222	
DROP Disbursements	6,512,526	
Refunds of Contributions	4,584,449	
Funds Transferred to another System	1,212,255	
Transfer to Plan B	(385,610)	
Administrative Expenses	1,583,003	
TOTAL EXPENSES:		$ 78,293,845
Net Market Value Income for Fiscal 2019 (Income - Expenses)		$ 30,833,492
Unadjusted Fund Balance as of June 30, 2019 (Fund Balance Previous Year + Net Income)		$ 828,512,961
Income Adjustment for Actuarial Smoothing		$ (22,009,930)
Actuarial Value of Assets (June 30, 2019)		$ 806,503,031


Non-Investment Cash Flow
(Millions)
90
80
70
60
50
40
30
20
10
0
-10
-20
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
Non-Investment Income
Benefits and Expenses
Net Non-Investment Income


Historical Asset Yields
14.0%
12.0%
10.0%
8.0%
6.0%
4.0%
2.0%
0.0%
-2.0%
-4.0%
-6.0%
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
Actuarial Yield
Market Yield
Assumption

7. Funding Deposit Account – Plan A

Funding Deposit Account Balance -- June 30, 2018	$	8,712,724
Interest at Opening Balance at 7.28%	$	633,851
Contributions to Funding Deposit Account Balance	$	-
Withdrawals to Funding Deposit Account Balance	$	-
Funding Deposit Account Balance -- June 30, 2019	$	9,346,575

8a. Schedule A – Plan A: Pension Benefit Obligation

Present Value of Credited Projected Benefits Payable to Current Employees	$	536,788,813
Present Value of Benefits Payable to Terminated Employees		29,206,052
Present Value of Benefits Payable to Current Retirees and Beneficiaries		740,687,475
Total Pension Benefit Obligation		$1,306,682,340
Net Actuarial Value of Assets	$	806,503,031
Ratio of Net Actuarial Value of Assets to Pension Benefit Obligation		61.72%

8b. Schedule B – Plan A: Entry Age Normal Accrued Liabilities

Accrued Liability of Active Employees	$	582,370,015
Accrued Liability for Terminated Employees		29,206,052
Accrued Liability for Current Retirees and Beneficiaries		740,687,475
Total Entry Age Normal Accrued Liability		$1,352,263,542
Net Actuarial Value of Assets	$	806,503,031
Ratio of Net Actuarial Value of Assets to Entry Age Normal Accrued Liability		59.64%

9. Census Data – Plan A

	Active	Terminated with Funds on Deposit	DROP	Retired	Total
Number of Members as of June 30, 2018	**4,667**	**3,179**	**221**	**3,468**	**11,535**
Additions to Census					
Initial Membership	681	107	0	0	788
Omitted in error last year	0	5	0	1	6
Death of another member	0	0	(3)	46	43
Adjustment for multiple records	4	0	0	9	13
Total Additions	**685**	**112**	**(3)**	**56**	**850**
Change in Status during the Year					
Active terminating service	(273)	273	0	0	0
Active who retired	(115)	0	0	115	0
Active entering DROP	(83)	0	83	0	0
Terminated members rehired	19	(19)	0	0	0
Terminated members who retire	0	(11)	0	11	0
Retirees who are rehired	6	0	0	(6)	0
Refunded who are rehired	13	3	0	0	16
DROP participants retiring	0	0	(55)	55	0
DROP returned to work	38	0	(38)	0	0
Omitted in error last year	0	0	0	0	0
Total Changes	**(395)**	**246**	**(10)**	**175**	**16**
Eliminated from Census					
Refund of contributions	(350)	(143)	0	0	(493)
Deaths	(20)	(4)	0	(147)	(171)
Included in error last year	0	0	0	0	0
Adjustment for multiple records	0	0	0	0	0
Total Eliminated	**(370)**	**(147)**	**0**	**(147)**	**(664)**
Number of Members as of June 30, 2019	**4,587**	**3,390**	**208**	**3,552**	**11,737**

10. Year-to-Year Comparison – Plan A

	Fiscal 2019	Fiscal 2018	Fiscal 2017	Fiscal 2016
Number of Active Members	4,795	4,888	4,937	4,912
Number of Retirees & Survivors	3,552	3,468	3,417	3,345
Number of Terminated Due Deferred Benefits	199	185	184	186
Number Terminated Due Refunds	2,994	2,994	2,885	2,826
Active Lives Payroll	$ 181,786,660	$ 181,786,660	$ 182,044,919	$ 177,777,678
Retiree Benefits in Payment	$ 66,521,523	$ 63,184,393	$ 60,663,715	$ 57,895,282
Market Value of Assets	$ 765,059,686	$ 734,226,194	$ 697,057,939	$ 671,876,210
Actuarial Value of Assets	$ 806,503,031	$ 797,679,469	$ 781,417,434	$ 769,849,744
Entry Age Actuarial Accrued Liability (EAN)	$ 1,352,263,542	$ 1,129,080,666	$ 1,096,616,918	$ 1,063,558,257
Ratio of AVA to EAN Accrued Liability	59.64%	70.65%	71.26%	72.38%
Frozen Unfunded Actuarial Accrued Liability	$ 65,648,756	$ 68,334,864	$ 70,511,316	$ 72,227,730
Present Value of Future Employer Normal Cost	$ 562,155,122	$ 367,352,092	$ 344,034,117	$ 315,256,488
Present Value of Future Employee Contributions	$ 111,493,700	$ 110,664,765	$ 109,901,879	$ 105,774,692
Funding Deposit Account Balance	$ 9,346,575	$ 8,712,724	$ 8,112,406	$ 8,421,235
Present Value of Future Benefits	$ 1,536,454,034	$ 1,335,318,466	$ 1,297,752,340	$ 1,254,687,419

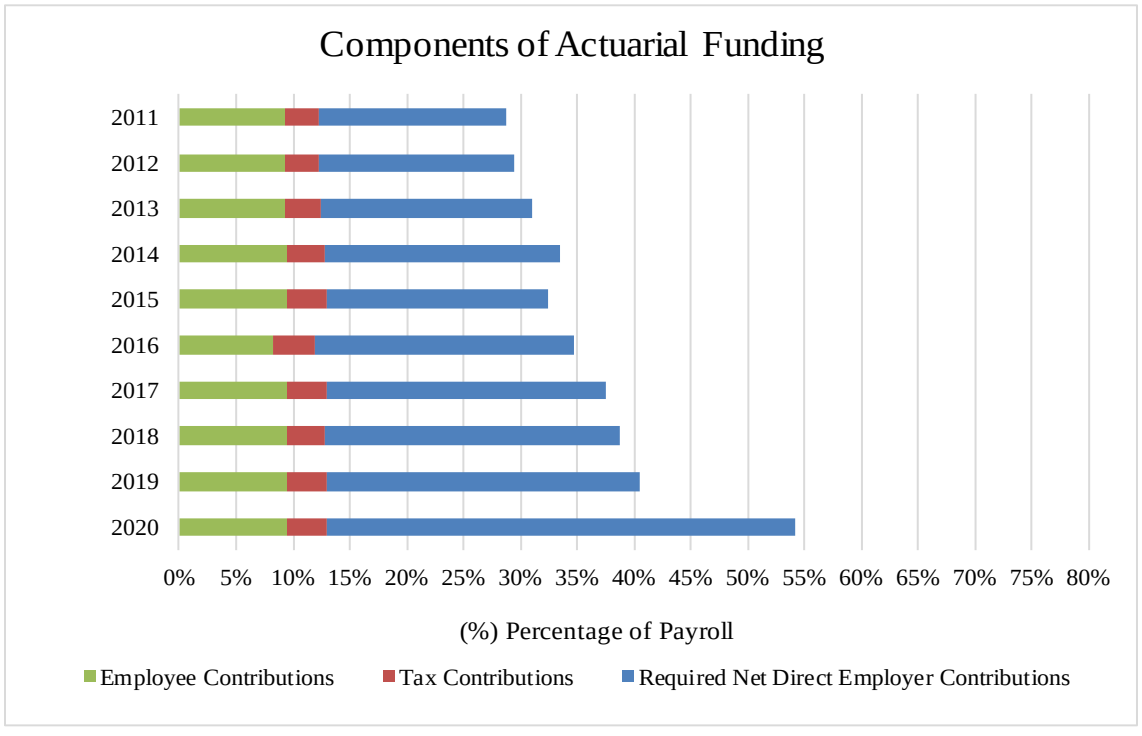
	Fiscal 2020	Fiscal 2018	Fiscal 2018	Fiscal 2017
Board Approved Employee Contribution Rate	9.50%	9.50%	9.50%	9.50%
Estimated Tax Contribution as a % of Payroll	3.50%	3.50%	3.39%	3.40%
Actuarially Required Net Direct Employer Contribution Rate	41.13%	27.53%	25.88%	24.64%
Board Approved Employer Contribution Rate	27.75%	26.00%	24.75%	23.25%*

* Includes 0.5% from the Funding Deposit Account

Fiscal 2015	Fiscal 2014	Fiscal 2013	Fiscal 2012	Fiscal 2011	Fiscal 2010
4,926	4,894	4,939	5,021	5,029	5,068
3,262	3,177	3,106	3,040	3,001	2,907
182	184	193	181	174	183
2,731	2,667	2,672	2,632	2,594	2,590
$ 172,033,158	$ 167,852,836	$ 167,422,222	$ 167,511,550	$ 164,262,655	$ 162,546,523
$ 54,791,332	$ 51,636,071	$ 48,994,132	$ 46,224,138	$ 44,218,709	$ 41,527,971
$ 698,984,365	$ 730,072,543	$ 657,723,192	$ 639,209,518	$ 679,285,361	$ 624,427,505
$ 770,402,847	$ 751,235,484	$ 717,816,409	$ 721,475,280	$ 723,942,801	$ 704,735,602
$ 1,038,155,304	$ 967,584,136	$ 948,970,683	$ 925,638,084	$ 903,431,729	$ 876,252,316
74.21%	77.64%	75.64%	77.94%	80.13%	80.43%
$ 73,553,869	$ 74,454,702	$ 75,038,341	$ 75,337,890	$ 75,313,546	$ 75,064,492
$ 287,312,026	$ 235,357,990	$ 249,506,497	$ 225,090,618	$ 201,003,138	$ 192,786,430
$ 101,854,569	$ 97,716,362	$ 97,624,041	$ 95,445,659	$ 92,535,571	$ 92,383,724
$ 7,833,707	$ 8,930,139	$ 8,287,832	$ 7,691,723	$ 7,121,966	$ 6,594,413
$ 1,225,289,604	$ 1,149,834,399	$ 1,131,697,456	$ 1,109,657,724	$ 1,085,673,090	$ 1,058,375,835

Fiscal 2016	Fiscal 2015	Fiscal 2014	Fiscal 2013	Fiscal 2012	Fiscal 2011
8.25%	9.50%	9.50%	9.25%	9.25%	9.25%
3.64%	3.52%	3.36%	3.13%	3.09%	3.07%
22.92%	19.48%	20.62%	18.67%	17.08%	16.41%
19.75%	20.75%**	18.75%	17.00%	16.75%	14.25%

** Includes 1.0% from the Funding Deposit Account



11. Analysis of Actuarially Required Contributions – Plan B

1. Present Value of Future Benefits	$	342,443,284
2. Funding Deposit Account Credit Balance	$	1,633,823
3. Frozen Unfunded Actuarial Accrued Liability	$	-
4. Actuarial Value of Assets	$	180,085,046
5. Present Value of Future Employee Contributions	$	23,965,056
6. Present Value of Future Employer Normal Costs (1 + 2 - 3 - 4 - 5)	$	140,027,005
7. Present Value of Future Salaries	$	531,611,709
8. Employer Normal Cost Accrual Rate (6 / 7)		26.340091%
9. Projected Fiscal 2020 Salary for Current Membership	$	68,145,796
10. Employer Normal Cost as of July 1, 2019 (8 x 9)	$	17,949,603
11. Employer Normal Cost Interest Adjusted for Mid-year Payment	$	18,515,083
12. Amortization Payment on Frozen Unfunded Accrued Liability with Payments Increasing at 4.25% per year	$	-
13. Amortization Payment Interest Adjusted for Mid-year Payment	$	-
14. Total Employer Normal Cost & Amortization Payment (11 + 13)	$	18,515,083
15. Estimated Administrative Cost for Fiscal 2020	$	778,175
16. Gross Employer Actuarially Required Contribution for Fiscal 2020 (14 + 15)	$	19,293,258
17. Projected Ad Valorem Tax Contributions for Fiscal 2020	$	2,648,467
18. Projected Revenue Sharing Funds for Fiscal 2020	$	46,483
19. Employer's Minimum Net Direct Actuarially Required Contribution for Fiscal 2020 (16 - 17 - 18)	$	16,598,308
20. Projected Payroll for Fiscal 2021	$	76,952,056
21. Employer's Minimum Net Direct Actuarially Required Contribution as a % of Projected Payroll for Fiscal 2020 (19 / 20)		21.57%
22. Board Approved Employer Contribution Rate for 2020		14.00%
23. Contribution Shortfall (Excess) as a Percentage of Payroll (21 - 22)		7.57%
24. Increase (Reduction) to Following Year Payment for Contribution Shortfall (Excess)		0.97%
25. Minimum Recommended Net Direct Employer Contribution Rate for Fiscal 2021 (21 + 24, Rounded to the nearest 0.25%)		22.50%

12. Present Value of Future Benefits – Plan B

PRESENT VALUE OF FUTURE BENEFITS FOR ACTIVE MEMBERS

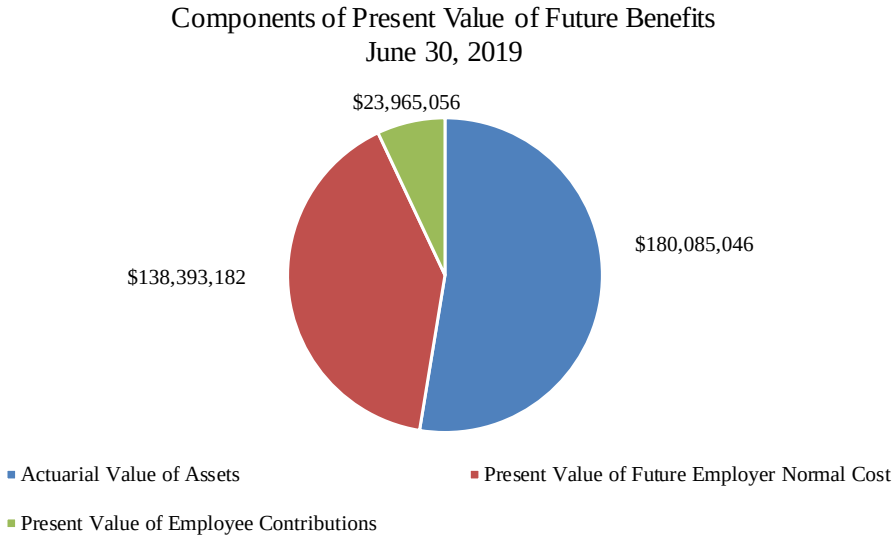
Retirement Benefits	$ 171,614,509	
Survivor Benefits	2,981,408	
Disability Benefits	7,832,577	
Vested Termination Benefits (including Refunds of Contributions)	19,037,416	
TOTAL Present Value of Future Benefits for Active Members		$ 201,465,910

PRESENT VALUE OF FUTURE BENEFITS FOR TERMINATED MEMBERS

Terminated Vested Members Due Benefits at Retirement	$ 8,977,134	
Terminated Members with Reciprocals Due Benefits at Retirement	1,031,972	
Terminated Members Due a Refund	1,218,407	
TOTAL Present Value of Future Benefits for Active Members		$ 11,227,513

PRESENT VALUE OF FUTURE BENEFITS FOR RETIREES

Regular Retirees	$ 101,512,513	
Disability Retirees	5,125,434	
Survivors & Widows	17,474,746	
DROP Account Balances Payable to Retirees	5,637,168	
TOTAL Present Value of Future Benefits for Retirees & Survivors		$ 129,749,861
TOTAL Present Value of Future Benefits		$ 342,443,284



13a. Market Value of Assets – Plan B

CURRENT ASSETS:			
Cash in Banks	$	9,493,020	
Contributions and Taxes Receivable		1,104,735	
Accrued interest and dividends		61,411	
Investment Receivable		1,060,697	
Due from Other Funds		(4,999,137)	
Other Current Assets		3,386	
TOTAL CURRENT ASSETS			$ 6,724,112
Property Plant & Equipment			$ 601,321
INVESTMENTS:			
Cash Equivalents	$	10,178,537	
Equities		83,912,630	
Fixed Income		61,405,095	
Real Estate		4,381,966	
Alternative Investments		4,729,182	
TOTAL INVESTMENTS			$ 164,607,410
TOTAL ASSETS			$ 171,932,843
CURRENT LIABILITIES			
Accounts Payable	$	27,280	
Refunds Payable		5,809	
Due to Other Plans		385,610	
Other Current Liabilities		506,616	
Other Post-Employment Benefits		136,424	
TOTAL CURRENT LIABILITIES			$ 1,061,739
MARKET VALUE OF ASSETS			$ 170,871,104

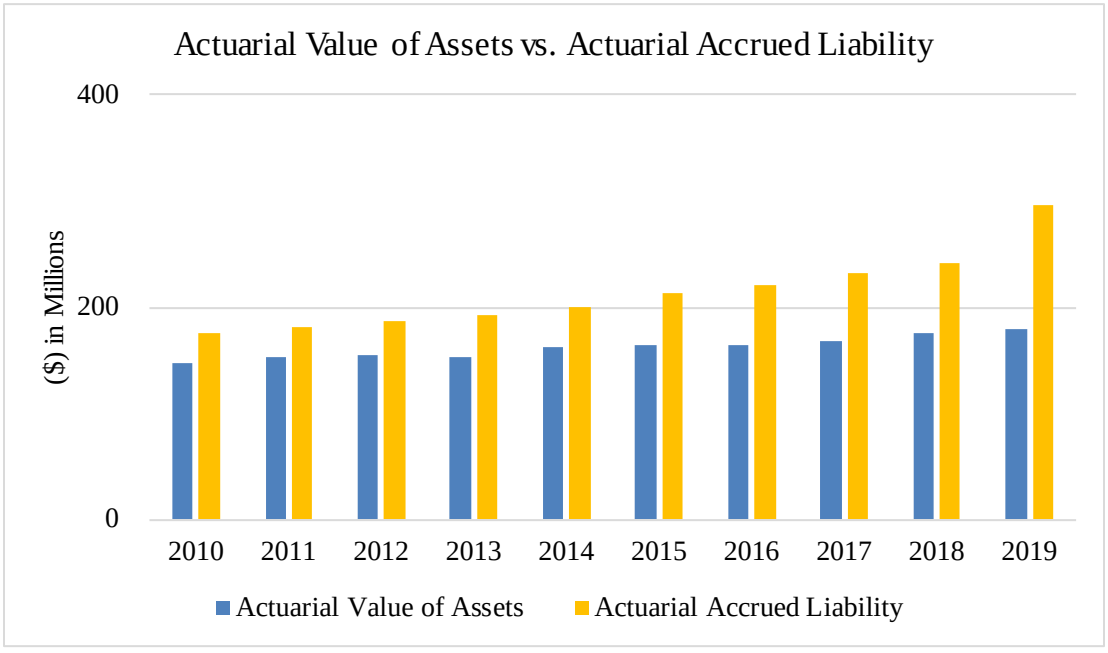
13b. Actuarial Value of Assets – Plan B

Excess/(Shortfall) of invested income for current and previous 4 years: *

Fiscal Year 2019	$	(4,002,113)
Fiscal Year 2018		(2,132,350)
Fiscal Year 2017		(4,100,380)
Fiscal Year 2016		(15,463,450)
Fiscal Year 2015		(16,980,623)
Total for five years	$	(42,678,916)

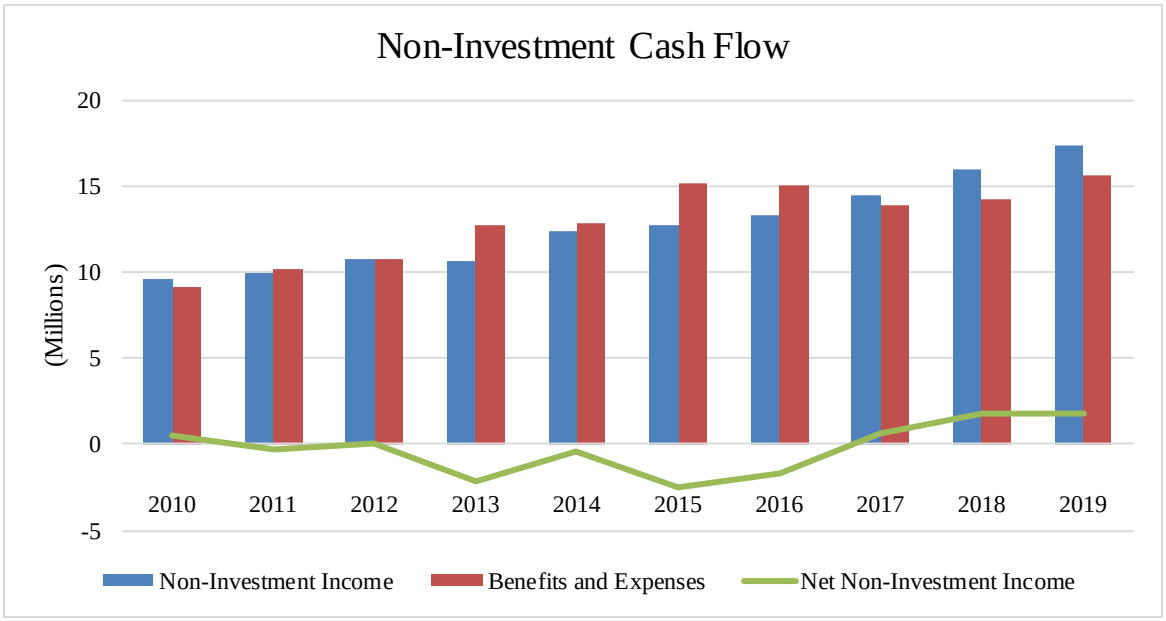
Deferral of Excess/(Shortfall) of invested income:

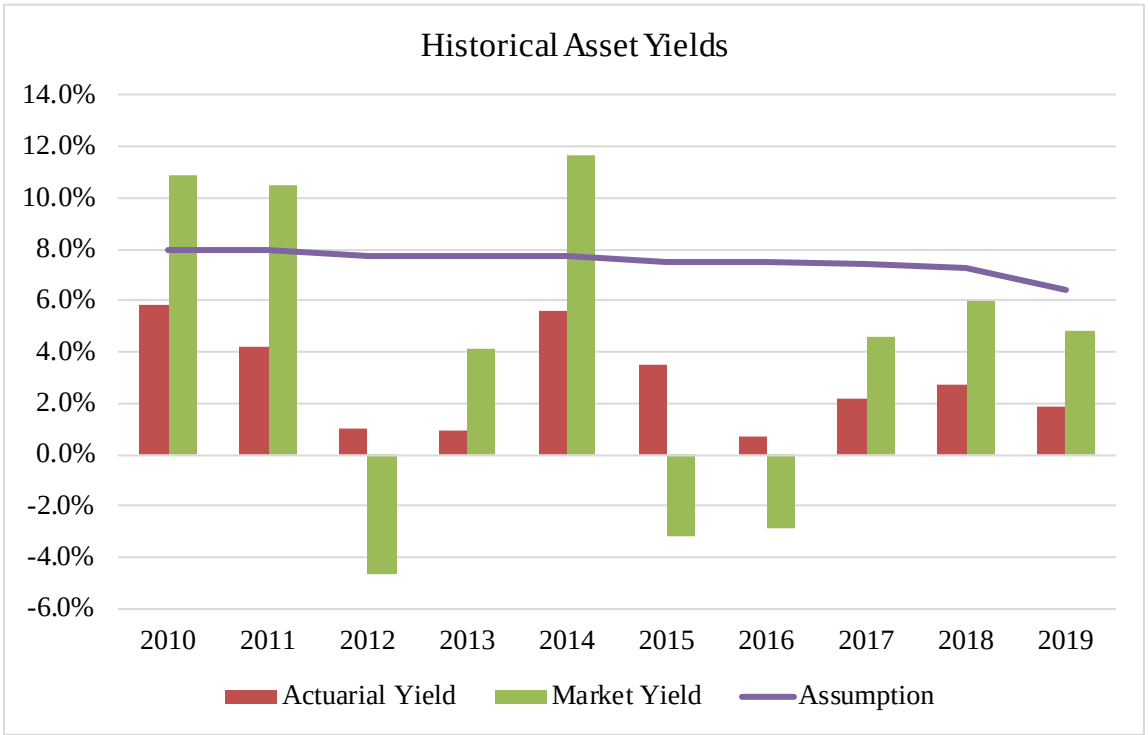
Fiscal Year 2019 (80%)	$	(3,201,690)
Fiscal Year 2018 (60%)		(1,279,410)
Fiscal Year 2017 (40%)		(1,640,152)
Fiscal Year 2016 (20%)		(3,092,690)
Fiscal Year 2015 (0%)		-
Total deferred for year	$	(9,213,942)
Market value of plan net assets, end of year	$	170,871,104
Preliminary actuarial value of plan assets, end of year	$	180,085,046
Actuarial value of assets corridor		
85% of market value, end of year	$	145,240,438
115% of market value, end of year	$	196,501,770
Net Valuation Assets, end of year	$	180,085,046



14. Present Value of Future Contributions – Plan B

Employee Contributions to the Annuity Savings Fund	$	23,965,056
Employer Normal Contributions to the Pension Accumulation Fund		140,027,005
Employer Amortization Payments to the Pension Accumulation Fund		-
Funding Deposit Account Credit Balance		(1,633,823)
TOTAL PRESENT VALUE OF FUTURE CONTRIBUTIONS	$	162,358,238





15. Analysis of Change in Assets – Plan B

Actuarial Value of Assets (June 30, 2018)		$ 175,032,415
Prior Period Adjustment		$ -
Actuarial Value of Assets (June 30, 2018)		$ 175,032,415
INCOME:		
Member Contributions	$ 3,629,182	
Employer Contributions	10,699,641	
Irregular Contributions	2,636,546	
Transfers from Other Systems	396,954	
Total Contributions		$ 17,362,323
INVESTMENTS:		
Net Appreciation of Investments	$ 7,599,648	
Interest & Dividends	702,273	
Investment Expense	(506,563)	
Net Investment Income		7,795,358
TOTAL Income		25,157,681
EXPENSES:		
Retirement Benefits	$ 11,852,841	
DROP Disbursements	1,279,928	
Refunds of Contributions	1,172,865	
Funds Transferred to another System	192,532	
Transfer to Plan B	385,610	
Administrative Expenses	687,603	
TOTAL EXPENSES:		$ 15,571,379
Net Market Value Income for Fiscal 2019 (Income - Expenses)		$ 9,586,302
Unadjusted Fund Balance as of June 30, 2019 (Fund Balance Previous Year + Net Income)		$ 184,618,717
Income Adjustment for Actuarial Smoothing		$ (4,533,671)
Actuarial Value of Assets (June 30, 2019)		$ 180,085,046

16. Funding Deposit Account – Plan B

Funding Deposit Account Balance -- June 30, 2018	$	1,523,023
Interest at Opening Balance at 7.28%	$	110,800
Contributions to Funding Deposit Account Balance	$	-
Withdrawals to Funding Deposit Account Balance	$	(2,004,590)
Funding Deposit Account Balance -- June 30, 2019	$	1,633,823

17a. Schedule A – Plan B: Pension Benefit Obligation

Present Value of Credited Projected Benefits Payable to Current Employees	$	138,858,097
Present Value of Benefits Payable to Terminated Employees		11,227,513
Present Value of Benefits Payable to Current Retirees and Beneficiaries		129,749,861
Total Pension Benefit Obligation	$	279,835,471
Net Actuarial Value of Assets	$	180,085,046
Ratio of Net Actuarial Value of Assets to Pension Benefit Obligation		64.35%

17b. Schedule B – Plan B: Entry Age Normal Accrued Liabilities

Accrued Liability of Active Employees	$	154,614,333
Accrued Liability for Terminated Employees		11,227,513
Accrued Liability for Current Retirees and Beneficiaries		129,749,861
Total Pension Benefit Obligation	$	295,591,707
Net Actuarial Value of Assets	$	180,085,046
Ratio of Net Actuarial Value of Assets to Entry Age Normal Accrued Liability		60.92%

18. Census Data – Plan B

	Active	Terminated with Funds on Deposit	DROP	Retired	Total
Number of Members as of June 30, 2018	**2,048**	**1,511**	**80**	**1,050**	**4,689**
Additions to Census					
Initial Membership	305	62	0	0	367
Omitted in error last year	0	0	0	0	0
Death of another member	0	0	0	15	15
Adjustment for multiple records	0	3	0	4	7
Total Additions	**305**	**65**	**0**	**19**	**389**
Change in Status during the Year					
Active terminating service	(155)	155	0	0	0
Active who retired	(44)	0	0	44	0
Active entering DROP	(30)	0	30	0	0
Terminated members rehired	12	(12)	0	0	0
Terminated members who retire	0	(8)	0	8	0
Retirees who are rehired	1	0	0	(1)	0
Refunded who are rehired	2	2	0	0	4
DROP participants retiring	0	0	(15)	15	0
DROP returned to work	13	0	(13)	0	0
Omitted in error last year	0	0	0	0	0
Total Changes	**(201)**	**137**	**2**	**66**	**4**
Eliminated from Census					
Refund of contributions	(154)	(59)	0	0	(213)
Deaths	(12)	(1)	(4)	(56)	(73)
Included in error last year	0	0	0	(3)	(3)
Adjustment for multiple records	(1)	0	0	0	(1)
Total Eliminated	**(167)**	**(60)**	**(4)**	**(59)**	**(290)**
Number of Members as of June 30, 2019	**1,985**	**1,653**	**78**	**1,076**	**4,792**

19. Year-to-Year Comparison – Plan B

	Fiscal 2019	Fiscal 2018	Fiscal 2017	Fiscal 2016
Number of Active Members	2,063	2,128	2,125	2,142
Number of Retirees & Survivors	1,076	1,050	1,025	975
Number of Terminated Due Deferred Benefits	97	92	82	71
Number Terminated Due Refunds	2,994	1,419	1,331	1,258
Active Lives Payroll	$ 74,696,846	$ 74,696,846	$ 73,275,324	$ 71,918,938
Retiree Benefits in Payment	$ 12,223,992	$ 11,522,493	$ 10,946,571	$ 10,254,964
Market Value of Assets	$ 170,871,104	$ 161,284,802	$ 150,467,958	$ 143,201,586
Actuarial Value of Assets	$ 180,085,046	$ 175,032,415	$ 168,698,012	$ 164,516,476
Entry Age Actuarial Accrued Liability (EAN)	$ 295,591,707	$ 241,302,909	$ 232,425,916	$ 221,633,353
Ratio of AVA to EAN Accrued Liability	60.92%	72.54%	72.58%	74.23%
Frozen Unfunded Actuarial Accrued Liability	$ -	$ -	$ 2,382,456	$ 2,742,698
Present Value of Future Employer Normal Cost	$ 140,027,005	$ 95,920,724	$ 91,249,645	$ 82,911,008
Present Value of Future Employee Contributions	$ 23,965,056	$ 24,253,572	$ 23,664,481	$ 23,119,585
Funding Deposit Account Balance	$ 1,633,823	$ 1,523,023	$ 3,286,730	$ 3,233,725
Present Value of Future Benefits	$ 342,443,284	$ 293,683,688	$ 282,707,864	$ 270,056,042

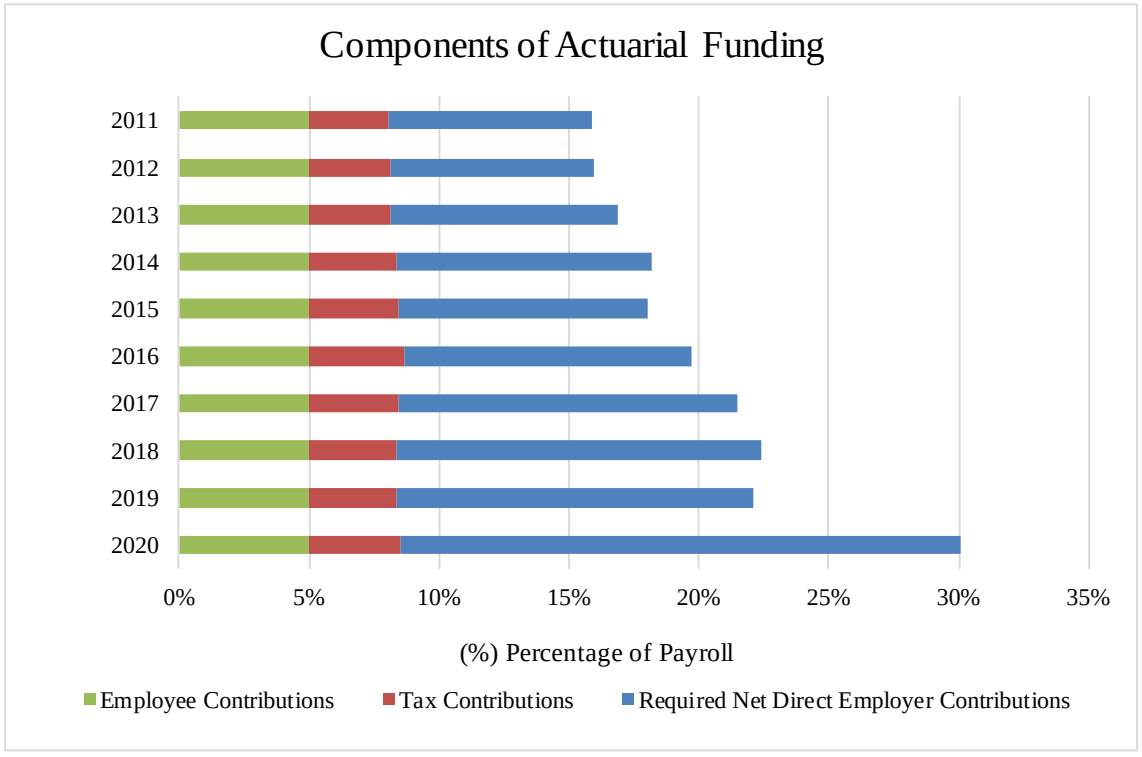
	Fiscal 2020	Fiscal 2018	Fiscal 2018	Fiscal 2017
Board Approved Employee Contribution Rate	5.00%	5.00%	5.00%	5.00%
Estimated Tax Contribution as a s% of Payroll	3.50%	3.38%	3.37%	3.41%
Actuarially Required Net Direct Employer Contribution Rate	21.57%	13.73%	14.00%	13.06%
Board Approved Employer Contribution Rate	14.00%	14.00%	13.25%	11.25%*

* Includes 0.25% from the Funding Deposit Account

Fiscal 2015	Fiscal 2014	Fiscal 2013	Fiscal 2012	Fiscal 2011	Fiscal 2010
2,200	2,168	2,128	2,155	2,175	2,197
959	916	900	879	865	836
71	74	61	61	62	72
1,218	1,170	1,155	1,100	1,062	1,062
$ 69,909,530	$ 67,939,158	$ 65,928,929	$ 66,409,896	$ 65,427,477	$ 65,241,810
$ 9,917,688	$ 9,141,803	$ 8,793,050	$ 8,285,257	$ 7,953,795	$ 7,339,269
$ 149,268,995	$ 156,659,396	$ 140,744,063	$ 137,164,489	$ 144,028,034	$ 130,596,777
$ 165,154,609	$ 161,992,280	$ 153,851,774	$ 154,451,871	$ 152,966,837	$ 147,046,143
$ 212,961,895	$ 199,762,726	$ 192,160,973	$ 187,178,650	$ 181,142,563	$ 175,023,271
77.55%	81.09%	80.06%	82.52%	84.45%	84.02%
$ 3,088,551	$ 3,421,001	$ 3,740,857	$ 4,049,257	$ 4,346,525	$ 4,633,960
$ 72,948,195	$ 60,613,662	$ 60,012,141	$ 54,153,087	$ 49,451,626	$ 48,645,557
$ 22,770,216	$ 21,982,912	$ 21,589,199	$ 21,845,625	$ 21,582,459	$ 21,546,957
$ 3,008,116	$ 3,126,521	$ 2,901,644	$ 2,692,941	$ 2,493,464	$ 2,308,763
$ 260,953,455	$ 244,883,334	$ 236,292,327	$ 231,806,899	$ 225,853,983	$ 219,563,854

Fiscal 2016	Fiscal 2015	Fiscal 2014	Fiscal 2013	Fiscal 2012	Fiscal 2011
5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
3.64%	3.41%	3.38%	3.14%	3.10%	3.07%
11.04%	9.60%	9.82%	8.72%	7.89%	7.78%
9.50%	10.00%**	8.75%	8.00%	8.00%	6.75%

** Includes 0.50% from the Funding Deposit Account



SECTION II
BASIS FOR THE VALUATION

1. Introduction

The June 30, 2019, valuation is used to determine actuarial liabilities as of June 30, 2019, the actuarially required employer contribution for FYE 2020, and the minimum recommended net direct employer contribution rate for FYE 2021. Census data, actuarial methods, and actuarial assumptions used in the preparation of June 30, 2019, assets, liabilities, and employer contribution requirements for FYE 2020 are shown in this section of the report. Additional information is provided with respect to changes made in actuarial valuation software systems, assumptions and methods since the June 30, 2018 valuation.

2. Census Data

Census data used in the preparation of the June 30, 2019 valuation is summarized below. The census data was provided by MERS. A comparison with census summaries prepared by the MERS' actuary confirmed the reasonability of the census data used in preparing this report.

Actives Census by Age: Plan A

Ages	Number Male	Number Female	Total Number	Average Salary	Total Salary
[16-20)	34	5	39	$24,062	$938,419
[21-25)	122	61	183	26,415	4,833,974
[26-30)	219	143	362	31,367	11,354,860
[31-35)	271	152	423	34,885	14,756,157
[36-40)	267	166	433	37,830	16,380,578
[41-45)	272	172	444	36,473	16,193,883
[46-50)	354	187	541	38,418	20,783,988
[51-55)	487	221	708	41,473	29,363,128
[56-60)	477	278	755	41,086	31,020,007
[61-65)	365	188	553	41,648	23,031,615
[66-70)	145	78	223	43,348	9,666,534
[71-75)	56	27	83	40,987	3,401,915
[76-80)	29	10	39	37,216	1,451,428
[81-85)	5	3	8	34,046	272,369
[86-90)	0	1	1	34,800	34,800
TOTAL	3,103	1,692	4,795	$38,266	$183,483,655

The above includes 208 DROP participants and 191 Active Former DROP participants.

Terminated Members Due a Deferred Retirement Benefit: Plan A

Ages	Number Male	Number Female	Total Number	Average Benefit	Total Benefit
[31-35)	4	2	6	$9,850	$59,100
[36-40)	7	5	12	15,534	186,404
[41-45)	6	12	18	15,030	270,546
[46-50)	16	8	24	17,791	426,975
[51-55)	26	24	50	14,972	748,616
[56-60)	39	26	65	15,313	995,319
[61-65)	10	7	17	15,823	268,989
[66-70)	1	2	3	6,068	18,203
[71-75)	0	1	1	14,642	14,642
[76-80)	1	2	3	3,565	10,694
TOTAL	110	89	199	$15,073	$2,999,488

Regular Retirees: Plan A

Ages	Number Male	Number Female	Total Number	Average Benefit	Total Benefit
[41-45)	4	1	5	$24,839	$124,195
[46-50)	17	7	24	28,009	672,204
[51-55)	43	24	67	30,541	2,046,239
[56-60)	173	84	257	29,600	7,607,191
[61-66)	322	151	473	26,439	12,505,829
[66-70)	409	176	585	22,213	12,994,336
[71-75)	348	166	514	18,255	9,382,931
[76-80)	247	110	357	16,738	5,975,596
[81-85)	169	68	237	15,284	3,622,222
[86-90)	85	39	124	13,032	1,615,931
[91-95)	31	24	55	12,956	712,580
[96-100)	9	3	12	10,543	126,519
[101+)	0	2	2	1,970	3,939
TOTAL	1,857	855	2,712	$21,161	$57,389,712

Disability Retirees: Plan A

Ages	Number Male	Number Female	Total Number	Average Benefit	Total Benefit
[36-40)	1	1	2	$12,235	$24,469
[41-45)	2	1	3	15,597	46,791
[46-50)	8	0	8	10,840	86,721
[51-55)	12	3	15	14,151	212,269
[56-60)	17	5	22	13,078	287,719
[61-66)	22	9	31	11,833	366,815
[66-70)	13	2	15	8,212	123,178
[71-75)	6	4	10	8,518	85,181
[76-80)	3	3	6	6,989	41,931
[81-85)	5	1	6	7,166	42,993
[86-90)	1	1	2	4,761	9,521
TOTAL	90	30	120	$11,063	$1,327,588

Survivors: Plan A

Ages	Number Male	Number Female	Total Number	Average Benefit	Total Benefit
[0-20)	6	6	12	$12,083	$145,000
[21-25)	0	0	0	0	0
[26-30)	0	0	0	0	0
[31-35)	1	2	3	11,755	35,264
[36-40)	1	3	4	6,056	24,223
[41-45)	3	3	6	5,939	35,636
[46-50)	2	7	9	9,448	85,034
[51-55)	5	25	30	9,875	296,254
[56-60)	8	44	52	10,197	530,237
[61-66)	5	54	59	15,573	918,806
[66-70)	9	76	85	12,807	1,088,609
[71-75)	7	95	102	11,426	1,165,454
[76-80)	4	121	125	10,188	1,273,511
[81-85)	8	103	111	10,107	1,121,859
[86-90)	2	79	81	9,427	763,570
[91-100)	0	31	31	7,934	245,943
[101+)	0	10	10	7,003	70,034
TOTAL	61	659	720	$10,833	$7,799,434

Active Members: Plan A

Member Count

Age/Service	0	1	2	3	4	[5-9)	[10-14)	[15-19)	[20-24)	[25-29)	[30+)	TOTAL
[0-20)	15	1										16
[21-25)	75	46	18	4	7							150
[26-30)	100	61	52	43	26	52	1					335
[31-35)	81	44	48	46	36	117	33					405
[36-40)	69	51	33	48	37	123	55	32	1			449
[41-45)	75	51	33	25	33	84	73	41	27	1		443
[46-50)	65	36	31	36	29	101	66	47	58	46		515
[51-55)	66	54	45	36	32	119	87	52	89	76	17	673
[56-60)	73	50	48	61	46	134	102	77	68	91	22	772
[61-65)	30	37	33	33	32	119	96	65	61	70	22	598
[66-70)	15	7	18	12	9	60	56	33	18	30	14	272
[71+)	9	8	8	7	7	18	53	20	17	13	7	167
TOTAL	673	446	367	351	294	927	622	367	339	327	82	4,795

Active Members: Plan A

Average Salary

Age/Service	0	1	2	3	4	[5-9)	[10-14)	[15-19)	[20-24)	[25-29)	[30+)	TOTAL
[0-20)	$22,844	$20,843										$22,719
[21-25)	24,623	26,784	30,045	24,255	26,834							26,030
[26-30)	26,398	31,248	30,361	32,655	28,995	35,563	62,737					30,432
[31-35)	27,747	29,753	29,523	35,928	36,715	37,586	35,940					33,412
[36-40)	27,259	31,407	34,613	36,639	37,149	42,106	46,227	45,931	40,210			37,839
[41-45)	27,782	31,667	32,864	32,671	34,477	37,665	42,192	42,644	45,498	67,774		36,177
[46-50)	29,377	35,691	28,624	33,750	36,954	36,268	40,863	42,550	46,388	53,553		38,606
[51-55)	29,794	39,742	30,037	33,692	35,576	38,441	40,200	43,111	51,266	55,223	61,615	41,510
[56-60)	31,243	31,515	38,494	38,335	35,843	36,856	41,049	44,482	43,808	49,417	72,809	40,570
[61-65)	33,946	43,150	32,266	35,443	38,352	38,821	40,717	41,526	42,724	53,038	50,129	41,348
[66-70)	44,594	45,128	38,156	39,006	43,791	41,216	41,923	43,739	48,434	53,831	56,504	44,396
[71+)	32,888	29,848	40,610	33,117	29,950	33,637	40,055	40,956	41,362	48,762	49,665	39,122
TOTAL	$28,501	$33,280	$32,498	$35,228	$35,597	$38,257	$41,209	$43,179	$46,260	$52,558	$59,644	$38,266

Actives Census by Age: Plan B

Ages	Number Male	Number Female	Total Number	Average Salary	Total Salary
[16-20)	21	2	23	$23,691	$544,891
[21-25)	57	27	84	26,237	2,203,911
[26-30)	95	36	131	28,622	3,749,451
[31-35)	92	38	130	32,163	4,181,142
[36-40)	113	72	185	35,622	6,590,048
[41-45)	127	55	182	37,741	6,868,951
[46-50)	142	97	239	37,136	8,875,577
[51-55)	199	90	289	38,496	11,125,315
[56-60)	243	113	356	37,638	13,399,190
[61-65)	173	93	266	40,151	10,680,143
[66-70)	80	29	109	40,358	4,399,000
[71-75)	29	16	45	37,139	1,671,248
[76-80)	19	0	19	35,577	675,966
[81-85)	2	1	3	43,350	130,050
[86-90)	2	0	2	59,235	118,470
TOTAL	1,394	669	2,063	$36,458	$75,213,353

The above includes 78 DROP participants and 83 Active Former DROP participants.

Terminated Members Due a Deferred Retirement Benefit: Plan B

Ages	Number Male	Number Female	Total Number	Average Benefit	Total Benefit
[31-35)	0	1	1	$9,204	$9,204
[36-40)	4	1	5	10,138	50,691
[41-45)	3	3	6	12,230	73,381
[46-50)	8	6	14	12,735	178,292
[51-55)	14	7	21	10,610	222,813
[56-60)	28	13	41	14,416	591,040
[61-65)	6	0	6	8,094	48,564
[66-70)	1	0	1	5,793	5,793
[71-75)	0	0	0	0	0
[76-80)	1	0	1	494	494
[81-85)	0	0	0	0	0
[86-90)	1	0	1	630	630
TOTAL	66	31	97	$12,174	$1,180,902

Regular Retirees: Plan B

Ages	Number Male	Number Female	Total Number	Average Benefit	Total Benefit
[51-55)	2	0	2	$31,726	$63,451
[56-60)	19	8	27	22,791	615,348
[61-66)	82	45	127	14,558	1,848,876
[66-70)	143	52	195	14,051	2,739,998
[71-75)	111	45	156	11,575	1,805,721
[76-80)	83	38	121	10,154	1,228,692
[81-85)	64	34	98	10,358	1,015,127
[86-90)	36	12	48	9,655	463,446
[91-99)	12	4	16	6,181	98,901
TOTAL	552	238	790	$12,506	$9,879,560

Disability Retirees: Plan B

Ages	Number Male	Number Female	Total Number	Average Benefit	Total Benefit
[41-45)	1	0	1	$6,645	$6,645
[46-50)	3	0	3	7,097	21,290
[51-55)	4	1	5	10,885	54,423
[56-60)	15	6	21	11,534	242,220
[61-66)	7	2	9	10,180	91,618
[66-70)	0	0	0	0	0
[71-75)	1	0	1	12,210	12,210
TOTAL	31	9	40	$10,710	$428,406

Survivors: Plan B

Ages	Number Male	Number Female	Total Number	Average Benefit	Total Benefit
[31-35)	0	1	1	$2,245	$2,245
[36-40)	1	0	1	10,042	10,042
[41-45)	0	3	3	3,646	10,937
[46-50)	0	2	2	15,785	31,570
[51-55)	2	9	11	5,359	58,948
[56-60)	3	11	14	9,873	138,225
[61-66)	5	28	33	9,729	321,042
[66-70)	2	23	25	9,944	248,605
[71-75)	1	35	36	7,870	283,315
[76-80)	1	34	35	6,618	231,626
[81-85)	1	38	39	7,538	293,970
[86-90)	1	27	28	7,231	202,469
[91-100)	1	17	18	4,613	83,031
TOTAL	18	228	246	$7,789	$1,916,025

Active Members: Plan B

Member Count

Age/Service	0	1	2	3	4	[5-9)	[10-14)	[15-19)	[20-24)	[25-29)	[30+)	TOTAL
[0-20)	9											9
[21-25)	45	27	5	2								79
[26-30)	44	29	17	12	8	12	1					123
[31-35)	29	24	12	9	10	27	17					128
[36-40)	28	20	17	14	19	38	32	14	2			184
[41-45)	32	19	12	10	14	31	34	15	13	1		181
[46-50)	28	28	15	12	8	34	40	24	19	13	1	222
[51-55)	20	25	20	17	16	47	48	30	25	16	7	271
[56-60)	31	33	15	18	23	59	59	39	25	18	17	337
[61-65)	19	20	20	20	17	49	50	37	23	33	34	322
[66-70)	7	6	3	6	9	29	27	7	12	4	11	121
[71+)	6	3	5	5	7	15	20	13	6	4	2	86
TOTAL	298	234	141	125	131	341	328	179	125	89	72	2,063

Active Members: Plan B

Average Salary

Age/Service	0	1	2	3	4	[5-9)	[10-14)	[15-19)	[20-24)	[25-29)	[30+)	TOTAL
[0-20)	$23,693											$23,693
[21-25)	24,803	26,543	28,824	24,503								25,645
[26-30)	25,159	29,959	27,981	33,151	28,445	31,109	51,475					28,469
[31-35)	28,685	26,529	35,979	28,130	30,019	33,346	35,211					30,880
[36-40)	25,833	29,544	38,537	29,154	34,431	36,768	42,887	45,255	30,810			35,307
[41-45)	25,597	31,363	32,010	31,551	34,071	38,746	46,466	45,874	47,418	40,782		37,115
[46-50)	28,575	32,903	32,792	39,876	35,896	40,758	39,411	39,642	43,759	43,067	36,358	37,478
[51-55)	27,252	30,451	33,956	28,235	33,098	36,964	45,419	43,856	45,090	50,103	57,866	38,974
[56-60)	30,120	28,564	40,028	29,385	37,456	32,268	38,152	42,317	41,005	50,960	49,522	36,963
[61-65)	29,547	29,075	29,608	37,853	33,828	32,997	36,212	48,301	43,322	48,662	55,673	39,680
[66-70)	25,984	27,514	52,421	27,836	37,103	38,734	41,211	52,465	43,882	57,923	50,750	40,702
[71+)	29,811	27,996	42,822	28,416	36,208	32,601	43,939	48,624	47,551	24,172	5,250	37,964
TOTAL	$26,885	$29,336	$34,225	$31,818	$34,348	$35,566	$40,890	$44,836	$43,761	$47,795	$52,013	$36,458

3. Plan Provisions (from the System's actuary, confirmed with the statutes)

All members of MERS are participants in either Plan A or B according to the provisions of the agreement entered into by their employer. All employees of a participating employer must participate in the same plan. The principal provisions of each plan are given below. The following summary of plan provisions is for general informational purposes only and does not constitute a guarantee of benefits.

MEMBERSHIP:

All persons who are actively employed by a participating employer on a permanent, regularly scheduled basis of at least an average of 35 hours per week are members of this System. Excluded from membership are members of city councils, aldermen, town councilmen, and constables; the exclusion does not apply to persons serving in excluded positions on January 1, 1997.

PLAN A PROVISIONS

CONTRIBUTION RATES:

The Board of Trustees may set the employee contribution rate not less than 9.25% nor more than 10.00% for Tier 1 members and not less than 8.00% nor more than 10.00% for Tier 2 members. In addition, each sheriff and ex officio tax collector deducts one-fourth of one percent of the aggregate amount of the tax shown to be collected by the tax roll of each respective parish, except Orleans Parish, and remits the money to the System on an annual basis. Taxes are apportioned between Plan A and Plan B in proportion to salaries of active plan participants. Taxes received from East Baton Rouge Parish are apportioned between MERS and the Employees' Retirement System of the City of Baton Rouge. The System also receives revenue sharing funds each year as appropriated by the legislature. The remaining employer contributions are determined according to actuarial requirements and are set annually.

RETIREMENT BENEFITS (Tier 1):

Members with 10 years of creditable service may retire at age 60; members with 25 years of service may retire regardless of age. The monthly retirement allowance is equal to 3% of the member's final compensation multiplied by his years of creditable service; elected officials receive an additional one-half percent of final compensation for each year of such elected service. However, the accrued retirement benefits for those employees who were members of only the supplemental plan prior to October 1, 1978, are based on 1% of final compensation plus two dollars per month for each year of service credited prior to October 1, 1978. The retirement allowance may not exceed the greater of final annual salary or 100% of the member's final compensation. Members with 20 of service credit, not otherwise eligible for normal retirement, are eligible for a modified actuarially reduced early retirement.

RETIREMENT BENEFITS (Tier 2):

Employees whose first employment making them eligible for membership occurs on or after January 1, 2013, become members of Tier 2. Normal retirement eligibility in Tier 2 is at age 67 with 7 years of service credit, at age 62 with 10 years of service credit, or age 55 with 30 years of service credit. Members are eligible for an actuarially-reduced early retirement at 25 years of service credit.

The monthly retirement allowance is equal to 3% of the member's final compensation multiplied by his years of creditable service.

DISABILITY BENEFITS:

Any member who has 5 years of Credited Service, is not eligible for Normal Retirement, and becomes totally and permanently disabled as a result from an act occurring in the performance of his duty as a general employee is immediately eligible for a disability benefit equal to the lesser of:

1) Forty-five percent of his final compensation or three percent of his final compensation multiplied by his years of creditable service, whichever is greater; or
2) Three percent of his final compensation multiplied by his years of creditable service projected to his earliest normal retirement age.

SURVIVOR BENEFITS:

Five years of creditable service are required in order to be eligible for survivor benefits. If the member is eligible for normal retirement at the time of death, the surviving spouse receives an automatic Option 2 benefit. If the member is not eligible for a normal retirement, the surviving spouse with minor children receives 60% of final compensation payable for life or until no child in her care satisfies the definition of minor child. The surviving spouse with no minor children receives 40% of final compensation payable upon attainment of age 60 by the spouse, or the actuarial equivalent of this amount payable immediately (such equivalent not to be less than 20% of final compensation).

Minor children with no surviving unmarried parent receive 30% of final compensation each not to exceed a total of 60% of final compensation. Survivor benefits are also payable to the surviving spouses of former members who have not withdrawn their accumulated contributions and who have at least 20 years of creditable service. The benefits payable are the actuarial equivalent of the Option 2 benefits that would have become payable to the surviving spouse at the time the former member would have begun receiving deferred normal retirement benefits, had the member survived until that date, elected Option 2, and died at that time.

PLAN B PROVISIONS

CONTRIBUTION RATES:

The Board of Trustees may set the employee contribution rate not less than 5.00% nor more than 6.00% for Tier 1 members and not less than 4.00% nor more than 6.00% for Tier 2 members. In addition, each sheriff and ex officio tax collector deducts one-fourth of one percent of the aggregate amount of the tax shown to be collected by the tax roll of each respective parish, except Orleans Parish, and remits the money to the System on an annual basis. Taxes are apportioned between Plan A and Plan B in proportion to salaries of active plan participants. Taxes received from East Baton Rouge Parish are apportioned between MERS and the Employees' Retirement System of the City of Baton Rouge. The System also receives revenue sharing funds each year as appropriated by the legislature. The remaining employer contributions are determined according to actuarial requirements and are set annually.

RETIREMENT BENEFITS (Tier 1):
Members with 10 years of creditable service may retire at age 60; members with 30 years of service may retire regardless of age. The monthly retirement allowance is equal to 2% of the member's final compensation multiplied by his years of creditable service; elected officials receive an additional one-half percent of final compensation for each year of such elected service. The retirement allowance may not exceed the greater of final annual salary or 100% of the member's final compensation.

RETIREMENT BENEFITS (Tier 2):
Employees whose first employment making them eligible for membership occurs on or after January 1, 2013, become members of Tier 2. Normal retirement eligibility in Tier 2 is at age 67 with 7 years of service credit, at age 62 with 10 years of service credit, or age 55 with 30 years of service credit. Members are eligible for an actuarially-reduced early retirement at 25 years of service credit. The monthly retirement allowance is equal to 2% of the member's final compensation multiplied by his years of creditable service.

DISABILITY BENEFITS:
Any member who has 10 years of Credited Service, is not eligible for Normal Retirement, and becomes totally and permanently disabled as a result from an act occurring in the performance of his or her duty as a general employee is immediately eligible for a disability benefit equal to the lesser of:

1) Thirty percent of his final compensation or 2% of his final compensation multiplied by his years of creditable service, whichever is greater; or
2) Two percent of his final compensation multiplied by his years of creditable service projected to his earliest normal retirement age.

SURVIVOR BENEFITS:

Five years of creditable service are required in order to be eligible for survivor benefits. If the member is eligible for normal retirement at the time of death, the surviving spouse receives an automatic Option 2 benefit. If the member is not eligible for a normal retirement, the surviving spouse receives 30% of final compensation payable upon attainment of age 60 by the spouse, or the actuarial equivalent of this amount payable immediately (such equivalent not to be less than 15% of final compensation).

Survivor benefits are also payable to the surviving spouses of former members who have not withdrawn their accumulated contributions and who have at least 20 years of creditable service. The benefits payable are the actuarial equivalent of the Option 2 benefits that would have become payable to the surviving spouse at the time the former member would have begun receiving deferred normal retirement benefits, had the member survived until that date, elected Option 2, and died at that time.

PROVISIONS APPLICABLE TO BOTH PLAN A AND B

FINAL COMPENSATION:

For a member whose first employment making him eligible for membership in the System began after June 30, 2006, final compensation is based on the average monthly earnings during the highest 60 consecutive months or joined months if service was interrupted. The earnings to be considered

for each 12-month period within the 60-month period may not exceed 115% of the preceding 12-month period.

Effective January 1, 2013, for a member whose first employment making him eligible for membership in the System began before July 1, 2006, final compensation was redefined to be 36 months plus the number of whole months since January 1, 2013, not to exceed 60 months. However, the actual monthly final compensation used to determine the member's benefit cannot be less than the 36-month final average compensation as of January 1, 2013. The earnings to be considered for each 12-month period within the final average compensation period may not exceed 115% of the preceding 12-month period.

UNUSED SICK & ANNUAL LEAVE:

All unused sick and annual leave is credited at the time of retirement to the member if the employer so elects for his employees. The actuarial cost of providing this conversion is borne solely by the employer and must be paid to the Board within 30 days of the member's retirement date.

OPTIONAL ALLOWANCES:

Members may receive their benefits as a life annuity, or in lieu of such receive a reduced benefit according to the option selected which is the actuarial equivalent of their retirement allowance.

Option 2 – Upon retirement, the member receives a reduced benefit. Upon the member's death, the designated beneficiary will continue to receive the same reduced benefit.

Option 3 – Upon retirement, the member receives a reduced benefit. Upon the member's death, the designated beneficiary will receive one-half of the member's reduced benefit.

Option 4 – Upon retirement, the member elects to receive a Board approved benefit which is actuarially equivalent to the retirement allowance.

Option 4.2 – Upon retirement, the member receives a reduced benefit. Upon the member's death, the designated beneficiary will continue to receive the same reduced benefit. If the member's spouse dies before the member, the member's benefit will revert to the retirement allowance.

Option 4.3 – Upon retirement, the member receives a reduced benefit. Upon the member's death, the designated beneficiary will receive one-half of the member's reduced benefit. If the member's spouse dies before the member, the member's benefit will revert to the retirement allowance. A member may also elect to receive an actuarially reduced benefit which provides for an automatic 2½% annual compound increase in monthly retirement benefits based on the reduced benefit and commencing on the later of age fifty-five or retirement anniversary; this COLA is in addition to any ad hoc COLAs which are payable.

DEFERRED RETIREMENT OPTION PLAN (DROP):

In lieu of terminating employment and accepting a service retirement allowance, any member of Plan A or B who is eligible for a normal retirement may elect to participate in DROP for up to three years and defer the receipt of benefits. A DROP participant shall not be eligible to receive a cost-of-living increase from the retirement System while participating and shall not be eligible to receive one until one year after terminating his employment.

Upon commencement of participation in DROP, membership in the System terminates. During participation in DROP, employer contributions are payable but employee contributions cease. The monthly retirement benefits that would have been payable, had the person elected to cease employment and receive a service retirement allowance, are paid into the DROP account. After a member terminates his participation in DROP, his account will earn interest at the actual rate of return earned on the funds left on deposit as certified by the custodian of the System's assets. This interest will be credited to the individual member's account balance on a daily basis beginning July 1, 2006.

Upon termination of employment prior to, or at the end of, the specified period of participation, a participant in DROP may receive, at his option, a lump sum payment from the account equal to the payments into the account, a true annuity based upon his account balance in that fund, or any other method of payment if approved by the Board of Trustees. The monthly benefits that were being paid into the DROP account will begin to be paid to the retiree. If a participant dies during the participation in the plan, a lump sum equal to his account balance in the plan fund shall be paid to his named beneficiary or, if none, to his estate. If employment is not terminated at the end of the three years, payments into the plan fund cease and the person resumes active contributing membership in the System. For any member hired prior to July 1, 2006, additional accrued benefits are based on the final average compensation used to calculate the member's original benefit unless the additional period of service is at least thirty-six months. For any member hired on or after July 1, 2006, whose period of additional service after their DROP participation period ends is less than sixty months, the final compensation figure used to calculate the additional benefit will be that used to calculate the original benefit. If their period of additional service is sixty months or more, the final compensation figure used to calculate the additional benefit will be based on their compensation during the period of additional service.

COST-OF-LIVING ADJUSTMENTS (COLAs):

The Board of Trustees is authorized to grant retired members, and widows of members, who have been retired for at least one full year an annual COLA of 2% of their original benefit, and all retired members and widows who are 35 years of age and older a 2% increase in their original benefit (or their benefit as of October 1, 1977, if they retired prior to that time). In order for the Board to grant either of these increases, the System must meet certain criteria detailed in the statute related to funding status and interest earnings on investments. In lieu of other COLAs, the Board may grant an increase to retirees in the form "X×(A&B)," where "A" is equal to the number of years of credited service accrued as retirement or death of the member or retiree and "B" is equal to the number of years since death of the member or retiree to June 30 of the initial year of increase, and "X" is equal to any amount available for funding such increase up to a maximum of $1.00.

4. Funding Policies

MERS' funding policy is generally described in Section 103 of Title 11 of Louisiana Revised Statutes. MERS is funded from employee and employer contributions using the Frozen Attained Age Normal funding method for Plan A and the Aggregate funding method for Plan B. The total contribution requirement consists of the normal cost (the value of benefits earned by current active employees allocated to the current year) and the amortization cost (amortization payments necessary to liquidate the unfunded accrued liability). The total contribution percentage is determined as the total contribution requirement divided by the payroll applicable to active members. Employee contribution requirements are set forth in R.S. 11:62. The employer contribution rate is equal to the total contribution rate minus the employee rate.

Employer contribution requirements are determined one year in advance of the fiscal year for which the requirement is used. Differences between projected contributions and actual contributions are defined as a contribution Gain or as a contribution Loss. The contribution process is defined below:

A. **Minimum Recommended Net Direct Employer Contribution Rate for FYE 2020** − The June 30, 2018 valuation established the minimum recommended employer contribution rate for FYE 2020. The minimum recommended contribution for FYE 2020 is equal to the minimum recommended net direct employer contribution rate, multiplied by the projected active member payroll for FYE 2020.

B. **Gross Employer Actuarially-Required Contribution for FYE 2020** – The actuarially-determined net direct employer contribution rate for FYE 2020 is determined by the June 30, 2019 valuation. The total contribution is the sum of the benefit normal cost, the assumed administrative expense and the amortization payment.

C. **Net Direct Employer Actuarially Required Contribution Rate for FYE 2020 –** The Net Direct Employer Actuarially Required Contribution is developed by subtracting Ad Valorem Taxes and Revenue Sharing expected for FYE 2020 from the Gross Employer Actuarially Required Contribution for FYE 2020. Net Direct Employer Actuarially Required Contribution Rate for FYE 2020 is computed by dividing the Net Direct Employer Actuarially Required Contribution for that year by the Payroll projected to the middle of 2020.

D. **Contribution Shortfall (Excess)** – The difference between the Net Direct Employer Actuarially Required Contribution Rate for FYE 2020 and the Board Adopted Employer Contribution Rate for Fiscal 2020, is equal to the Contribution Shortfall (Excess) as a Percentage of Payroll.

E. **Minimum Recommended Net Direct Employer Contribution Rate for FYE 2021** – The minimum recommended net direct employer contribution rate for FYE 2021 is determined by the June 30, 2019 valuation. It is developed as a sum of the Net Direct Employer Actuarially Required Contribution Rate for FYE 2020 and a contribution shortfall amortized over the future working lifetime of current participants.

5. Actuarial Methods

Cost Method:

The Frozen Attained Age Normal Actuarial Cost Method is the method for Plan A and the Aggregate Actuarial Cost Method is the method for Plan B. Refer to R.S. 11:22 of the Louisiana statutes for applicable methods for producing annual employer contribution requirements. These methods generally produce normal costs that are level as a percentage of payroll through aggregate working careers of the current membership. These methods build the annual gain or loss into the normal cost.

The funding policy described above is consistent with the plan accumulating adequate assets to make benefit payments when due and consistent with improving the funded status of the plan by fully amortizing the unfunded accrued liability. This retirement System is sustainable as long as actuarially determined contributions are paid when due and all actuarial assumptions are realized.

The Amortization Conversion Account was initially funded from the residual balance in the Experience Account as of June 30, 2013. Payments from the account are made as an offset to employer contributions based on the provisions of Act 478 of the 2014 Regular Legislative Session each year through Fiscal 2019. Any balances in the account as of June 30, 2019, will be amortized as an experience gain. Once the remaining balance in the Amortization Conversion Account is amortized, no further exclusion from the Actuarial Value of Assets will be necessary.

Asset Valuation Method

The actuarial value of assets is equal to the market value of assets for the current valuation date plus an adjustment to phase in investment gains and losses occurring over the past four years. For June 30, 2019, the preliminary actuarial value is equal to the market value of assets on June 30, 2015, plus 80% of investment gains/losses for FYE 2016, plus 60% of investment gains/losses for FYE 2017, plus 40% of investment gains/losses for FYE 2018, plus 20% of investment gains/losses for FYE 2019.

If the preliminary actuarial value of assets exceeds 115% of the market value on June 30, 2019, then the actuarial value is equal to the average of the preliminary value and 115% of the market value. If the preliminary value is less than 85% of the market value, then the actuarial value is equal to the average of the preliminary value and 85% of the market value. Otherwise, the actuarial value is equal to the preliminary value.

Asset valuation formulas are shown in Sections I(3) and I(13).

Benchmarking

Valuation results were tested by comparing actuarial calculations produced in this valuation with values produced by MERS' retained actuary. Comparisons of values were made for each sub-plan, for each member status category, and for each type of decrement.

In aggregate, this valuation's present value of benefits, normal cost and accrued liability values (using old assumptions) as of June 30, 2019, was within acceptable margins of the value produced by the MERS' actuary. Comparisons of values by status category and by decrement showed larger deviations, but on the whole produced values acceptable for valuation purposes.

6. Actuarial Assumptions

Demographic assumptions used in the valuation were adopted by the MERS Board of Trustees following the most recent experience study, effective June 30, 2019. The study was based on an observation period July 1, 2013, through June 30, 2018. The System is required to conduct an experience study every five years, but the scope of such a study is not necessarily limited to a five-year period. The experience study report, dated September 5, 2019, provides further information regarding the rationale for these assumptions. Unless otherwise indicated, all assumptions adopted by the MERS Board for its June 30, 2019 valuation are implemented in this valuation. The prior assumptions and rate tables are illustrated at the end of this section.

Valuation Interest Rate

The assumed rate of return on the actuarial value of assets used for all purposes in this valuation is 6.40%. This rate is net of investment expenses. This 6.40% rate is based on research undertaken by the office of the LLA's actuary. Refer to Appendices B through D for further details.

Assumed Rate of Inflation

The assumed annual rate of inflation is 2.20%, and is a component of the assumed rate of return and of individual members' salary increase assumption.

Please refer to Appendix B for further details.

Mortality Assumption

Mortality assumptions used in this valuation are the same as adopted by the System and based on its most recent experience study.

The mortality assumption has been updated to the 2010 Public Retirement Plans Generational Mortality Table for Below Median Income [PubG-2010(B)], adjusted by System-derived mortality experience factors, with mortality generational improvement projected using the MP-2018 improvement scale from 2016. Base tables have been adjusted as follows:

- Active members mortality rates are taken from the PubG-2010(B) Employee Tables and adjusted by 1.2 for males and by 1.2 for females;

- Non-disabled retirees mortality rates are taken from the PubG-2010(B) Healthy Retiree tables and adjusted by 1.2 for males and by 1.2 for females;

- Disabled retirees mortality rates are taken from the standard 2010 Public Retirement Plans Non-Safety Mortality Table (PubNS-2010) for Disabled Retirees and adjusted by 1.2 for males and by 1.2 for females;

Refer to pages that follow for a listing of mortality rates in the base table.

Please refer to Appendix A for comments on selection of demographic assumptions.

Cost-of-Living Adjustments/Increases

Unfunded actuarial accrued liabilities as of June 30, 2019, and contribution rates for FYE 2020 and FYE 2021 were developed based on MERS' gain-sharing COLA program using an explicit approach. The future benefits expected to be paid under the System's complex gain-sharing program are approximated with a single equivalent fixed annual COLA equal to approximately 0.45% for retirees prior to age 65 and 0.65% thereafter

Please refer to Appendix E for further details.

Annual Salary Increase Rate

Plan A

Service	Rate
< 1	0.062
2	0.062
3	0.062
4	0.062
5	0.043
6	0.043
7	0.043
8	0.043
9	0.043
10+	0.043

Plan B

Service	Rate
< 1	0.072
2	0.072
3	0.072
4	0.072
5	0.047
6	0.047
7	0.047
8	0.047
9	0.047
10+	0.047

These rates include anticipated productivity growth, merit adjustments, and an inflation component of 2.20% for all purposes in this valuation, which is consistent with the inflation assumption used to develop the return assumption.

Please refer to Appendix B further details concerning the inflation assumption.

Retirement Rates

The retirement rates were developed in the most recent experience study and are the same as adopted by MERS. The table of these rates through age 75 is included later in the report. These rates apply only to those individuals eligible to retire.

Retirement Limitations

Projected retirement benefits are not subject to IRC Section 415 limits.

DROP Entry Rates

DROP entry rates were developed in the most recent experience study and are the same as adopted by MERS and based on the System's most recent experience study. The table of these rates is included later in the report. These rates apply only to those individuals eligible to enter the DROP plan and are applied only in the year of earliest DROP eligibility.

DROP Participation Period

All DROP participants are assumed to participate for three years. At the end of the DROP participation period, 50% of participants are assumed to retire; the other 50% are assumed to work one additional year.

Retirement Rates for Active Former DROP Participants

Retirement rates for active former DROP participants were developed in the most recent experience study and are the same as adopted by MERS.

Ages	Plan A	Plan B
<86	0.21	0.17
86+	1.00	1.00

Disability Rates

Disability incidence assumptions used in this valuation are the same as adopted by MERS and based on the System's most recent experience study.

Age	Plan A Rate	Plan B Rate
< 35	0.00038	0.00075
35	0.00043	0.00085
36	0.00048	0.00095
37	0.00053	0.00105
38	0.00060	0.00120
39	0.00068	0.00135
40	0.00078	0.00155
41	0.00088	0.00175
42	0.00098	0.00195
43	0.00110	0.00220
44	0.00125	0.00250
45	0.00143	0.00285
46	0.00163	0.00325
47	0.00183	0.00365
48	0.00208	0.00415
49	0.00235	0.00470
50	0.00268	0.00535
51	0.00305	0.00610
52	0.00345	0.00690
53	0.00392	0.00785
54	0.00445	0.00890
55	0.00505	0.01010
56	0.00575	0.01150
57	0.00653	0.01305
58	0.00740	0.01480
59	0.00843	0.01685
60+	0.01220	0.02440

Withdrawal Rates

Voluntary termination or withdrawal rates were developed in the most recent experience study and are the same as adopted by MERS.

The following rates of withdrawal are applied based upon completed years of service:

Plan A Service	Plan A Tier 1 Rate	Tier 2 Rate	Plan B Tier 1 and 2 Rate
< 1	0.23	0.23	0.29
2	0.20	0.20	0.24
3	0.17	0.17	0.19
4	0.14	0.14	0.15
5	0.12	0.12	0.12
6	0.10	0.10	0.10
7	0.09	0.09	0.09
8	0.09	0.09	0.08
9	0.08	0.08	0.07
10	0.07	0.07	0.07
11	0.06	0.06	0.06
12	0.05	0.05	0.06
13	0.04	0.04	0.05
14	0.04	0.04	0.05
15	0.03	0.03	0.04
16	0.03	0.03	0.04
17	0.03	0.03	0.04
18	0.03	0.03	0.04
19	0.03	0.03	0.04
20	0.03	0.03	0.04
21	0.03	0.03	0.04
22	0.03	0.03	0.04
23	0.04	0.03	0.03
24	0.05	0.03	0.03
25	0.08	0.03	0.02
26	0.00	0.03	0.02
27	0.00	0.03	0.01
28	0.00	0.03	0.01
29	0.00	0.04	0.01
30	0.00	0.05	0.01
31+	0.00	0.08	0.01

Marriage Statistics

70% of the members are assumed to be married (same assumption used by the System based on the most recent actuarial valuation); husbands are assumed to be three years older than wives.

Family Statistics

Assumptions utilized in determining the costs of various survivor benefits as listed below, and are the same as used by the System based on the most recent actuarial valuation:

Member's Age	% With Children	Number of Children	Average Age
25	70%	1.84	5
35	86%	2.13	9
45	75%	1.70	12
55	22%	1.42	14
65	4%	1.45	15

Vesting Electing Percentage

Plan A: For members terminating with less than 20 years of service, it is assumed that 50% will elect deferred benefits in lieu of being refunded their accumulated employee contributions. For members terminating with 20 or more years of service, it is assumed that 85% will elect deferred benefits in lieu of being refunded their accumulated employee contributions. These percentages are the same as adopted by the System based on the most recent experience study.

Plan B: For members terminating with less than 25 years of service, it is assumed that 66% will elect deferred benefits in lieu of being refunded their accumulated employee contributions. For members terminating with 25 or more years of service, it is assumed that 85% will elect deferred benefits in lieu of being refunded their accumulated employee contributions. These percentages are the same as adopted by the System based on the most recent experience study.

Administrative Expenses

Administrative expenses have been accounted for in this valuation by explicitly recognizing them as an addition to normal cost, as one of the three components of the employer contribution. For FYE 2020, administrative expenses are assumed to be $1,898,365 for Plan A and $778,175 for Plan B.

CURRENT ACTUARIAL ASSUMPTIONS FOR ACTIVE EMPLOYEES (Effective June 30, 2019)
PubG-2010(B) Employee Table (120% Male/120% Female)
PROJECTED GENERATIONALLY WITH SCALE MP-2018 (No Projection in Table)

	Mortality Rate			Mortality Rate	
Age	Male	Female	Age	Male	Female
18	0.000444	0.000156	50	0.002616	0.001284
19	0.000480	0.000168	51	0.002832	0.001380
20	0.000492	0.000156	52	0.003060	0.001488
21	0.000504	0.000156	53	0.003300	0.001608
22	0.000492	0.000144	54	0.003564	0.001740
23	0.000492	0.000144	55	0.003840	0.001884
24	0.000480	0.000132	56	0.004140	0.002040
25	0.000492	0.000144	57	0.004452	0.002220
26	0.000516	0.000156	58	0.004800	0.002400
27	0.000540	0.000168	59	0.005184	0.002616
28	0.000564	0.000192	60	0.005592	0.002856
29	0.000600	0.000204	61	0.006024	0.003120
30	0.000624	0.000228	62	0.006504	0.003420
31	0.000660	0.000252	63	0.007020	0.003756
32	0.000696	0.000264	64	0.007572	0.004128
33	0.000732	0.000300	65	0.008184	0.004560
34	0.000780	0.000324	66	0.008844	0.005028
35	0.000816	0.000360	67	0.009588	0.005556
36	0.000876	0.000384	68	0.010392	0.006144
37	0.000924	0.000432	69	0.011304	0.006804
38	0.000996	0.000468	70	0.012300	0.007524
39	0.001068	0.000516	71	0.013416	0.008316
40	0.001152	0.000564	72	0.014652	0.009204
41	0.001236	0.000612	73	0.016020	0.010176
42	0.001344	0.000660	74	0.017532	0.011244
43	0.001452	0.000720	75	0.019188	0.012432
44	0.001584	0.000792	76	0.021012	0.013740
45	0.001716	0.000864	77	0.023016	0.015180
46	0.001872	0.000936	78	0.025212	0.016764
47	0.002040	0.001008	79	0.027624	0.018516
48	0.002220	0.001092	80	0.030276	0.020460
49	0.002412	0.001188			

CURRENT ACTUARIAL ASSUMPTIONS FOR HEALTHY ANNUITANTS (Effective June 30, 2019)
PubG-2010(B) Healthy Retiree Table (120% Male/120% Female)
PROJECTED GENERATIONALLY WITH SCALE MP-2018 (No Projection in Table)

	Mortality Rate			Mortality Rate	
Age	Male	Female	Age	Male	Female
50	0.008652	0.005040	86	0.133800	0.090480
51	0.009060	0.005160	87	0.147684	0.102348
52	0.009492	0.005280	88	0.162528	0.115596
53	0.009936	0.005400	89	0.178332	0.130176
54	0.010368	0.005520	90	0.195036	0.145968
55	0.010812	0.005640	91	0.212172	0.162324
56	0.011256	0.005748	92	0.229512	0.178944
57	0.011688	0.005868	93	0.247056	0.195768
58	0.012120	0.006000	94	0.264936	0.212928
59	0.012552	0.006180	95	0.283404	0.230700
60	0.012996	0.006396	96	0.302712	0.249396
61	0.013452	0.006672	97	0.323088	0.269328
62	0.013932	0.007008	98	0.344676	0.290712
63	0.014460	0.007404	99	0.367488	0.313620
64	0.015036	0.007848	100	0.391308	0.337920
65	0.015696	0.008340	101	0.415632	0.363180
66	0.017076	0.009252	102	0.439680	0.388584
67	0.018696	0.010284	103	0.463248	0.413928
68	0.020544	0.011460	104	0.486144	0.438972
69	0.022656	0.012780	105	0.508224	0.463500
70	0.025032	0.014268	106	0.529356	0.487308
71	0.027684	0.015948	107	0.549432	0.510228
72	0.030636	0.017820	108	0.568368	0.532092
73	0.033936	0.019932	109	0.586116	0.552804
74	0.037620	0.022296	110	0.600000	0.572280
75	0.041736	0.024936	111	0.600000	0.590460
76	0.046344	0.027888	112	0.600000	0.600000
77	0.051480	0.031188	113	0.600000	0.600000
78	0.057228	0.034920	114	0.600000	0.600000
79	0.063672	0.039120	115	0.600000	0.600000
80	0.070884	0.043896	116	0.600000	0.600000
81	0.078972	0.049344	117	0.600000	0.600000
82	0.087972	0.055548	118	0.600000	0.600000
83	0.097956	0.062640	119	0.600000	0.600000
84	0.108924	0.070728	120	1.000000	1.000000
85	0.120876	0.079956			

ACTUARIAL TABLES AND RATES

Age	Plan A Tier 1 Retirement Rates	Plan A Tier 2 Retirement Rates	Plan B Tier 1 Retirement Rates	Plan B Tier 2 Retirement Rates
18	0.00000	0.00000	0.00000	0.00000
19	0.00000	0.00000	0.00000	0.00000
20	0.00000	0.00000	0.00000	0.00000
21	0.00000	0.00000	0.00000	0.00000
22	0.00000	0.00000	0.00000	0.00000
23	0.00000	0.00000	0.00000	0.00000
24	0.00000	0.00000	0.00000	0.00000
25	0.00000	0.00000	0.00000	0.00000
26	0.00000	0.00000	0.00000	0.00000
27	0.00000	0.00000	0.00000	0.00000
28	0.00000	0.00000	0.00000	0.00000
29	0.00000	0.00000	0.00000	0.00000
30	0.00000	0.00000	0.00000	0.00000
31	0.00000	0.00000	0.00000	0.00000
32	0.00000	0.00000	0.00000	0.00000
33	0.00000	0.00000	0.00000	0.00000
34	0.00000	0.00000	0.00000	0.00000
35	0.00000	0.00000	0.00000	0.00000
36	0.00000	0.00000	0.00000	0.00000
37	0.00000	0.00000	0.00000	0.00000
38	0.00000	0.00000	0.00000	0.00000
39	0.00000	0.00000	0.00000	0.00000
40	0.00000	0.00000	0.00000	0.00000
41	0.20000	0.00000	0.00000	0.00000
42	0.20000	0.00000	0.00000	0.00000
43	0.20000	0.00000	0.00000	0.00000
44	0.13000	0.00000	0.00000	0.00000
45	0.08000	0.00000	0.00000	0.00000
46	0.05000	0.00000	0.01000	0.00000
47	0.04000	0.00000	0.01000	0.00000
48	0.04000	0.00000	0.01000	0.00000
49	0.05000	0.00000	0.01000	0.00000
50	0.06000	0.00000	0.01000	0.00000
51	0.07000	0.00000	0.02000	0.00000
52	0.07000	0.00000	0.02000	0.00000
53	0.08000	0.00000	0.03000	0.00000
54	0.07000	0.00000	0.03000	0.00000
55	0.07000	0.07000	0.03000	0.03000
56	0.07000	0.07000	0.03000	0.03000
57	0.06000	0.06000	0.03000	0.03000
58	0.06000	0.06000	0.04000	0.04000
59	0.07000	0.07000	0.05000	0.05000
60	0.07000	0.07000	0.06000	0.06000
61	0.08000	0.08000	0.08000	0.08000
62	0.09000	0.09000	0.11000	0.11000
63	0.10000	0.10000	0.13000	0.13000
64	0.12000	0.12000	0.16000	0.16000
65	0.14000	0.14000	0.18000	0.18000
66	0.16000	0.16000	0.20000	0.20000
67	0.18000	0.18000	0.22000	0.22000
68	0.19000	0.19000	0.23000	0.23000
69	0.20000	0.20000	0.23000	0.23000
70	0.21000	0.21000	0.23000	0.23000
71	0.21000	0.21000	0.23000	0.23000
72	0.20000	0.20000	0.21000	0.21000
73	0.19000	0.19000	0.20000	0.20000
74	0.17000	0.17000	0.19000	0.19000
75	0.16000	0.16000	0.18000	0.18000

Age	Plan A Tier 1 Post-DROP Retirement Rates	Plan A Tier 2 Post-DROP Retirement Rates	Plan B Tier 1 Post-DROP Retirement Rates	Plan B Tier 2 Post-DROP Retirement Rates
18	0.00000	0.00000	0.00000	0.00000
19	0.00000	0.00000	0.00000	0.00000
20	0.00000	0.00000	0.00000	0.00000
21	0.00000	0.00000	0.00000	0.00000
22	0.00000	0.00000	0.00000	0.00000
23	0.00000	0.00000	0.00000	0.00000
24	0.00000	0.00000	0.00000	0.00000
25	0.00000	0.00000	0.00000	0.00000
26	0.00000	0.00000	0.00000	0.00000
27	0.00000	0.00000	0.00000	0.00000
28	0.00000	0.00000	0.00000	0.00000
29	0.00000	0.00000	0.00000	0.00000
30	0.00000	0.00000	0.00000	0.00000
31	0.00000	0.00000	0.00000	0.00000
32	0.00000	0.00000	0.00000	0.00000
33	0.00000	0.00000	0.00000	0.00000
34	0.00000	0.00000	0.00000	0.00000
35	0.00000	0.00000	0.00000	0.00000
36	0.00000	0.00000	0.00000	0.00000
37	0.00000	0.00000	0.00000	0.00000
38	0.00000	0.00000	0.00000	0.00000
39	0.00000	0.00000	0.00000	0.00000
40	0.00000	0.00000	0.00000	0.00000
41	0.04000	0.00000	0.00000	0.00000
42	0.04000	0.00000	0.00000	0.00000
43	0.04000	0.00000	0.00000	0.00000
44	0.04000	0.00000	0.00000	0.00000
45	0.04000	0.00000	0.00000	0.00000
46	0.04000	0.00000	0.15000	0.00000
47	0.04000	0.00000	0.15000	0.00000
48	0.04000	0.00000	0.15000	0.00000
49	0.04000	0.00000	0.15000	0.00000
50	0.07000	0.00000	0.15000	0.00000
51	0.10000	0.00000	0.15000	0.00000
52	0.12000	0.00000	0.15000	0.00000
53	0.14000	0.00000	0.15000	0.00000
54	0.16000	0.00000	0.14000	0.00000
55	0.18000	0.18000	0.12000	0.12000
56	0.19000	0.19000	0.10000	0.10000
57	0.19000	0.19000	0.08000	0.08000
58	0.20000	0.20000	0.07000	0.07000
59	0.21000	0.21000	0.06000	0.06000
60	0.21000	0.21000	0.06000	0.06000
61	0.22000	0.22000	0.07000	0.07000
62	0.22000	0.22000	0.09000	0.09000
63	0.22000	0.22000	0.12000	0.12000
64	0.22000	0.22000	0.15000	0.15000
65	0.21000	0.21000	0.18000	0.18000
66	0.20000	0.20000	0.20000	0.20000
67	0.18000	0.18000	0.22000	0.22000
68	0.17000	0.17000	0.24000	0.24000
69	0.15000	0.15000	0.25000	0.25000
70	0.14000	0.14000	0.25000	0.25000
71	0.13000	0.13000	0.25000	0.25000
72	0.13000	0.13000	0.24000	0.24000
73	0.13000	0.13000	0.24000	0.24000
74	0.13000	0.13000	0.23000	0.23000
75	0.13000	0.13000	0.21000	0.21000

Age	Plan A Tier 1 DROP Rates	Plan A Tier 2 DROP Rates	Plan B Tier 1 DROP Rates	Plan B Tier 2 DROP Rates
18	0.00000	0.00000	0.00000	0.00000
19	0.00000	0.00000	0.00000	0.00000
20	0.00000	0.00000	0.00000	0.00000
21	0.00000	0.00000	0.00000	0.00000
22	0.00000	0.00000	0.00000	0.00000
23	0.00000	0.00000	0.00000	0.00000
24	0.00000	0.00000	0.00000	0.00000
25	0.00000	0.00000	0.00000	0.00000
26	0.00000	0.00000	0.00000	0.00000
27	0.00000	0.00000	0.00000	0.00000
28	0.00000	0.00000	0.00000	0.00000
29	0.00000	0.00000	0.00000	0.00000
30	0.00000	0.00000	0.00000	0.00000
31	0.00000	0.00000	0.00000	0.00000
32	0.00000	0.00000	0.00000	0.00000
33	0.00000	0.00000	0.00000	0.00000
34	0.00000	0.00000	0.00000	0.00000
35	0.00000	0.00000	0.00000	0.00000
36	0.00000	0.00000	0.00000	0.00000
37	0.00000	0.00000	0.00000	0.00000
38	0.00000	0.00000	0.00000	0.00000
39	0.00000	0.00000	0.00000	0.00000
40	0.00000	0.00000	0.00000	0.00000
41	0.17000	0.00000	0.00000	0.00000
42	0.17000	0.00000	0.00000	0.00000
43	0.17000	0.00000	0.00000	0.00000
44	0.17000	0.00000	0.00000	0.00000
45	0.17000	0.00000	0.00000	0.00000
46	0.16000	0.00000	0.10000	0.00000
47	0.15000	0.00000	0.10000	0.00000
48	0.14000	0.00000	0.10000	0.00000
49	0.14000	0.00000	0.22000	0.00000
50	0.14000	0.00000	0.32000	0.00000
51	0.14000	0.00000	0.35000	0.00000
52	0.16000	0.00000	0.36000	0.00000
53	0.18000	0.00000	0.36000	0.00000
54	0.20000	0.00000	0.36000	0.00000
55	0.23000	0.23000	0.37000	0.37000
56	0.24000	0.24000	0.38000	0.38000
57	0.25000	0.25000	0.39000	0.39000
58	0.24000	0.24000	0.37000	0.37000
59	0.23000	0.23000	0.34000	0.34000
60	0.21000	0.21000	0.28000	0.28000
61	0.19000	0.19000	0.22000	0.22000
62	0.17000	0.17000	0.17000	0.17000
63	0.15000	0.15000	0.12000	0.12000
64	0.13000	0.13000	0.10000	0.10000
65	0.13000	0.13000	0.08000	0.08000
66	0.12000	0.12000	0.07000	0.07000
67	0.12000	0.12000	0.06000	0.06000
68	0.12000	0.12000	0.06000	0.06000
69	0.12000	0.12000	0.06000	0.06000
70	0.12000	0.12000	0.06000	0.06000
71	0.12000	0.12000	0.07000	0.07000
72	0.12000	0.12000	0.08000	0.08000
73	0.11000	0.11000	0.09000	0.09000
74	0.11000	0.11000	0.09000	0.09000
75	0.09000	0.09000	0.09000	0.09000

PRIOR YEAR ASSUMPTIONS
(Revised Effective in this Valuation)

Valuation Interest Rate

The assumed rate of return on the actuarial value of assets used for all purposes in the prior valuation was 7.275% (net of investment expense).

Mortality Assumption

The mortality assumption used in the prior valuation was the RP-2000 Employee Table set back 2 years for males and females for active members. For annuitants and beneficiaries, the RP-2000 Healthy Annuitant Table set forward 2 years and projected to 2028 using Scale AA for males and set forward 1 year and projected to 2028 using Scale AA for female was used in the prior valuation. The RP-2000 Disabled Lives Mortality Table set back five years for males and set back three years for females was used for disabled members. The table of these rates through age 75 is included later in the report.

Annual Salary Increase Rate

The annual salary increase rate used in the prior valuation was 5.0%, including 2.6% inflation.

Retiree Cost of Living Increases

The present values and accrued liabilities in the prior report did not include provisions for potential future COLA increases.

Vesting Electing Percentage

Plan A – Tier 1: For members terminating with less than 20 years of service, it was assumed that 60% would elect deferred benefits in lieu of being refunded their accumulated employee contributions. For members terminating with 20 or more years of service, it was assumed that 100% would elect deferred benefits in lieu of being refunded their accumulated employee contributions.

Plan A – Tier 2: For members terminating with less than 25 years of service, it was assumed that 60% would elect deferred benefits in lieu of being refunded their accumulated employee contributions. For members terminating with 25 or more years of service, it was assumed that 100% would elect deferred benefits in lieu of being refunded their accumulated employee contributions.

Plan B – Tier 1: It was assumed that 66% would elect deferred benefits in lieu of being refunded their accumulated employee contributions.

Plan B – Tier 2: For members terminating with less than 25 years of service, it was assumed that 60% would elect deferred benefits in lieu of being refunded their accumulated employee contributions. For members terminating with 25 or more years of service, it was assumed that 100% would elect deferred benefits in lieu of being refunded their accumulated employee contributions.

Withdrawal Rates

The following rates of withdrawal are applied based upon completed years of service:

Service	Plan A	Plan B
0	0.20	0.23
1	0.17	0.20
2	0.14	0.15
3	0.12	0.13
4	0.10	0.10
5	0.09	0.09
6	0.08	0.08
7	0.07	0.07
8	0.06	0.06
9	0.06	0.05
10	0.05	0.04
11	0.05	0.04
12	0.04	0.03
13	0.04	0.03
14	0.03	0.03
15	0.03	0.03
16	0.02	0.03
17	0.02	0.03
18	0.02	0.03
19+	0.02	0.02

PRIOR YEAR ASSUMPTIONS
ACTUARIAL TABLES AND RATES

Age	Retired Male Mortality Rates	Retired Female Mortality Rates	Active Male Mortality Rates	Active Female Mortality Rates	Female Disabled Mortality Rates
18	0.00020	0.00013	0.00028	0.00018	0.00745
19	0.00021	0.00013	0.00030	0.00018	0.00745
20	0.00021	0.00012	0.00032	0.00019	0.00745
21	0.00022	0.00012	0.00033	0.00019	0.00745
22	0.00023	0.00012	0.00035	0.00019	0.00745
23	0.00025	0.00013	0.00036	0.00019	0.00745
24	0.00026	0.00014	0.00037	0.00019	0.00745
25	0.00029	0.00014	0.00037	0.00020	0.00745
26	0.00033	0.00016	0.00038	0.00020	0.00745
27	0.00036	0.00017	0.00038	0.00021	0.00745
28	0.00039	0.00018	0.00038	0.00021	0.00745
29	0.00043	0.00019	0.00038	0.00022	0.00745
30	0.00049	0.00023	0.00039	0.00024	0.00745
31	0.00055	0.00028	0.00041	0.00025	0.00745
32	0.00061	0.00031	0.00044	0.00026	0.00745
33	0.00067	0.00034	0.00050	0.00031	0.00745
34	0.00073	0.00036	0.00056	0.00035	0.00745
35	0.00079	0.00038	0.00063	0.00039	0.00745
36	0.00084	0.00040	0.00070	0.00044	0.00745
37	0.00089	0.00041	0.00077	0.00047	0.00745
38	0.00091	0.00044	0.00084	0.00051	0.00745
39	0.00094	0.00046	0.00090	0.00055	0.00745
40	0.00097	0.00051	0.00096	0.00060	0.00745
41	0.00101	0.00056	0.00102	0.00065	0.00745
42	0.00105	0.00061	0.00108	0.00071	0.00745
43	0.00111	0.00067	0.00114	0.00077	0.00745
44	0.00115	0.00074	0.00122	0.00085	0.00745
45	0.00120	0.00078	0.00130	0.00094	0.00745
46	0.00125	0.00082	0.00140	0.00103	0.00745
47	0.00131	0.00086	0.00151	0.00112	0.00745
48	0.00340	0.00093	0.00162	0.00122	0.00745
49	0.00342	0.00141	0.00173	0.00133	0.00818
50	0.00339	0.00152	0.00186	0.00143	0.00896
51	0.00334	0.00169	0.00200	0.00155	0.00978
52	0.00329	0.00195	0.00214	0.00168	0.01063
53	0.00335	0.00228	0.00229	0.00181	0.01154
54	0.00348	0.00266	0.00245	0.00197	0.01248
55	0.00377	0.00313	0.00262	0.00213	0.01346
56	0.00415	0.00370	0.00281	0.00232	0.01446
57	0.00463	0.00428	0.00303	0.00253	0.01550
58	0.00522	0.00481	0.00331	0.00276	0.01654
59	0.00573	0.00539	0.00363	0.00301	0.01760
60	0.00631	0.00601	0.00400	0.00329	0.01865
61	0.00717	0.00668	0.00441	0.00360	0.01971
62	0.00794	0.00739	0.00488	0.00393	0.02077
63	0.00904	0.00816	0.00538	0.00429	0.02184
64	0.01002	0.00901	0.00592	0.00466	0.02294
65	0.01109	0.00992	0.00647	0.00504	0.02408
66	0.01262	0.01090	0.00703	0.00543	0.02529
67	0.01394	0.01197	0.00757	0.00582	0.02660
68	0.01496	0.01317	0.00810	0.00621	0.02803
69	0.01656	0.01455	0.00860	0.00658	0.02959
70	0.01787	0.01615	0.00907	0.00695	0.03132
71	0.01990	0.01746	0.00951	0.00729	0.03323
72	0.02220	0.01941	0.00992	0.00761	0.03533
73	0.02478	0.02091	0.02457	0.01858	0.03764
74	0.02762	0.02309	0.02728	0.02067	0.04014
75	0.03161	0.02473	0.03039	0.02297	0.04285

Age	Retirement Rates Plan A Tier 1	Retirement Rates Plan A Tier 2	DROP Rates Plan A Tier 1	DROP Rates Plan A Tier 2
18	0.00000	0.00000	0.00000	0.00000
19	0.00000	0.00000	0.00000	0.00000
20	0.00000	0.00000	0.00000	0.00000
21	0.00000	0.00000	0.00000	0.00000
22	0.00000	0.00000	0.00000	0.00000
23	0.00000	0.00000	0.00000	0.00000
24	0.00000	0.00000	0.00000	0.00000
25	0.00000	0.00000	0.00000	0.00000
26	0.00000	0.00000	0.00000	0.00000
27	0.00000	0.00000	0.00000	0.00000
28	0.00000	0.00000	0.00000	0.00000
29	0.00000	0.00000	0.00000	0.00000
30	0.00000	0.00000	0.00000	0.00000
31	0.00000	0.00000	0.00000	0.00000
32	0.00000	0.00000	0.00000	0.00000
33	0.00000	0.00000	0.00000	0.00000
34	0.00000	0.00000	0.00000	0.00000
35	0.00000	0.00000	0.00000	0.00000
36	0.00000	0.00000	0.00000	0.00000
37	0.00000	0.00000	0.00000	0.00000
38	0.00000	0.00000	0.00000	0.00000
39	0.00000	0.00000	0.00000	0.00000
40	0.00000	0.00000	0.00000	0.00000
41	0.06000	0.00000	0.18000	0.00000
42	0.06000	0.00000	0.18000	0.00000
43	0.06000	0.00000	0.18000	0.00000
44	0.06000	0.00000	0.18000	0.00000
45	0.06000	0.00000	0.18000	0.00000
46	0.06000	0.00000	0.18000	0.00000
47	0.06000	0.00000	0.18000	0.00000
48	0.06000	0.00000	0.18000	0.00000
49	0.06000	0.00000	0.18000	0.00000
50	0.06000	0.00000	0.27000	0.00000
51	0.06000	0.00000	0.27000	0.00000
52	0.06000	0.00000	0.27000	0.00000
53	0.06000	0.00000	0.27000	0.00000
54	0.06000	0.00000	0.27000	0.00000
55	0.06000	0.06000	0.27000	0.27000
56	0.06000	0.06000	0.27000	0.27000
57	0.06000	0.06000	0.27000	0.27000
58	0.06000	0.06000	0.27000	0.27000
59	0.06000	0.06000	0.27000	0.27000
60	0.12000	0.12000	0.24000	0.24000
61	0.12000	0.12000	0.16000	0.16000
62	0.12000	0.12000	0.16000	0.16000
63	0.12000	0.12000	0.16000	0.16000
64	0.12000	0.12000	0.16000	0.16000
65	0.18000	0.18000	0.16000	0.16000
66	0.18000	0.18000	0.16000	0.16000
67	0.18000	0.18000	0.16000	0.16000
68	0.18000	0.18000	0.16000	0.16000
69	0.18000	0.18000	0.16000	0.16000
70	0.18000	0.18000	0.09000	0.09000
71	0.18000	0.18000	0.09000	0.09000
72	0.12000	0.12000	0.09000	0.09000
73	0.12000	0.12000	0.09000	0.09000
74	0.12000	0.12000	0.09000	0.09000
75	0.12000	0.12000	0.09000	0.09000

PRIOR-YEAR ASSUMPTIONS
ACTUARIAL TABLES AND RATES

Age	Retirement Rates Plan B Tier 1	Retirement Rates Plan B Tier 2	DROP Rates Plan B Tier 1	DROP Rates Plan B Tier 2	Disability Rates Plan B
18	0.00000	0.00000	0.00000	0.00000	0.00090
19	0.00000	0.00000	0.00000	0.00000	0.00090
20	0.00000	0.00000	0.00000	0.00000	0.00090
21	0.00000	0.00000	0.00000	0.00000	0.00090
22	0.00000	0.00000	0.00000	0.00000	0.00090
23	0.00000	0.00000	0.00000	0.00000	0.00090
24	0.00000	0.00000	0.00000	0.00000	0.00090
25	0.00000	0.00000	0.00000	0.00000	0.00090
26	0.00000	0.00000	0.00000	0.00000	0.00090
27	0.00000	0.00000	0.00000	0.00000	0.00090
28	0.00000	0.00000	0.00000	0.00000	0.00090
29	0.00000	0.00000	0.00000	0.00000	0.00090
30	0.00000	0.00000	0.00000	0.00000	0.00090
31	0.00000	0.00000	0.00000	0.00000	0.00090
32	0.00000	0.00000	0.00000	0.00000	0.00090
33	0.00000	0.00000	0.00000	0.00000	0.00090
34	0.00000	0.00000	0.00000	0.00000	0.00090
35	0.00000	0.00000	0.00000	0.00000	0.00102
36	0.00000	0.00000	0.00000	0.00000	0.00114
37	0.00000	0.00000	0.00000	0.00000	0.00126
38	0.00000	0.00000	0.00000	0.00000	0.00144
39	0.00000	0.00000	0.00000	0.00000	0.00162
40	0.00000	0.00000	0.00000	0.00000	0.00186
41	0.00000	0.00000	0.00000	0.00000	0.00210
42	0.00000	0.00000	0.00000	0.00000	0.00234
43	0.00000	0.00000	0.00000	0.00000	0.00264
44	0.00000	0.00000	0.00000	0.00000	0.00300
45	0.00000	0.00000	0.00000	0.00000	0.00342
46	0.08000	0.00000	0.33000	0.00000	0.00390
47	0.08000	0.00000	0.33000	0.00000	0.00438
48	0.08000	0.00000	0.33000	0.00000	0.00498
49	0.08000	0.00000	0.33000	0.00000	0.00564
50	0.08000	0.00000	0.33000	0.00000	0.00642
51	0.08000	0.00000	0.33000	0.00000	0.00732
52	0.08000	0.00000	0.33000	0.00000	0.00828
53	0.08000	0.00000	0.33000	0.00000	0.00942
54	0.08000	0.00000	0.33000	0.00000	0.01068
55	0.20000	0.20000	0.25000	0.25000	0.01212
56	0.08000	0.08000	0.25000	0.25000	0.01380
57	0.08000	0.08000	0.25000	0.25000	0.01566
58	0.08000	0.08000	0.25000	0.25000	0.01776
59	0.08000	0.08000	0.25000	0.25000	0.02022
60	0.08000	0.08000	0.40000	0.40000	0.02928
61	0.08000	0.08000	0.20000	0.20000	0.02928
62	0.12000	0.12000	0.20000	0.20000	0.02928
63	0.12000	0.12000	0.20000	0.20000	0.02928
64	0.12000	0.12000	0.20000	0.20000	0.02928
65	0.12000	0.12000	0.20000	0.10000	0.02928
66	0.12000	0.12000	0.10000	0.10000	0.02928
67	0.12000	0.12000	0.10000	0.10000	0.02928
68	0.12000	0.12000	0.10000	0.10000	0.02928
69	0.12000	0.12000	0.10000	0.10000	0.02928
70	0.12000	0.12000	0.10000	0.10000	0.02928
71	0.12000	0.12000	0.10000	0.10000	0.02928
72	0.12000	0.12000	0.10000	0.10000	0.02928
73	0.12000	0.12000	0.10000	0.10000	0.02928
74	0.12000	0.12000	0.10000	0.10000	0.02928

APPENDIX A
BASIS FOR DEMOGRAPHIC ASSUMPTIONS

Experience Study

An actuarial experience study was prepared by the System's actuary for the period from July 1, 2013, through June 30, 2018, for MERS. The experience study report, dated September 5, 2019, summarized the results. The experience study report includes the following demographic assumptions:

- Mortality Rates
- Retirement Rates
- Disability Rates
- Withdrawal/Termination Rates
- Salary Increases
- DROP Entry Rates
- Post-DROP Retirement Rates
- Vesting Election Percentage
- DROP and Post-DROP participation

We reviewed the experience study report and found all the sections relating to the demographic assumptions mentioned above to be described with reasonable detail and careful recognition of relevant experience. We did not perform a comprehensive review of the experience study report; nevertheless, we do accept all the demographic assumptions proposed in the experience study report and find them fully appropriate for this 2019 actuarial valuation.

Mortality Assumption

As stated in the experience study report, mortality rates were developed by comparing the System's experience to a reference mortality table. The System's actuary selected the reference table to be PubG-2010(B) adjusted for general Louisiana mortality experience. PubG-2010(B) is one of the tables recently developed by the Society of Actuaries from data obtained from public sector pension plans across the U.S. and was published in January 2019. The "G" in PubG refers to the subpopulation of general employees (as opposed to public safety) and the "(B)" refers to the below-median benefit income subpopulation. A reference table was created by the System's actuary by multiplying this standard table by 115% to reflect the geographic variation in Louisiana (per the Centers for Disease Control and Prevention).

The final mortality rates were developed by the System's actuary by calculating adjustment factors based on the actual experience of the System over the last five years compared the reference table. The experience of Plans A and B were combined in order to increase actuarial credibility of the data. However, even the aggregated experience had only partial credibility: 52% for males and 42% for females. Based on that information, the System's actuary selected PubG-2010(B) with a 120% adjustment factor as a base table. This was judged to be a reasonable base table for the purpose of the LLA's 2019 actuarial valuation as well.

The MP-2018 improvement scale, released in October 2018, was the most recent improvement scale available as of the valuation date, and was used in the 2019 actuarial valuation report prepared by the System's actuary and used in this 2019 actuarial valuation prepared by the LLA.

Actuarial Practice

Actuarial Standard of Practice (ASOP) No. 35, *Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations*, states that at each measurement date the actuary should determine whether the assumptions continue to be reasonable, which includes the requirement to take into account historical and current demographic data that is relevant as of the measurement date.

We believe the mortality table used in this 2019 actuarial valuation by the LLA (also used by the System's actuary) is the most current available, satisfies ASOP No. 35 and was developed in a manner consistent with current actuarial literature.

APPENDIX B
BASIS FOR INFLATION ASSUMPTION

Perspectives: Where Should Actuaries Look for Input on Inflation Assumptions?

There are two types of perspectives to consider when defending or determining an assumed rate of future inflation: Do we look more to historical rates to inform decision-makers; or more to forward-looking forecasts of the future? Secondly, do we look more to what other retirement systems are doing; or look more to what expert inflation forecasters are expecting?

Past Returns? Looking backwards at historical inflation rates is not considered to be reliable supporting documentation for current pension actuarial assumptions of future inflation. Historical inflation rates are viewed more as information, than used to defend or determine a current inflation assumption. The past is indeed useful for understanding historical relationships among various economic forces.

The current economic environment is not like the past 10, 30, or 50 years; and the future economic environment is certain to be different from the past. The role of the Federal Reserve Board and other factors are different than they used to be years ago.

A forward-looking perspective should drive the defense or determination of an inflation assumption for pension actuarial valuations. Strategically selecting historical rates (an X-year period ending on Y-date) to justify a return assumption being applied to the next 10, 20, or 30year period is not valid.

Therefore, historical CPI rates of increase have minimal relevance to us. We chose instead to develop our inflation assumptions based on *forward-looking* forecasts from subject matter experts.

Other Retirement Systems? Looking to what other peer retirement systems are assuming for future inflation rates is generally not a well-placed focus for defending or determining a future inflation rate.

While it may be interesting, even important, to know what inflation assumptions are used by other large public sector retirement systems, that information is not useful for discharging our duties for adopting an inflation assumption for the System's actuarial valuation. It is not useful for actually informing us concerning the economic forecasts applicable to this valuation.

a. *Different Environments*. Public retirement systems across the United States each have their own politics, environments and sets of agency risk. Their assumption-setters may not have adhered to mainstream and objective forecasts of experts, but may have been influenced by budgets, protectionism, and politics. These are not best practices to be emulated when setting assumptions. Since it is impossible to determine which retirement systems applied a robust, analytical process and which were more influenced by budgets, it is best not to select the inflation assumption based on what other retirement systems assume.

b. *Different Horizon.* Other retirement systems may have been influenced by their consultants advocating a long-term horizon for the net investment return assumption. This is fairly common, but as discussed below, a mid-term horizon (or a blend) is more

appropriate for the reasons stated. A single equivalent rate between the mid-term consensus and the longer term consensus, derived from a system's own respective cash flow demands, may be the most appropriate return assumption.

Looking at other retirement systems is important and useful for knowing what others are doing; but it is not appropriate as a driving factor in defending or determining an inflation assumption for this retirement System.

Expert sources of inflation forecasts (from large, independent, unbiased and, reputable inflation forecasting organizations) are the best places to look for input when setting an inflation assumption for pension valuations. These are much more objective and unfiltered sources, directly from the experts themselves, to guide decision-makers.

Adopting a *process* that looks to a consensus of external and independent subject matter experts' forward-looking forecasts is the best way to avoid the political and budget pressures that sometimes distract or influence assumption-setters away from our primary duty to set an inflation assumption as an unbiased best estimate (or most appropriate) of the future inflation.

Inflation Forecasts from Independent Experts

Expected rates of inflation are critical components of expected rates of return. In a building block approach, it forms the starting point for building up the final choice for the return assumption, salary scale increases for individuals, cost-of-living adjustment benefits, general wage inflation and a payroll growth rate assumption when applicable.

We applied considerable care to obtain relevant research and opinions from independent inflation forecasting experts for this fundamental component.

There are many professional sources available to actuaries and investment consultants that forecast inflation on a forward-looking basis.

Inflation forecasting is mostly the domain of *economists*, particularly those specializing in that area. In our opinion, as mentioned earlier, forward-looking forecasts from subject matter experts are much more appropriate than historical rates or peer groups.

Consider the forward-looking forecasts from the following ten (10) subject matter experts (eight organizations providing 10 sources), comprising hundreds of economists' opinions.

Major National Inflation Forecasters	
Congressional Budget Office	Federal Reserve Bank of Cleveland
Federal Reserve Bank of Philadelphia (2)	Federal Reserve Bank of New York (2)
Federal Reserve Board	Social Security Trustees Report
Investment Forecaster Survey (GRS)	U.S. Department of the Treasury

Some of these organizations provide multiple forecasts of inflation for different time horizons, making a total of 17 forecasts from ten (10) reputable sources.

June 2019 Forward-looking Forecasts of CPI Inflation		
Horizon	**Average**	**Sources**
27 - 30^{+} yrs	2.25%	6
20 yrs	1.81%	2
10 -15 yrs	2.16%	10

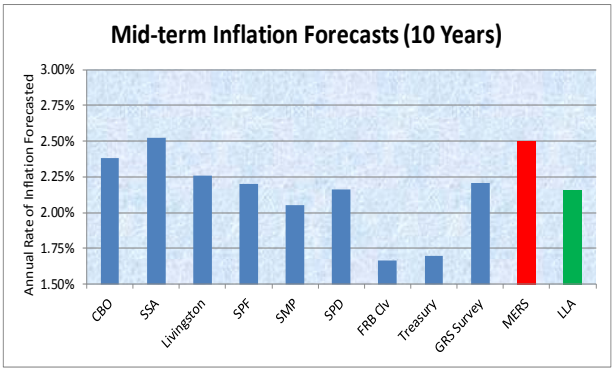
Our preferred inflation assumption for a 10-year horizon would be 2.16%, the consensus average directly from ten (10) expert sources of mid-term inflation forecasts.

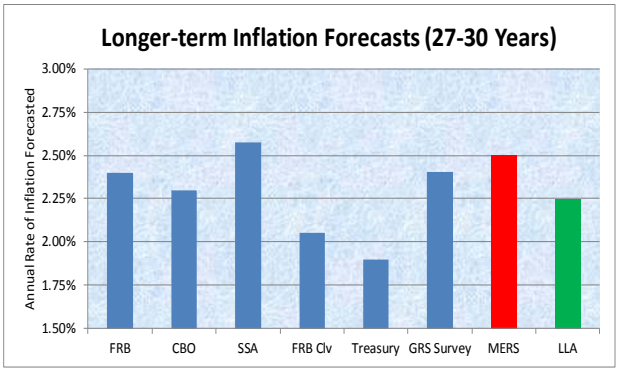
Our preferred inflation assumption for a 30-year horizon would be 2.25%, the consensus average directly from five (5) expert sources of long-term inflation forecasts

Both mid-term and long-term horizons of inflation forecasts are used in developing our final net return assumption. It would be a false choice to be forced to pick between mid-term and long-term for the net return assumption. The composite single equivalent benefit horizon turns out to be much closer to the mid-term horizon than the long-term horizon, due to the expected future benefits stream, and the long-term forecasts are less reliable for reasons discussed in Appendix D. Nevertheless, our final development of the net return assumption is a blend or the single equivalent net return assumption (between the mid-term and long-term census averages).

Consider the exhibit on the following page, which shows the detailed inflation forecasts of these ten large reputable expert organizations in the field of inflation forecasting.

2019 Forward-looking Annual Inflation Forecasts (From Professional Experts in the Field of Forecasting Inflation)	
Federal Reserve Board's Federal Open Market Committee	
Current "Long-run" Price Inflation Objective (<10 years):	
Objective since Jan 2012; Personal Consumer Expenditures (PCE)	2.00%
Consumer Price Index Inflation Objective (CPI = PCE + approx 40 bps)	2.40%
Congressional Budget Office: *The Budget and Economic Outlook*	
Overall Consumer Price Index (January 2019; Ultimate)	2.30%
Overall Consumer Price Index (January 2019; 10 Years)	2.38%
2019 Social Security Trustees Report	
CPI-W 10-Year Intermediate Assumption	2.53%
CPI-W 30-Year Intermediate Assumption	2.58%
Federal Reserve Bank of Philadelphia	
Livingston Survey: 10-Year Median Forecast (June 2019)	2.26%
Survey of Professional Forecasters: 10-Year Median Forecast (2Q2019)	2.20%
Federal Reserve Bank of New York's Trading Desk (June 2019)	
Survey of Market Participants: 10-Year Median Expectation	2.05%
Survey of Primary Dealers: 10-Year Median Expectation	2.16%
Federal Reserve Bank of Cleveland (July 1, 2019)	
10-Year Expectation	1.67%
20-Year Expectation	1.88%
30-Year Expectation	2.05%
U.S. Department of the Treasury (Ave in June 2019)	
10-Year Breakeven Inflation	1.70%
20-Year Breakeven Inflation	1.74%
30-Year Breakeven Inflation	1.90%
2019 GRS Survey of Investment Consultants and Forecasters	
Median expectation among 14 firms (averaging a 10-year horizon)	2.21%
Median expectation among 6 firms (averaging a 26-year horizon)	2.41%





Note the System's inflation assumption makes no distinction between mid-term or longer-term; but is just a single 2.50% rate for its 2019 valuation.

Clearly, it is difficult to defend an inflation assumption of 2.50% for a mid-term horizon of 10 years. An inflation assumption of 2.50% for a long-term assumption of 30 years might also seem excessive high compared to the experts.

For this valuation, the LLA adopted an inflation assumption of 2.20%, a weighted average between near- and long-term forecasts from external sources.

APPENDIX C
BASIS FOR NET INVESTMENT RETURN ASSUMPTION

Principles for Setting Pension Return Assumptions

The purpose of the return assumption is to forecast what the pension portfolio is expected to earn in the future. While we are cognizant of the financial burden that pension contributions place on participating employers, our responsibility is to measure costs and liabilities without being unduly influenced by the resulting contribution requirement for a given return assumption. The role of the LLA is to make an unbiased measurement of the retirement program's expected future cost to taxpayers, without regard whether the contributions are affordable. This role is not to set or recommend assumptions to assist the employers in balancing their current budgets.

The pension return assumption should be a reasonable and defensible best estimate of the future net investment return of the pension portfolio over the given horizon. It should be based on the professional forecasts of *independent* subject matter experts and should be appropriate for use in an actuarial valuation of a retirement system. While we understand that different professionals may have differing opinions about the future, we do not consider the pension return assumption to be a lever to adjust up or down depending on what is affordable at the time.

Our primary focus is on following a robust and analytical process for objectively adopting an appropriate forecast of the pension portfolio's future earnings. We recognize the initial contribution shock caused by a large change in the return assumption. But we choose to separate the setting of the most appropriate return assumption from budget implications; not to ignore the budget implications, but to address them separately, after the most appropriate return assumptions is derived.

Nevertheless, a reasonable and defensible "most appropriate" assumption for future net investment returns:

a. Provides the most unbiased measure of the unfunded actuarial liability that is reported to the public;

b. Provides the most responsible funding levels for the benefit security of plan members;

c. Achieves an appropriate balance of intergenerational equity (does not unduly "kick the can down the road"); and

d. Moves the System toward attaining and maintaining actuarial soundness, as required by the Louisiana Constitution.

Process for Setting the Pension Return Assumption

We follow a robust and disciplined process for setting the return assumption (including the inflation assumption). The process includes these elements:

1. Perspectives: Where Should Actuaries Look for Input?
2. Inflation Forecasts from *Independent* Experts.
3. Asset Allocation.
4. Investment Return Forecasts from *Independent* Experts.
5. Consensus of Multiple Independent Experts.
6. Appropriate Horizon.
7. Most Appropriate Return Assumption

Perspectives: Where Should Actuaries Look for Input on Return Assumptions?

This section on "perspectives" for return assumptions is similar, but not identical to, the previous section on perspectives for inflation assumptions.

There are two types of perspectives to consider when defending or determining an assumed rate of future net investment returns of a pension fund: Do we look more to historical rates to inform decision-makers; or more to forward-looking forecasts of the future? Secondly, do we look more to what other retirement systems are doing; or look more to what expert forecasters would expect for the System's own portfolio in the future?

Past Returns? Looking backwards at historical rates of return is not considered to be reliable supporting documentation for current pension actuarial assumptions of future net returns. Historical rates of return are viewed more as information, than used to defend or determine a current net return assumption. The past is indeed useful for understanding historical relationships among various economic forces and various statistical metrics such as standard deviations, correlation coefficients and P/E ratios; but even those have been known to change over time and may be different from their historical averages.

The current economic environment is not like the past 10, 30, or 50 years; and the future economic environment is certain to be different from the past. The role of the Federal Reserve Board and other factors are different than they used to be years ago. The System's portfolio and its managers are not even the same now as they were in the past; nor will they be the same in the future as they are now.

A forward-looking perspective should drive the defense or determination of a net return assumption for pension actuarial valuations. Strategically selecting historical returns (an X-year period ending on Y-date) to justify a return assumption being applied to the next 10, 20, or 30year period is not valid.

Therefore, historical returns for this System or investments in general have minimal relevance to us. We chose instead to develop our net return assumptions based on *forward-looking* forecasts from subject matter experts, then apply this System's own characteristics to arrive at a final assumption.

Other Retirement Systems? Looking to what other peer retirement systems are assuming for future investment returns is generally not a well-placed focus.

While it may be interesting, even important, to know what investment return assumptions are used by other large public sector retirement systems, that information is not useful for discharging our duties for adopting a net investment return assumption for the System's actuarial valuation. It is not useful for actually informing us concerning the economic forecasts applicable to this valuation.

a. *Different Environments*. Public retirement systems across the United States each have their own politics, environments and sets of agency risk. Their assumption-setters may not have adhered to mainstream and objective forecasts of experts, but may have been influenced by budgets, protectionism, and politics. These are not best practices to be emulated when setting assumptions. Since it is impossible to determine which retirement systems applied a robust, analytical process and which were more influenced by budgets, we felt it best not to select the return assumptions based on what other retirement systems assume.

b. *Different Asset Allocations*. Other retirement systems are certain to have different asset allocations than this System, either more aggressive or less aggressive. That would make it a false comparison. A system's own table of asset allocation targets is a major input factor into the selection process.

c. *Different Horizon*. Other retirement systems may have been influenced by their consultants advocating a long-term horizon for the net investment return assumption. This is fairly common, but as discussed below, a mid-term horizon (or a blend) is more appropriate for the reasons stated. A single equivalent rate between the mid-term consensus and the longer-term consensus, derived from a system's own respective cash flow demands, may be the most appropriate return assumption.

Looking at other retirement systems is important and useful for knowing what others are doing; but is not appropriate as a driving factor in defending or determining a return assumption for this retirement System.

Expert sources of investment return forecasts (from large, independent, unbiased and, reputable investment forecasting firms) are the best places to look for input when setting a return assumption for pension valuations. These are much more objective and unfiltered sources, directly from the experts themselves, to guide decision-makers.

Adopting a *process* that looks to a consensus of external and independent subject matter experts' forward-looking forecasts is the best way to avoid the political and budget pressures that sometimes distract or influence assumption-setters away from our primary duty to set a return assumption as the most appropriate rate of future earnings of the portfolio.

Asset Allocation

It has been generally accepted for many years that a fund's asset allocation is responsible for the vast majority of a fund's investment performance. Therefore, the asset allocation of the System is a core element in setting and evaluating assumed future returns.

We relied on the 9 target asset allocation percentages set forth in the System's formal Investment Policy Statement last updated May 16, 2019.

MERS 2019 Target Asset Allocation			
Risk-oriented Assets		**Fixed Income Assets**	
Domestic Equity	30.0%	U.S. Core Bonds	20.0%
Developed Market Equity (Intl)	13.0%	TIPS	7.0%
Emerging Market Equity	10.0%	High Yield	6.0%
Core Real Estate	6.0%	Foreign Bonds	5.0%
Private Debt	3.0%		
		Total Fixed Income Assets	*38.0%*
Total Risk-oriented Assets	*62.0%*		
		Total Asset Allocation	*100.0%*

Source: Current MERS Investment Policy Statement (dated May 16, 2019)

Input from Independent Experts

We applied the target asset allocations to the expectations in the GRS Survey of 14 major national investment consultants and forecasters.

External Forecasters

These 14 firms are independent of the LLA and GRS. This way, all parties can be assured there is no real or perceived agency risk or bias in the selection of the most appropriate return assumption by the LLA.

All 14 investment consultants/forecasters provided GRS with their mid-term (10 years) horizon forecasts, and six of them provided GRS with their longer-term (20 to 30 years) horizon forecasts. Given the brevity of the descriptions of the asset classes identified, our mapping of the fund's asset classes to the investment consultant's asset classes may not be exact.

Listed below are the national firms in our 2019 GRS Survey. These are very large and reputable investment consultants and forecasters.

Participating Investment Forecasters			
Aon/Hewitt[IC]	Blackrock[IM]	BNY/Mellon[IM]	Callan[IC]
Cambridge[IC]	J.P. Morgan[IM]	Marquette[IC]	Meketa[IC]
Mercer[IC]	RVK[IC]	NEPC[IC]	Summit[IC]
VOYA[IM]		Wilshire[IC]	

[IC] *In the top 25 largest investment consultants, according to the most recent survey from P&I.*
[IM] *In the top 75 largest investment managers, according to the most recent survey from P&I/WTW.*

Number of Experts

A caution is in order against including too many in the consensus survey. GRS includes 14 large forecasting firms, with large research staffs, robust methodologies and peer accountability.

If the number of firms in the survey were too high, it would include firms with smaller research staffs, much less robust methodologies and less peer accountability. Furthermore, smaller firms often rely on some of the same research information and forecasts developed by the larger firms and, therefore, create overlap in the survey.

Methodology

The LLA adopts a methodology that minimizes "mapping error" and selects experts for inflation forecasting separate from investment return forecasting:

1. *Mapping error* refers to the slippage that sometimes occurs when mapping asset allocations from one list of asset classes to another. Not all asset class lists are identical. For example, one list might include international debt while another might fold its holdings in international debt into an asset class called merely core fixed income. A reasonable proxy must be substituted. This creates some amount of uncertainty in the process.

   The LLA minimized this mapping error by using only a single mapping.

   Other methodologies first create a standardized set of asset classes and map all forecasters' asset classes into this single standardized list of asset classes. The *first source of mapping error* occurs when each such standardized asset class is assigned a composite expected arithmetic return, a composite standard deviation and a composite expected geometric return (without the original connection between arithmetic return and standard deviation) from those forecasters who all have different lists of asset classes. A *second source of mapping error* arises from trying to create a single standardized composite set of correlation coefficients across mismatched sets of asset classes. These two sources of mapping error distort each forecaster's original capital market assumptions and their own considered relationships among asset classes. Then a *third source of mapping error* occurs when a system's own asset class list is mapped to the standardized set of asset classes with their composite expected returns, standard deviations and correlation coefficients.

The methodology employed by the LLA maps the System's asset allocation directly to each of the 14 forecasters' asset classes separately, without the interim steps discussed above, thereby preserving the integrity of each such forecaster's capital market assumptions' inter-relationships. This methodology also generates useful information about what each forecaster would say is their own expectation of the System's portfolio returns in the future.

2. As described in detail in Appendix B, the LLA turned to professional inflation forecasters for estimates of future inflation rates for this actuarial valuation report. Investment consultants and managers all have some expectations of future inflation, and usually include those expectations in their capital market assumptions for their investment forecasts. As mentioned previously, while investment forecasters are one source for inflation forecasting, they are not considered the best source.

   Economists are the best source of inflation forecasting. Economists often specialize in a wide range of subtopics (labor markets, tax revenue, etc.). Economists who publish inflation forecasts (specialists) are the best sources, not investment consultants.

Independent Experts' Forecasts for MERS

We mapped the System's most recent target asset allocation to each of these 14 investment forecasters' expected returns by asset class.

We replaced the mid-term investment forecasters' respective mid-term inflation assumptions with 2.16%, our preferred mid-term assumption based on the consensus of expert inflation forecasters' expectations presented above in order to normalize for a consistent inflation assumption across all forecasters.

Likewise, we replaced the long-term investment forecasters' respective long-term inflation assumptions with 2.25%, our preferred long-term assumption based on the consensus of expert inflation forecasters' expectations presented above in order to normalize for a consistent inflation assumption across all forecasters.

This process results in normalized expected returns for any one given year in each of the two forecast horizons (mid-term and long-term). These are called the expected arithmetic returns. Finally, we reduced the resultant one-year arithmetic returns for volatility drag in the compound return expected over time, because pensions are all about compounding in a volatile environment over the horizon. These are called the expected geometric returns, or 50^{th} percentiles.

Below are the results of this process for the mid-term horizon.

Investment Forecaster	Distribution of 10-Year Compound Average Percentile Expectations 40th	50th	60th	Probability of exceeding 7.00%
(1)	(2)	(3)	(4)	(5)
1	3.51%	4.45%	5.40%	24.96%
2	4.24%	5.14%	6.04%	30.23%
3	4.50%	5.45%	6.42%	34.32%
4	4.92%	5.67%	6.43%	32.87%
5	5.23%	6.03%	6.84%	38.12%
6	5.16%	6.06%	6.97%	39.66%
7	5.06%	6.07%	7.10%	40.94%
8	5.16%	6.12%	7.08%	40.85%
9	5.22%	6.21%	7.21%	42.10%
10	5.37%	6.28%	7.19%	42.00%
11	5.63%	6.51%	7.40%	44.48%
12	5.70%	6.53%	7.37%	44.38%
13	5.93%	6.82%	7.72%	48.00%
14	6.16%	7.02%	7.89%	50.24%
Average	**5.13%**	**6.03%**	**6.93%**	**39.51%**

There are three important takeaways from this exhibit:

a. Over the mid-term horizon, the range of expert expectations of the 50th percentile of compound average return runs from 4.45% to 7.02%.

b. The 50th percentile consensus expert mid-term forecast is 6.03%.

c. The consensus of these experts is that there is only a 39.51% chance of achieving at least the current 7.0% over the mid-term horizon. This does not mean a 39.51% chance of achieving the 7.0% assumption in any year during the horizon; it means that the compound return over the next 10 years has a 39.51% of achieving at least the 7.0% assumption.

This is why, actuarially speaking, the 6.03% rate of return is the preferred assumption for a mid-term horizon because it is the 50th percentile expectation of compound returns over a mid-term horizon. The consensus is that there is a 50-50 chance of returning at least 6.03% when compounded over the next 10 years.

Applying a similar process to longer-term forecasts (averaging 26 years) results on a consensus average of 6.73%.

However, as discussed in a later section, we do not have to choose between the mid-term and long-term horizons. That most appropriate return is somewhere in between the two horizons, derived by recognizing the plan's own expected benefit stream.

A new pension plan with very little in benefits paid until the third decade can comfortably use a

long-term horizon. But a mature pension plan, like MERS, with a large proportion of its future benefits expected to be paid in the first decade or two should adopt a return assumption that is closer to the mid-term than to the long-term. This derives from basic actuarial principles.

Refer to the Appendix D below on the appropriate horizon and recognition of cash flow for more actuarial details.

Consensus of Multiple Independent Experts

Rather than rely on just one or two experts, we follow conventional wisdom and track the consensus (average) of several expert forecasts.

It matters not whether the field of forecasting is for hurricanes, earthquakes, elections, or inflation and investment returns, a *consensus average* of many reputable experts is proven to be more reliable than any one of those experts.

This ensures the final selection of the return assumption is consistent with the mainstream consensus of reputable national experts.

As described in the section above on "Perspectives: Where Should Actuaries Look for Input on Return Assumptions," it is more important to be in (a) the mainstream of what forecasting experts say about this System's portfolio than to be in (b) the mainstream of what other retirement systems say about their own systems.

APPENDIX D
HORIZON AND CASH FLOW CONSIDERATIONS FOR THE NET INVESTMENT RETURN ASSUMPTION

Appendix D: Horizon and Cash Flow Considerations for the Net Investment Return Assumption

It is often said that projecting pension costs is a long-term proposition. Forecasts of future inflation and future returns come in short-term horizons (1-5 years), mid-term horizons (5-10 years), and longer-term horizons (20-30 years). Long-term forecasts are appealing and tempting, usually producing higher returns than mid-term horizon forecasts.

While it may be argued that reliance should be placed on the longest-term horizons, there are at least four compelling reasons not to do so:

Reason #1: Underperformance in the Mid-term is Not Sustainable.

If the forecasting experts are right, there may be a decade or two of lower pension plan returns, with a need for very high returns thereafter if their longer-term forecasts are to hold up.

For example, in correspondence dated May 6, 2016, the U.S. Treasury Department denied the application of the Board of Trustees of the Central States, Southeast and Southwest Areas Pension Plan for rolling back benefits under the Multiemployer Pension Reform Plan Act of 2014 in order to avoid insolvency. One of the reasons given in the ruling[1] was that the 7.5% and other embedded return assumptions were "significantly optimistic" and were "not reasonable." More specifically, the ruling stated that the return assumptions used to support the application were not reasonable or appropriate for the purpose of the measurement, did not take into account relevant current economic and investment forecast data, and had significant bias by being significantly optimistic. This three-fold denouncement was made primarily on the basis of the assumption's failure to recognize the lower expected returns in the first 10 to 20 years of the longer term horizon.

Even though pensions are long-term propositions, we live in a short-term and mid-term world. We should not need to wait 20 or 30 years to be vindicated for an assumption for which we have so little confidence in anyway. In *The Tract on Monetary Reform (*1923), John Maynard Keynes said, "*But this long run is a misleading guide to current affairs. In the long run we are all dead. Economists set themselves too easy, too useless a task if in tempestuous seasons they can only tell us that when the storm is past the ocean is flat again.*" Many financial economists, many in the press and many academics are calling for much lower investment return assumptions. The optics are not good for continuing to hold to a long-term horizon of 20-30^{+} years, when so many mid-term years are forecasted by the experts to be underperforming against the long-term.

Repeated underperformance (for the next decade or so) of actual returns compared to the assumed return undermines the confidence in defined benefit plans. If the experts are right about the next 10 years but the return assumption is significantly higher, legislators and taxpayers might insist on a retirement plan that transfers the investment risk onto the members. Repeated increases in contribution rates and repeated additions to the unfunded actuarial liability may not be tolerable.

It is better to be more conservative in the return assumption over the mid-term time horizon while experts are forecasting lower compound annual returns.

[1] https://www.treasury.gov/services/Responses2/Central%20States%20Notification%20Letter.pdf

Reason#2: Over-reliance on Reversion to Mean Returns.

Long-term investment return forecasts (20-30 year horizons) often use a different methodology than mid-term forecasts. They often rely on the concept of "reversion to mean returns." While almost everything about the future is not known for certain, at least two things are known for sure – (1) The long-term picture will not be like the past and (2) Neither will the steps leading through it. Reversion to mean returns depends on the future environment being like the past.

The number of heads we see in an unbiased coin-flip experiment exhibits reversion to the mean. Given a large enough number of coin-flips, we can reasonably expect the future number of heads to be approximately the same as in the past (half the number of coin-flips), because the coin is unbiased and the future is very much like the past. This cannot be said of investment markets.

This weakness of long-term forecasts is not, by itself, sufficient to *disregard* experts' long-term forecasts of the future entirely. But it should inform us not to rely on it to the exclusion of mid-term forecasts.

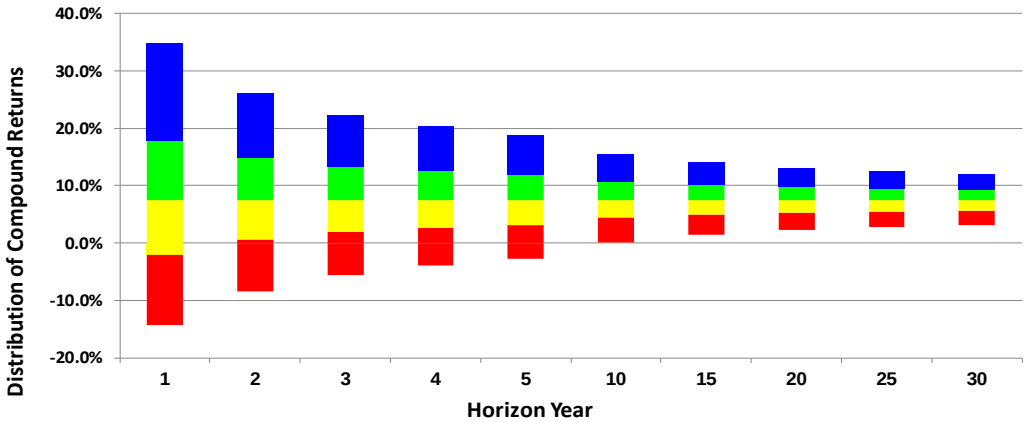
Reason #3: Return Forecasts Over a Longer-term Horizon are the Less Reliable.

There is less certainty in the longer-term forecasts. Conventional risk management says that in the face of uncertainty, investors become more conservative. Thus, decision-makers should consider being more conservative than the longer-term forecasts because the longer-term forecasts are more uncertain. This is a principle in any forecasting profession, whether investment forecasting, election forecasting or hurricane forecasting. Longer-term forecasts are less reliable than mid-term forecasts.

There are two types of statistical error in forecasting –

1. Error around the mean (some have called this "risk") and
2. Error in the mean (and some call this "uncertainty").

Consider the following graph of the expected dispersion of forecasted compound returns around the forecasted compound mean. This shows that the compounded error around the compounded mean decreases over time. This is a common graph. But that type of error is not the one that brings the most uncertainty.



This dispersion graph *presumes* we know for certain what the statistical mean is for the ever-varying future investment returns, and illustrates merely what we think about how the varying returns will behave around that anchor-mean. The biggest uncertainty, here, is that no one knows for certain what the anchor-mean will be.

Many unexpected events will happen in the future that will throw off the anchor from our *presumption*. Even though the experts are reasonably accurate about the dispersion around the mean, they are likely to be off for their expectation of the future mean.

Many more things can insert themselves into our future over the next 30 years than over the next 10 years. So when we say, "*Return forecasts over a longer-term horizon are the less reliable,*" we do not refer to the dispersion illustrated in this graph (which might be misunderstood as proving the opposite). We are referring to how confident (or not) we are in the mean itself.

We can mitigate some of the uncertainty by aggregating the opinions or several experts as to what the long-term compound annual return will be, i.e., calculate the average (or consensus) of their forecasts. However, the consensus of long-term forecasts is still more unreliable than the consensus of mid-term forecasts. There will be many events in years 1-10 that will undermine the mid-term outcome, making the final result either higher or lower than the mid-term consensus forecast. But add other 20 years on top of that (years 11-30) and many more events can insert themselves in years 11-30 to undermine any such long-term forecast.

Reason #4: The System's Own Cash Flow Demands.

Possibly the most compelling reason *not* to accept the long-term forecasts without regard to the mid-term forecasts is a purely actuarial reason. It is fundamental in setting actuarial assumptions to incorporate (explicitly so) a retirement system's own characteristics into the process.

- The most obvious factor is to incorporate a system's own investment policy's asset allocation, as required by ASOP 27 Section 3.8.3(a). It is an actuarial weakness to either select or defend a system's return assumption without explicitly incorporating the fund's own asset allocation into the math.

- Secondly, a system's own cash demands upon the fund should explicitly be incorporated into the assumption-setting math, as required by ASOP 27 Section 3.8.3(f). The timing of when benefit and expense payments place a drain on the fund affects how much the fund should be expected to earn while those assets are still in the fund.

Experts currently forecast investment returns to be lower over the mid-term horizon (say, years 1-10) than over the long-term (years 11-30). They generally expect the later years to boost the compound average over 30 years compared to the compound average over the first 10 years.

Cash Flow Hypothetical #1: Consider a newly formed retirement system (system A), which is expected to pay very little in benefits over the mid-term horizon and most of its benefits beginning in year 25. Consider another retirement system (system B) that is a "mature" retirement system. This is not so extreme, but actually quite common. A mature retirement system is expected to pay a significant amount of its current accrued and projected benefits over

years 1-10. Mature retirement systems often pay out more in benefits than they take in from contributions (from employees, employers, or other sources). Refer to Appendix F for statistics demonstrating that MERS is a mature plan.

Retirement system A can comfortably adopt a longer-term horizon for its expected investment return assumption because it has a long time to make up for the lower earnings that are expected in the mid-term (e.g., years 1-10) before it has to actually pay benefits out of the fund.

A large portion of retirement system B's current assets will not be around in years 11-30. They will be paid out of the fund over the next 1-10 years. Those assets will be earning only what is available in the marketplace over the next 1-10 years. They will not be around to make up for the lower earnings that are expected in the mid-term (e.g., years 1-10).

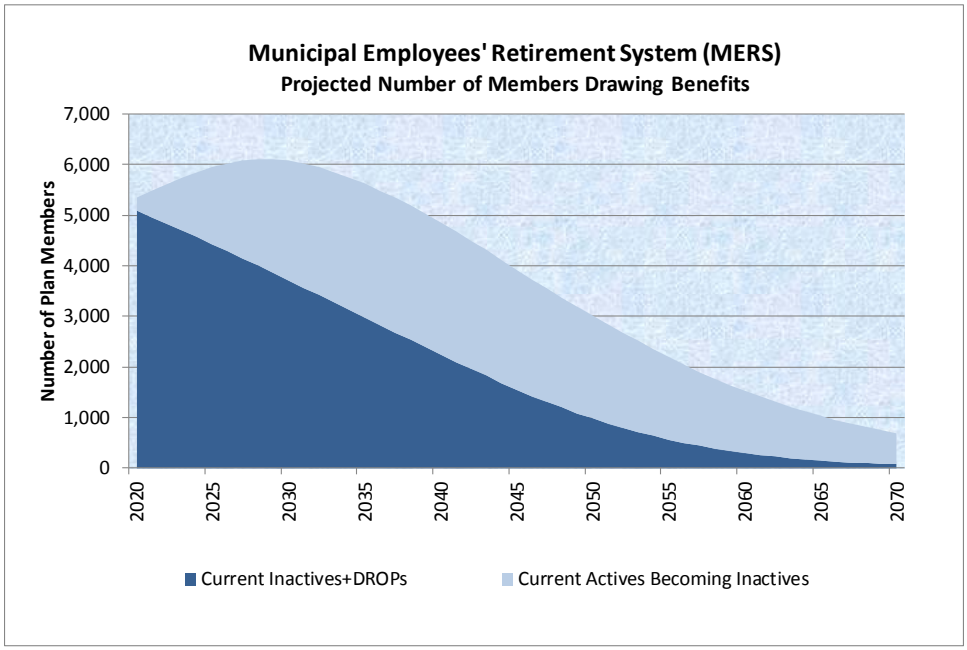
Cash Flow Hypothetical #2: Consider a state-run program that has been operational for 50 years and is fully expected to continue in operation. It is a "long-term proposition" (as is often said to describe pension systems). Since inception, this program has received a large infusion of capital at the beginning of each of the past 10-year periods, then pays disbursements every month until the end of the 10-year period when the assets are depleted. This infusion and payout occur in each 10-year period and are expected to continue in the same pattern.

While this hypothetical program is a long-term proposition, long-term expected rates of return should not be employed in forecasting future returns. The program's cash flow must be considered in estimating future returns.

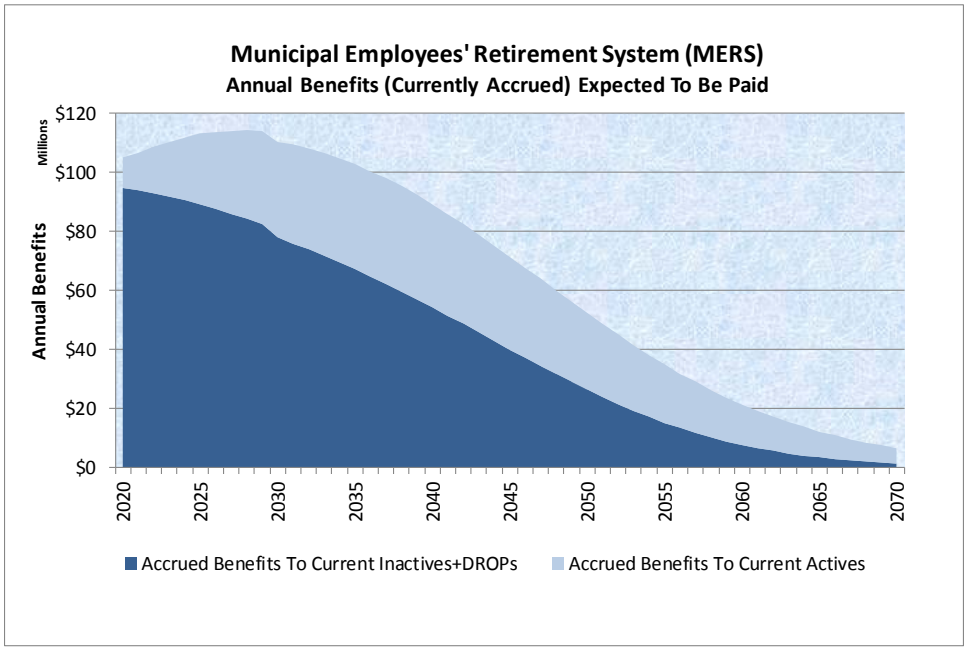
Even if one were to accept a long-term horizon for setting return assumptions (which we do not), in disregard of the first three arguments outlined in the immediately preceding pages, he or she would need to take into account the systems own benefit demands and adopt a return assumption somewhere between the mid-term and long-term expectations, so as to recognize the investment horizon or timetable for the benefit payments to be made over the next 10 years.

Furthermore, even the benefits expected to be paid out in years 11-20 will not be around for those last 10 years (years 20-30) and the first 10 years of earnings will drag down their average compounded return for the time remaining in the fund (years 1-20).

There is a not-so-complicated actuarial projection of a retirement system's future benefit demands. Consider the following graphs illustrating these points.

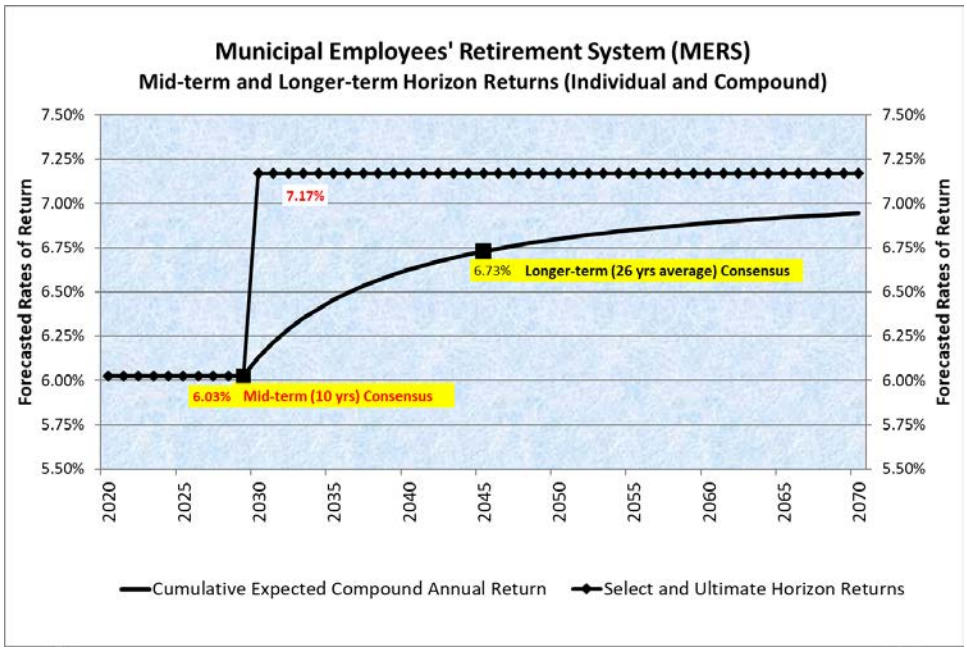


More than 5,000 current retirees are drawing benefits and will continue to do so until death. More retirees will be added to the roll from current active employees retiring in the years ahead, and then they will continue to receive benefits until death.



Currently, over $90 million per year in benefits are being paid to current retirees. Their benefits will continue until death. More benefits will be paid to current active who will retire in the years ahead. This, of course, is the purpose of retirement systems – to pay benefits to retiring public servants.

Benefits and expenses paid are expected to continue exceeding the contributions made from employees and employers (i.e., negative cash flow). The cash demands upon the fund need to be recognized in setting or defending the return assumptions.

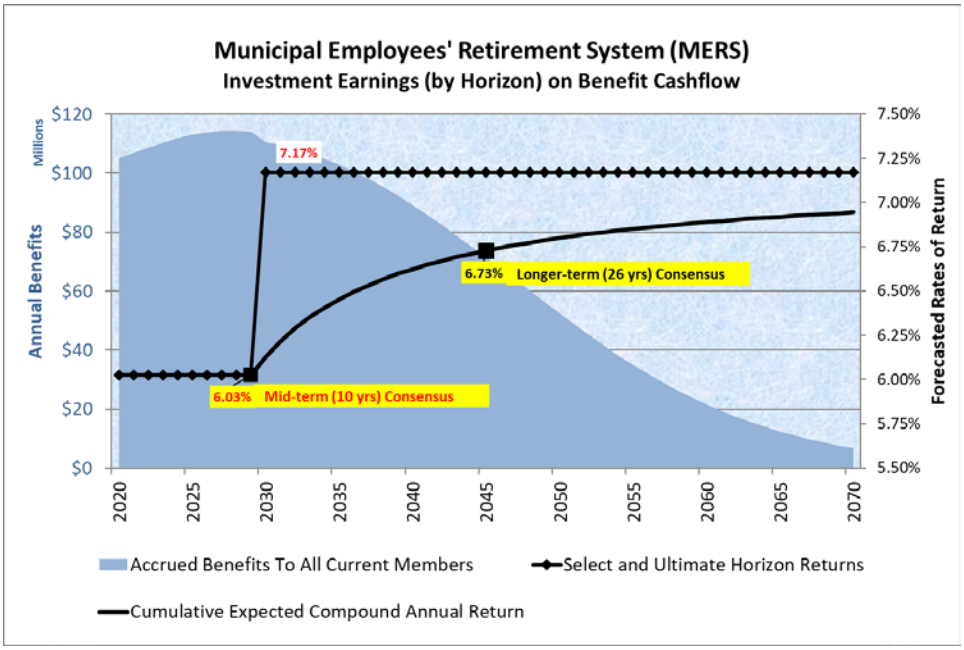


As presented previously in Appendix C, the consensus 50th percentile expectation for the compound annual returns over the next 10 years (years 1-10) is 6.03%, and over the full 26 years (years 1-26) it is 6.73%. In order for the 26-year average to be 6.73%, the returns during each of the years 11-26 need to be 7.17% (in order to make up for drag in returns for years 1-10).

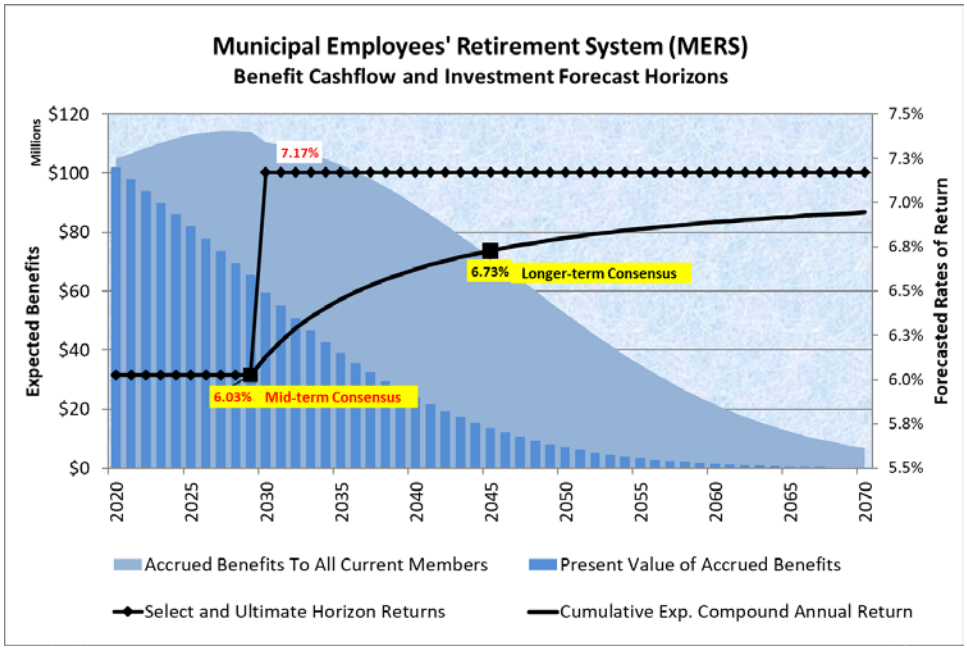
The curved line from 2029 through 2070 represents the cumulative compound average returns at each point, comprised of returns of 6.03% per year for years 1-10 compounded with returns of 7.17% each year thereafter. Notice at 26 years, the compound average return is the forecasted 6.73%.

This separate forecast of returns for years 1-10 and years 11-30 is necessary to measure the earnings generated by the fund's current assets from the valuation date through the year when the benefits are expected to be paid.

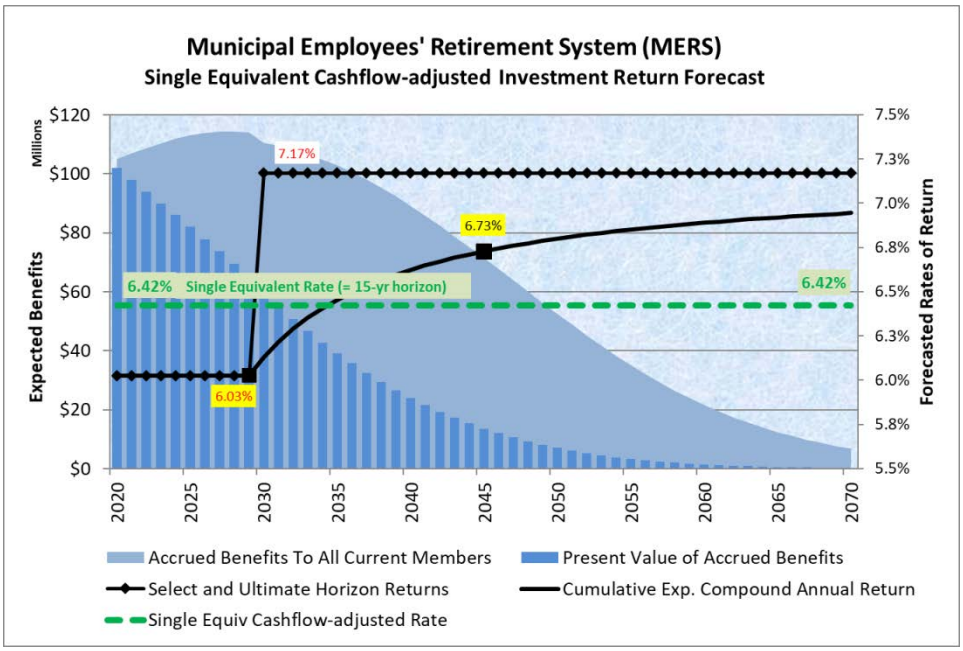
The graph below overlays the total annual benefits (accrued to current retirees and current actives becoming retired) to illustrate the time when the benefit assets are still in the fund.



The graph below overlays the present value (dark blue region) of those annual benefit payments to illustrate the effect in terms of current dollars, i.e., current assets that will ultimately pay those benefits (light blue region). Again, the current assets that will pay these expected benefits for years 1-10 will only be earning 6.03% per year, while assets that will pay the benefits for years 11-20 will be earning only 6.03% for years 1-10 and 7.17% for the balance of years until payment.



Recognizing the System's own benefit demand timing and the different earnings expectations over years 1-10 versus years 11-26, the single equivalent net investment return on all assets used to pay these benefits is 6.42%.



We tested this same procedure with projected benefits (not just accrued) and with new hires (not just current members). The result was very little difference. Adding those other two benefits streams does not move the needle much.

All of these last several pages demonstrate how inappropriate it is to simply adopt a 30-year horizon for setting the net investment return assumption for an actuarial funding valuation.

To summarize, adopting a return assumption should incorporate in an explicit manner:

1. A retirement system's own investment policy (target asset allocation) and
2. A retirement system's own expected benefit stream.

Notice the horizon associated with the single equivalent expected return is 15 years. Therefore, the mid-term forecast consensus should have a strong influence over the final assumption that incorporates the system's own cash benefit demands.

Some might argue, based on the first three compelling reasons not to consider long-term horizon forecasts at all, i.e., that the 6.03% consensus of 10-year expectations is even more appropriate than the 6.42% single equivalent return assumption. There is merit in that position for those three compelling reasons.

The LLA chose to use a rounded-down assumption of 6.40% as the "most appropriate" return assumption.

Appendix E
Measuring Future
Gain-Sharing Cost-of-Living Benefits

Appendix E: Measuring Future Gain-sharing COLA Benefits

Cost-of-living adjustment (COLA) benefits derived from investment earnings above the valuation rate are commonly called "gain-sharing" COLAs. This term "gain-sharing" derives from plan provisions that "share" investment gains with members rather than using them, as is typically done, to help pay (indirectly) the employer's required contribution. But there is a cost to that "sharing." Measuring that cost is the subject of this Appendix E.

MERS does not currently include the value of future COLA-grants in its measurement of costs and liabilities. Future COLAs are currently recognized in the calculations of costs and liabilities only after they are granted. However, the System's retirees are likely to receive COLA benefit increases with some regularity. This likelihood comes from the workings of the relevant state statutes coupled with the tendency of board members to grant COLAs whenever permitted in accordance with the statutory template. Consider the following internal and external forces at play, which tend to press board members to recommend and approve COLAs when permitted:

a. We recognize there is pressure to keep benefits and contributions down, especially from municipal and state representatives. However, there may be considerable pressure to grant COLAs to retired plan members, especially when one has not been granted in several years and when there is a mechanism for it.

b. The template was designed to prevent benefit increases during periods when investment returns fall below expectations or the system falls below certain thresholds. Governing bodies may be more likely to grant COLAs when permitted, knowing that the legislative framework protects them from jeopardizing system's financial security.

c. When the MERS pension fund has better-than-expected investment gains, board members may feel pressure to "share" those gains with retired plan members by way of the gain-sharing COLA program. That is the purpose of the program. Generally speaking, board members may feel beholden to plan members to provide them benefits they might feel entitled to.

d. All Social Security recipients receive regular and guaranteed cost-of-living increases. But MERS plan members do not, generally, participate in Social Security. As a result, MERS is their only source of increases to help protect them from erosion of their purchasing power during retirement. This may enhance the pressure on board members to grant a COLA whenever permitted to do so under the statutory rules. Under the current assumptions, COLAs for MERS retirees are expected to lag behind the adjustments provided to Social Security recipients even if granted as frequently as permitted by the template.

e. Whenever other state and statewide retirement systems grant COLAs, it may embolden MERS plan members to pressure MERS board members to grant a COLA if permitted. It is a "me too" phenomenon.

Following is a table that illustrates the recent history of the statutory conditions and board actions concerning the MERS COLA benefit program.

Appendix E: Measuring Future Gain-sharing COLA Benefits

COLA History for the Municipal Employees' Retirement System										
	Statutory Conditions for Gain-Sharing COLA Under:		Authorizing COLA Statute Pct and Recipients[2]		Authorizing Funding Deposit Account COLAs					
Actuarial Measurement Date	The Window Rule[3]	The Sufficient Actuarial Return Rule[4]	R.S. 11:1761(A) COLA [Up to 2% to All Elg]	R.S. 11:246 COLA [2% or Nothing, to Elg Over 65]	Balance in the FDA	FDA Balance Spent?	Amount Granted by Board	Date Approved by Board	Effective Date of COLA	Comments
6/30/2019	**Satisfied** (For YE 2020)	Not Satisfied (1.7% and 1.9% vs. 7.275%)	None Permitted [To All Eligibles]	None Permitted [To Elg Over 65]	$9,346,575 (Plan A) and $1,633,823 (Plan B)	NA	NA	NA	NA	None permitted for failure of Sufficient Investment Return
6/30/2018	**Satisfied** (For YE 2019)	Not Satisfied (2.8% and 2.7% vs. 7.4%)	None Permitted [To All Eligibles]	None Permitted [To Elg Over 65]	$8,930,139 (Plan A) and $1,523,023 (Plan B)	NA	NA	NA	NA	None permitted for failure of Sufficient Investment Return
6/30/2017	**Satisfied** (For YE 2018)	Not Satisfied (2.3% and 2.2% vs. 7.5%)	None Permitted [To All Eligibles]	None Permitted [To Elg Over 65]	$8,112,406 (Plan A) and $3,286,730 (Plan B)	Yes, to pay off Frozen UAL for Plan B	NA	NA	NA	None permitted for failure of Sufficient Investment Return
6/30/2016	**Satisfied** (For YE 2017)	Not Satisfied (0.8% and 0.7% vs. 7.5%)	None Permitted [To All Eligibles]	None Permitted [To Elg Over 65]	$8,421,235 (Plan A) and $3,233,725 (Plan B)	Yes, to reduce ER contributions	NA	NA	NA	None permitted for failure of Sufficient Investment Return
6/30/2015	**Satisfied** (For YE 2016)	Not Satisfied (3.7% and 3.5% vs. 7.75%)	None Permitted [To All Eligibles]	None Permitted [To Elg Over 65]	$7,833,707 (Plan A) and $3,008,116 (Plan B)	NA	NA	NA	NA	None permitted for failure of Sufficient Investment Return
6/30/2014[5]	**Satisfied** (For YE 2015)	Not Satisfied (5.8% and 5.6% vs. 7.75%)	None Permitted [To All Eligibles]	None Permitted [To Elg Over 65]	$8,930,139 (Plan A) and $3,126,521 (Plan B)	Yes, to reduce ER contributions	NA	NA	NA	None permitted for failure of Sufficient Investment Return

[2] Per R.S. 11:1761(A), the Board is authorized to provide a COLA of up to 2% of the original benefit to all eligible pensioners. Additionally, per R.S. 11:246, the Board is authorized to provide an additional COLA of 2% to eligible pensioners over age 65. No COLA may be provided during any fiscal year until the lapse of at least one-half of the fiscal year.

[3] Per R.S. 11:243, the Board may grant a benefit increase if any of the following apply: (1) the system has a funded ratio of at least 70% and has not granted a benefit increase to retirees, survivors, or beneficiaries in any of the three most recent fiscal years, (2) the system has a funded ratio of at least 80% and has not granted such an increase in any of the two most recent fiscal years, or (3) the system has a funded ratio of at least 90% and has not granted a benefit increase to retirees, survivors, or beneficiaries in the most recent fiscal year. The funded ratio as of any fiscal year is the ratio of the actuarial value of assets to the actuarial accrued liability under the funding method prescribed by the office of the legislative auditor.

[4] Per R.S. 11:1761(A), the Board is authorized to use interest earnings on investments of the system in excess of normal requirements to provide a COLA of up to 2% of the original benefit to all eligible pensioners. Additionally, per R.S. 11:246, the Board has the authority to provide an additional COLA of 2% to eligible pensioners over age 65 if there is sufficient excess interest earnings to fund the entire 2% additional COLA.

[5] The 6/30/14 valuation date marks the first year that Act 170 applies, after the trustees elected to be covered under R.S. 11:243 by 12/31/13.

Notice that this is not a pattern of no COLA granted out of six years. It is a pattern of six-out-of-six, considering that no COLA was granted in years when not permitted. The investment returns in the last six years were not sufficient to allow COLAs to be granted. *However, future investment returns will likely be sufficient in some years to allow COLAs to be granted.*

Management changes have also recently been made relating to the investments of MERS' plan assets. Based on these changes, future investment returns will likely be different than in the recent history and are expected to be sufficient to allow COLA grants on a more frequent basis.

In our opinion, there is a reasonable likelihood that the board will grant a COLA when permitted. It seems unreasonable to "assume" a 0% chance of granting a COLA in future years when otherwise permitted. Something is better than nothing.

In addition, the COLA provisions are in the Louisiana statutes for a reason: To pay COLAs – sometimes. The sponsors and other legislators presume COLAs to be granted periodically, even if only every few years. If not, these statutory provisions probably would not have been codified.

It is incumbent upon the actuary to recognize the possibility and likelihood that COLA benefits will be paid with some regularity, even if only every few years. That is why we believe the statutory provision is there. Failure to recognize (even if making only a rough estimate) material costs and liabilities of the statutes' COLA provisions is to deny the purpose of the statutes.

COLAs do not have to be guaranteed before adopting prudent advance-funding. COLA-granting does not have to be known with certainty in advance. Actuarial projections seldom ever involve certainties of future events. Traditional actuarial practice suggests that when benefits are material, actuarially measurable and reasonably likely, they should be recognized in advance in actuarial valuations of costs and liabilities. That serves to move the System toward attaining and maintaining actuarial soundness as required by the Louisiana Constitution, rather than merely adopting a pay-you-go policy.

The evidence leads us to conclude that, based on (a) the historical pattern inherent in the data (meager though it is) and (b) the common-sense likelihood, COLAs will be granted in years that the statutory template permits the board to grant one, and that COLAs will not be granted for years when the statutory mechanism would not otherwise permit the board to grant one.

It is clear that not recognizing future COLA benefits does not reflect the reasonable likelihood that COLAs will be granted in the future. Thus, in this valuation, all actuarially expected COLA benefits are assumed to be granted in accordance with the statutory template. This is a change in the actuarial assumptions from the previous PRSAC-adopted valuations.

The mathematical and logical rules set forth in the statutory template lend themselves to actuarial modeling. The frequency and magnitude of the future COLAs can be modelled actuarially using well-accepted techniques. Given the presumption that board members will grant COLAs whenever permitted by the statutes, it is actuarially appropriate to recognize the frequency and magnitude of future COLAs when performing an annual actuarial valuation of the System's costs and liabilities.

Even if the assumption were to be that the board of trustees would grant COLAs half of the time when permitted, that would be an improvement over the current practice. Again, something is

better than nothing. For the purpose of this actuarial valuation, the LLA adopts the assumption that a COLA will be granted to the extent they are permitted.

Furthermore, while the statutes permit COLAs to be funded with the balance in a Funding Deposit Account (FDA), it seems unlikely the FDA will be used for that purpose instead of "excess interest." A portion of the FDA was used to offset the remaining balance of the frozen unfunded accrued liability for Plan B as of June 30, 2018, and to reduce employer contributions for the fiscal years ending June 30, 2015, and June 30, 2017. Thus, if COLAs are to be granted for MERS, the more likely mechanism is by way of "excess interest" (i.e., "gain-sharing") described above.

Modeling Gain-sharing COLA Benefits

There are at least two preferred approaches to actuarially measuring the cost and liabilities of MERS' COLA provisions. Both preferred approaches use explicit, stochastic methods and involve running actuarial simulations of the future.

1. *Single equivalent annual COLA assumption.* The simulation spins off information about the frequency and magnitude of each year's permitted gain-sharing COLA. The mean (average) transfer amount can be considered a benefit stream. Solving for X, it determines what would be the single annual equivalent COLA, e.g., 0.35%, or some other such estimated equivalent annual COLA. Solve for the X% that has the same actuarial present value over the next 30 years as the average simulated transfer amount. In some systems, like MERS, it may be necessary to solve for two equivalent COLA rates if eligibility differs between segments of population.

2. *Single equivalent benefit load assumption.* Dividing that same mean (average) transfer stream for each year by its regular benefits projected to be payable for that year, as spun off from the open group forecast valuation, provides an estimate of the load (X%) on benefits that approximates the average transfer amount, e.g., 7% or some other such percent load.

Either of these two alternative *actuarial methods* is acceptable in our opinion. Both of these methods are transparent and explicit *actuarial methods* for recognizing the actuarially measurable likelihood of future gain sharing COLAs for funding purposes.

The first method presented above (single set equivalent annual COLA rates) provides a reasonable proxy for what would likely actually happen in the years to come. Members age 65 or older are eligible for COLA under two different statutes, while younger members may benefit only from one of them. Values of X% annual COLA to all eligible members and Y% to all eligible members over age 65 serve as an equivalent COLA assumption, and can be treated in the valuation "as if" these were regular annual COLA increases. The only challenge is to make a reasonable estimate of X% and Y% which scientific actuarial methods enable us to do.

Modeling Results for the First Actuarial Method

The first actuarial method (preferred) projects the expected streams of future gain-sharing COLAs using the investment-related assumptions adopted by the LLA.

The application of this explicit model stochastically generated net investment returns for the next 30 years, and did so 500 times (i.e., 500 trials). A total of 15,000 annual rates of return (single-year market rates) were randomly selected from a lognormal distribution with these parameters:

- A mean of 6.63% during years 1-10,
- A mean of 7.44% during years 11-30, and
- A standard deviation of 11.37% for years 1-30.

These lognormal parameters (arithmetic means - one year) are not to be confused with the 50th percentile expectations (geometric means - compounded) over similar time periods addressed in Appendices B through D.

The computer-generated market returns were used as the base input to the model which simulated the operation of the System's complex gain-sharing COLA program over time. The means were not the expected compound returns over time (as discussed in Appendices B and C), which is much lower and more appropriate for actuarial valuations. These means are the forecaster's consensus expectations for each one year standing on its own.

It assumes that every year for which the statutes permit a permanent benefit increase to be granted, it will be granted and will be the maximum allowed. The model built for this purpose includes the following primary steps, as well as numerous other intermediary tests and calculations:

a. Modeling future new hires and future actuarial valuations,
b. Modeling the markets and future rates of return using generally acceptable techniques,
c. Modeling the smoothed actuarial rate of return,
d. Modeling the maximum allowed on the COLA rate,
e. Modeling the frequency rules for granting a COLA, and
f. Modeling the amount of the COLA rate.

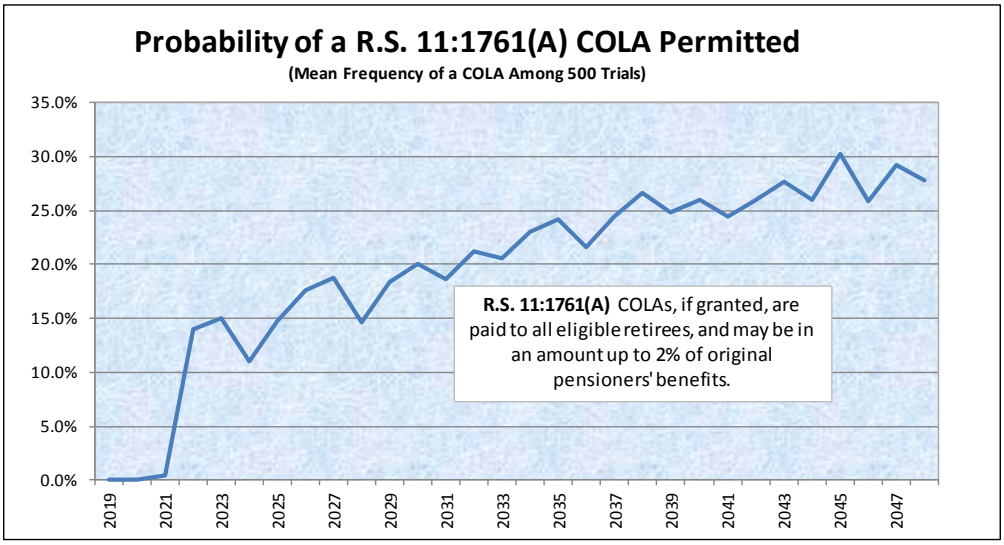
In some years, the model expects a COLA to be granted and in some years the model expects none. For each year in which the model expects a COLA, the amount can vary widely.

The mean (average) amount expected to be granted each year was captured and their present value calculated. *It was determined that an R. S. 11:1761(A) COLA of approximately 0.40-0.45% for eligible pensioners under the age of 65 and an R.S. 11:246 COLA of approximately 0.60%-0.65% for eligible pensioners age 65 or older would produce the same additional present value.* These are the fixed annual COLA rates (0.45%-0.65% used) that approximate the statutory COLA template.

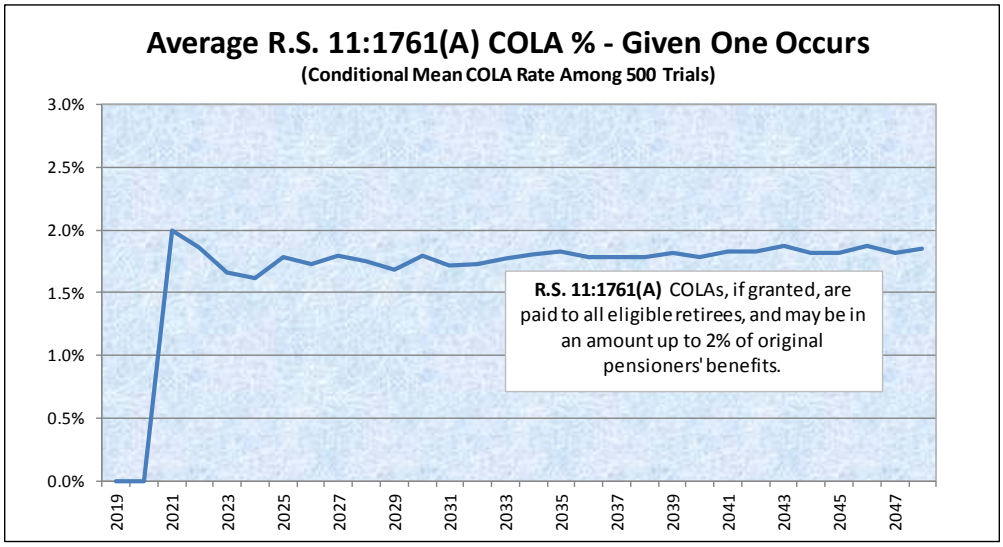
They are, therefore, considered the single equivalent COLAs this year representing the future working of the statutory gain-sharing mechanism.

R. S. 11:1761(A) COLA

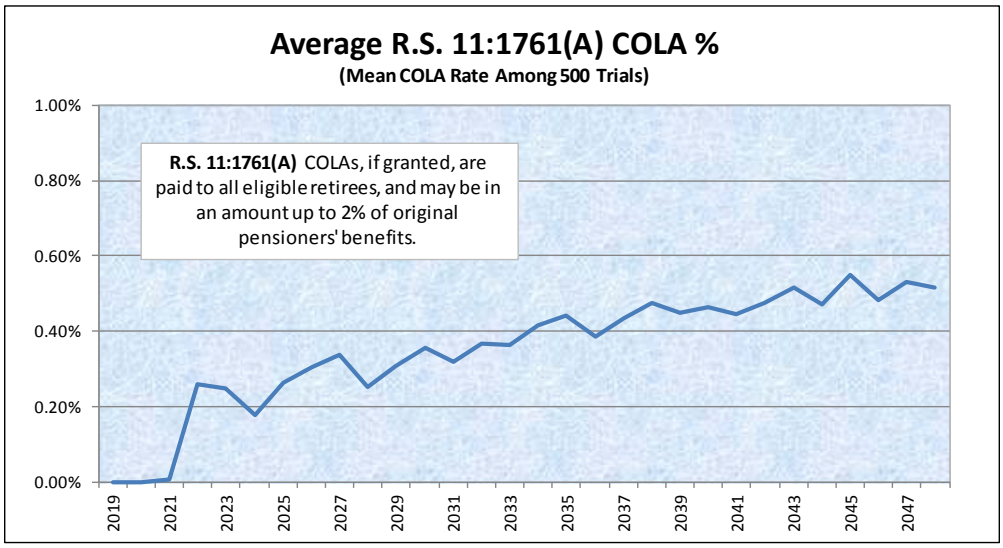
Consider the following graphs illustrating the results of the simulations in the stochastic model of MERS' gain-sharing COLA program under R.S. 11:1761(A).



Based on the graph above, the probabilities that a COLA described in R.S. 11:1761(A) will be permitted and granted each year lie mostly between 15% and 20% in each of the next 10 years, and lie mostly between 20% and 30% in years 11-30.



Based on the graph above, over the next 30 years, when an R.S. 11:1761(A) COLA is granted, according to the model, the percent increase will lie mostly between 1.7% and 2.0% of all pensioners' current benefits (averaging 1.8% overall). Recall that R.S. 11:1761(A) permits COLA up to 2% of benefits for all eligible retirees.

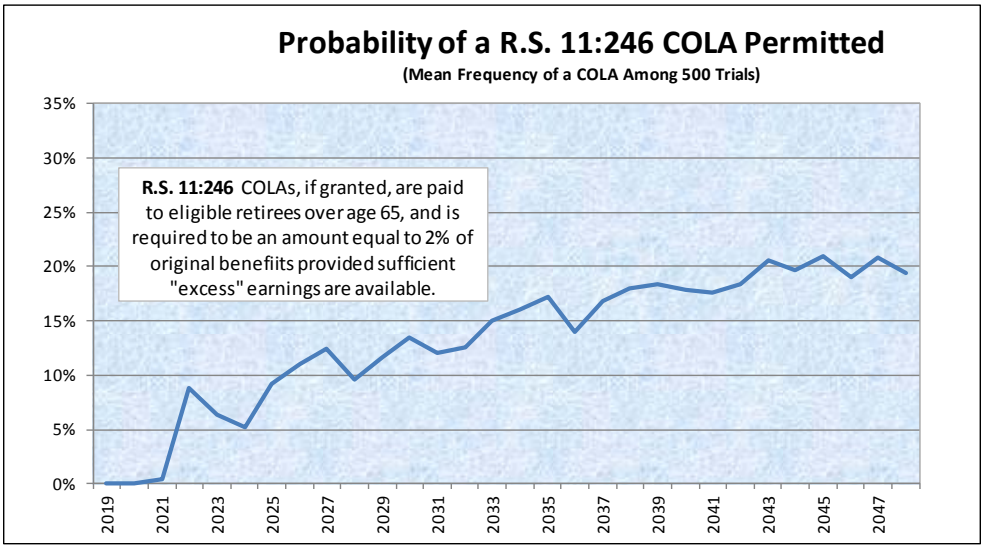


Based on present values of future expected COLAs averaging between 0.30% and 0.50%, the final assumption used in this first actuarial method is to include a fixed annual R.S. 11:1761(A) COLA of 0.45% as a reasonable approximation of the future workings of the actual statutory gain-sharing COLA template.

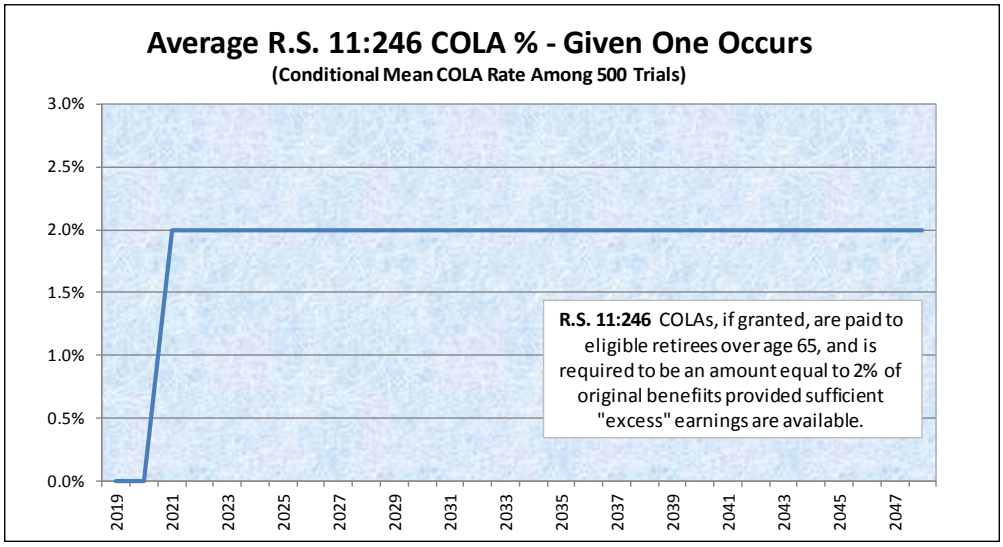
The frequency and amounts of gain-sharing COLAs for MERS are both (a) predictable and (b) material under R.S. 11: 1761(A).

R. S. 11:246 COLA

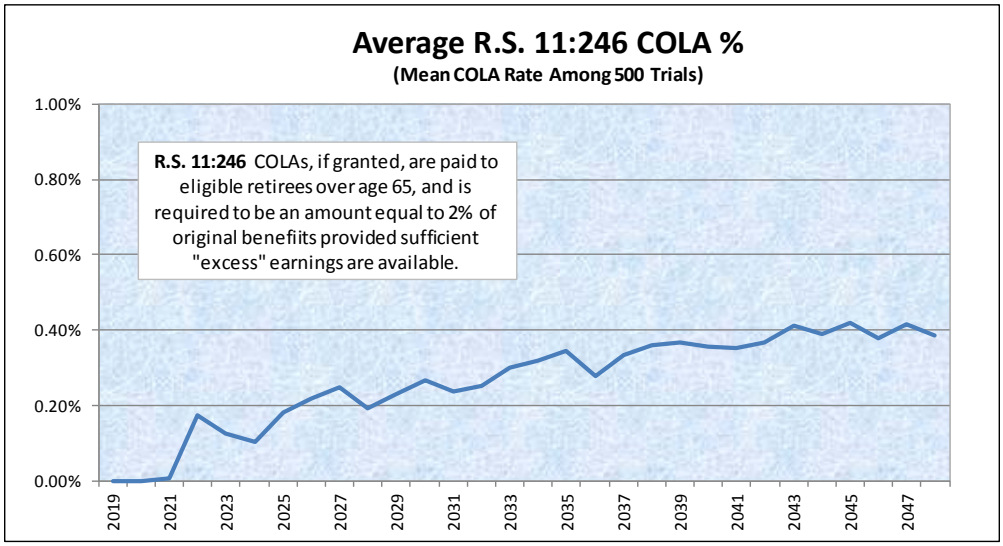
Consider the following graphs illustrating the results of the simulations in the stochastic model of MERS' gain-sharing COLA program under R.S. 11:246.



Based on the graph above, the probabilities that COLA described in R.S. 11:246 will be permitted and granted each year lie mostly between 5% and 15% in each of the next 15 years, and lie mostly between 15% and 25% in years 16-30.



Based on the graph above, over the next 30 years, when an R.S. 11:246 COLA is granted, according to the model, it will be a 2.0% COLA (by design; 2.0% of eligible pensioners' original benefits). Recall that R.S. 11:246 permits COLAs equal to 2.0% (and never less) of original benefits for all eligible retirees over age 65.



Based on present values of future expected COLAs averaging between 0.10% and 0.40%, the final assumption used in this first actuarial method is to include a fixed annual R.S. 11:246 COLA of 0.20% as a reasonable approximation of the future workings of the actual statutory gain-sharing COLA template.

The frequency and amounts of gain-sharing COLAs for MERS are both (a) predictable and (b) significant, under R.S. 11:246.

Compliance with Actuarial Standards of Practice

The method employed for recognizing the gain-sharing COLA benefits as described above complies with the Actuarial Standards of Practice.

According to Section 3.5.3 of Actuarial Standards of Practice No. 4:

> *Plan Provisions that are Difficult to Measure – Some **plan provisions** may create pension obligations that are difficult to appropriately measure using traditional valuation procedures. Examples of such **plan provisions** include the following:*
>
> *a. gain sharing provisions that trigger benefit increases when investment returns are favorable but do not trigger benefit decreases when investment returns are unfavorable;*
> *b. floor-offset provisions that provide a minimum defined benefit in the event a **participant's** account balance in a separate plan falls below some threshold;*
> *c. benefit provisions that are tied to an external index, but subject to a floor or ceiling, such as certain cost of living adjustment provisions and cash balance crediting provisions; and*
> *d. benefit provisions that may be triggered by an event such as a plan shutdown or a change in control of the plan sponsor.*
>
> *For such **plan provisions**, the actuary **should consider** using alternative valuation procedures, such as stochastic modeling, option-pricing techniques, or deterministic procedures in conjunction with assumptions that are adjusted to reflect the impact of variations in experience from year to year. When selecting alternative valuation procedures for such **plan provisions**, the actuary should use professional judgment based on the purpose of the measurement and other relevant factors.*

According to Section 2.1 of Actuarial Standards of Practice No. 1:

> *The words "must" and "should" are used to provide guidance in the ASOPs. "Must" as used in the ASOPs means that the ASB does not anticipate that the actuary will have any reasonable alternative but to follow a particular course of action. In contrast, the word "should" indicates what is normally the appropriate practice for an actuary to follow when rendering actuarial services. Situations may arise where the actuary applies professional judgment and concludes that complying with this practice would be inappropriate, given the nature and purpose of the assignment and the principal's needs, or that under the circumstances it would not be reasonable or practical to follow the practice.*
>
> *Failure to follow a course of action denoted by either the term "must or "should" constitutes a deviation from the guidance of the ASOP. In either event, the actuary is directed to ASOP No. 41, Actuarial Communications.*
>
> *The terms "must" and "should" are generally followed by a verb or phrase denoting action(s), such as "disclose," "document," "consider," or "take into account." For*

example, the phrase "should consider" is often used to suggest potential courses of action. If, after consideration, in the actuary's professional judgment an action is not appropriate, the action is not required and failure to take this action is not a deviation from the guidance in the standard.

Bold and underline have been added for emphasis and identification

Appendix F
Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contributions

Appendix F: Risks Associated with Actuarial Measurements

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

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

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

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

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

The computed contribution rates presented in this actuarial valuation report may be considered as a minimum contribution rate that complies with state statute. The timely receipt of actuarially determined contributions is critical to support the financial health of the plan. Users of this report should be aware that contributions made at the actuarially determined rate do not necessarily guarantee benefit security.

Plan Maturity Measures

Risks facing a pension plan evolve over time. A young plan with virtually no investments and paying few benefits may experience little investment risk. An older plan with a large number of members in pay status and a significant trust may be much more exposed to investment risk. This System is considered to be mature, requiring extra attention to various actuarial risks.

Generally-accepted plan maturity measures include the following:

Risk Measures	2019	2018	2017	2016	2015
Ratio of the market value of assets to total payroll	3.6	3.5	3.3	3.3	3.5
Ratio of actuarial accrued liability to payroll	5.5	5.3	5.2	5.1	5.2
Funded ratio	66%	65%	64%	63%	68%
Ratio of actives to inactives receiving benefits	1.5	1.6	1.6	1.6	1.7
Net cash in (out) flow: in millions	($3.2)	($3.4)	($5.5)	($8)	($11)
Ratio of net cash flow to market value of assets	-0.3%	-0.4%	-0.6%	-1.0%	-1.3%
Duration of the actuarial accrued liability	10.4	NA	NA	NA	NA

Ratio of Market Value of Assets to Payroll

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

Ratio of Actuarial Accrued Liability to Payroll

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

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

Ratio of Actives to Retirees and Beneficiaries

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

Ratio of Net Cash Flow to Market Value of Assets

A positive net cash flow means contributions exceed benefits and expenses. A negative cash flow means existing funds are being used to make payments. A certain amount of negative net cash flow is generally expected to occur when a plan is mature. Large negative net cash flows as a percent of assets may indicate a super-mature plan or a need for additional contributions. As a plan matures, it takes on more actuarial risk.

Duration of Actuarial Accrued Liability

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

Additional Risk Assessment

Additional risk assessment is outside the scope of the annual actuarial valuation. Additional assessment may include scenario tests, sensitivity tests, stochastic modeling, stress tests, and a comparison of the present value of accrued benefits at low-risk discount rates with the actuarial accrued liability.

Useful risk metrics include unfunded actuarial liability (and net pension liability), funded ratio (on actuarial value or market value basis), and actuarially determined employer contribution rates required.

APPENDIX G
PRESS CLIPPINGS FOR OTHER RETIREMENT SYSTEMS LOWERING THEIR RETURN ASSUMPTIONS (2015-2019)

Other retirement systems and state officials have characterized their decisions to lower pension return assumptions as being positive actions for plan members and taxpayers.

Appendix G: Press Clippings for Retirement Systems Lowering Return Assumptions

New Jersey

The New Jersey Pension Fund's assumed rate of return has been reduced to 7% from 7.65% by state Treasurer Ford M. Scudder, the second rate cut he has enacted this year. Mr. Scudder had cut the rate to 7.65% from 7.9% in February 2017.
"Given the current elevated level of asset values across the board, long-run expected returns have diminished, so it is appropriate to lower the assumed rate of return," Mr. Rijksen wrote [Willem Rijksen, a Treasury Department spokesman]. "Our actuaries have suggested doing so, and it is the unmistakable trend in public pension plans across the country."
Pensions and Investments Online (pionline.com), 12/22/17

The move increases the pension tab for state and local governments by more than $800 million for the fiscal year that begins in July, according to an NJ Advance Media analysis of state actuary reports released Tuesday. The change was praised by the pension fund actuaries, who say a 7 percent assumed rate of return is in line with other large funds and is a more conservative estimate of what pension investments can achieve over the long term. In contrast, assuming the investments will earn a high rate makes the pension fund look healthier than it really is and doesn't reflect the reality of the state's investment outcomes, actuaries say.
The state contributes less than what's recommended by actuaries. This year, it's expected to kick in about $2.5 billion, or half of what's recommended, and it is on track to contribute 60 percent next year.
NJ.com, New Jersey Online, 12/22/17

Notice a couple observations: (1) Down from 7.9% to 7.65% to 7.0% in 10 months, (2) The change will increase the contribution requirement by more than $800 million and (3) NJ is roughly tied (with Kentucky) for the worst-funded pension system in the country (30.9% in 2016) and has been contributing only about half the actuarially required contribution under their previously high return assumption, yet they did the "appropriate" thing and lowered the return assumption from 7.9% to 7.0%.
*Notice the **positive statements** about this decision: (1) "a 7 percent assumed rate of return is a more conservative estimate of what pension investments can achieve" (2) "Given the current elevated level of asset values across the board, long-run expected returns have diminished, so it is appropriate to lower the assumed rate of return."*

Kentucky

Since the last actuarial valuation, the Board adopted changes to certain economic assumptions for KERS, CERS and SPRS. Specifically, the Board decreased the price inflation assumption to 2.30% for all funds. The assumed rate of return was decreased to 5.25% for two of its pension funds, and to 6.25% for the three other pension funds and all the insurance funds associated with the systems.
2017 Actuarial Valuation Report

He admonished, "We need to use real numbers . . . We need to use actual data. We need to use true rates of return, and not hypothetical ones."
Huffingtonpost.com, 4/4/17, quote from Gov. Matt Bevin

"The most important function of our board is to give correct numbers to the legislature," Farris said. "If we don't do that, if we continue to rely on aggressively optimistic assumptions, then we will continue to fall behind.", Kentucky.com, 5/20/17, quote from board chairman John Farris

"We're trying to make the assumptions more realistic and from an investment standpoint, more in line with structure and expectations of the portfolios," Mr. Eager said.
pionline.com, 7/14/17, quote from Interim Executive Director David Eager

[State Budget Director John] Chilton said that Gov. Matt Bevin and state lawmakers believe it is important to embrace the revised financial assumptions. "No more pretending that everything is just fine," he wrote. "Everyone needs to understand the severity of the situation. To do otherwise will lead to solutions that fall short of solving the problem." Kentucky.com, 9/9/17

Note a couple observations: (1) Down from 7.5% to 6.35% for some plans and 5.25% for others and (2) KY is roughly tied (with New Jersey) for the worst-funded pension system in the country (31.4% in 2016), yet they did the "more realistic" thing and lowered the return assumption from 7.5% to 6.25% and 5.25%.
*Notice the **positive statements** said: (1) "The most important function of our board is to give correct numbers to the legislature", (2) "We're trying to make the assumptions more realistic and from an investment standpoint, more in line with structure and expectations of the portfolios,"*

Appendix G: Press Clippings for Retirement Systems Lowering Return Assumptions

Arkansas

The trustees last week voted to reduce the system's projected annual investment returns from 7.25 percent to 6.25 percent at the recommendation of actuary Gabriel, Roeder, Smith & Co. of Southfield, Mich., . . . [Gail Stone, executive director for the judicial retirement system,] explained that "10-year capital market predictions from a basket of 8 different public fund investment consultants did not support a 7.25 [percent investment] return, given the AJRS fund's very conservative asset allocation."
Arkansasonline.com, 8/14/15

*Notice the **positive statement**: The executive director wanted the return assumption to be consistent with the "10-year capital market assumptions of a basket of 8 different public fund investment consultants."*

New York

New York State Common Retirement Fund, Albany, is lowering its assumed rate of return to 7% from 7.5%. "Lowering the assumed rate of return is fiscally prudent and will better position the state pension fund for the future. This strategic decision is consistent with the tougher investment climate ahead."
pionline.com, 9/9/15, quote from Thomas DiNapoli (State Comptroller and sole trustee)

*Notice the **positive statements**: (1) Lowering it is fiscally prudent, (2) Lowering the return assumption will put the state pension fund in a better position for the future."*

California Teachers

CalSTRS on Wednesday approved lowering the pension fund's assumed rate of return to 7% from 7.5% over the next two years because of diminished capital market and inflation forecasts. Milliman, the board's actuarial consultant, last month had recommended a reduction to 7.25%, but also offered the board the option of a 7% rate of return.
The plan approved by the board of the $196.4 billion California State Teachers' Retirement System would lower the rate of return to 7.25% as of July 1, and 7% as of July 1, 2018.
The vote for the more aggressive reduction came at a meeting in San Diego after a report from one of CalSTRS' investment consultants, Pension Consulting Alliance, that the pension fund had a less than 50% chance of meeting the 7.25% rate of return long term. "It's responsible," said board member Harry M. Keiley of the move to 7%. Mr. Keiley said it was necessary to ensure the long-term financial stability of the retirement system.
pionline.com, 2/4/17

"Going to 7.00% would be an acceptable alternative if the board wanted to add another level of conservatism in the actuarial assumptions by increasing the likelihood the investment assumption will be met long term," the report said.
calpensions.com, 1/28/17, quote from the Milliman actuarial experience study

Note a couple observations: (1) CalSTRS investment consultant said there was less than a 50% chance of meeting a 7.25% assumption and (2) The board's investment consultant directed attention to the probability of the compound average return over time reaching the assumption.
*Notice the **positive statements** the Board member made about this move: (1) "It's responsible." and (2) "It was necessary to ensure the long-term financial stability of the retirement system."*

Oregon

The Oregon Public Employees Retirement Fund's board lowered the assumed rate of return for the $73 billion pension fund to 7.2% from 7.5%, said James Sinks, spokesman for the Oregon State Treasury, in an email. Return projections for the next 10 years are lower than in the prior decade, according to a report presented at the pension fund's July 28 meeting.
pionline.com, 8/1/17

Appendix G: Press Clippings for Retirement Systems Lowering Return Assumptions

Article about Alaska that mentions California

The nation's largest public employee retirement system has just cut its long-term predictions of how much it expects to earn on its investments to 6.5 percent, raising a caution flag for Alaska, which still has expectations of 8 percent returns.

The assumed long-range investment returns are a key indicator of the financial health of the state retirement programs. Pick a number that is too high and the systems give a false image of financial strength. In addition, it could force a pattern of more aggressive and risky investments.

It is generally easier to get agreement on optimistic numbers, especially when budgets are tight. The difficulty is that you never really know what returns will be until the future becomes the past.

While other states have trimmed back their long-term earnings estimates since 2008, Alaska is still using 8 percent as its target, which is on the high end of pension systems in the United States.

"Some critics of current public pension investment return assumption levels say that current low interest rates and volatile investment markets require public pension funds to take on excessive investment risk to achieve their assumption," the National Association of State Retirement Administrators said in May.

But California Gov. Jerry Brown says the new plan is irresponsible because of the slow pace in lowering expectations, a claim that the California Public Employees Retirement System denies. A more rapid reduction in investment return projections would have increased the strain on local governments, it said. But Brown, expressing more caution than his state's retirement board, said the CalPERS plan is based on "unrealistic investment returns" and assumes an "unacceptable level of risk in the coming years."

Alaska Dispatch News, 12/9/15

Iowa

Iowa Public Employees' Retirement System, Des Moines, lowered its assumed rate of return to 7% from 7.5%, said a news release from the $28.5 billion pension fund.

Under the changes, the pension fund's funding ratio is expected to fall by roughly four basis points to 80% and liabilities are expected to increase by $1.4 billion.

The changes follow a review of economic assumptions from actuarial firm Cavanaugh Macdonald Consulting. "Even though these changes will have a negative impact on IPERS' funded ratio, the investment board believes that these modifications will provide a more accurate valuation of future liabilities," IPERS said in the news release.

pionline.com, 3/28/17

*Notice the **positive statement** about the decision "Even though these changes will have a negative impact on IPERS' funded ratio, the investment board believes that these modifications will provide a more accurate valuation of future liabilities,"*

Maryland

"The action taken by the Board is part of its overall strategy to increase the probability of achieving investment returns required to improve the health of the retirement System and meet its obligations to its members," says State Treasurer Nancy K. Kopp, chair of the MSRPS Board of Trustees. "Recognizing that both the inflation experience and expectations for future inflation remain lower than the rate currently assumed, the Board felt it reasonable to reduce the expected return accordingly."

plansponsor.com, 8/2/17

*Notice those two **positive statements** about their changes.*

San Mateo County

San Mateo County Employees' Retirement Association, Redwood City, Calif., lowered its assumed rate of return to 7% from 7.25%.

"In the coming years, lowering the rate will add to the financial strength and stability of the retirement fund by mitigating the effects of future returns that are lower than current expectations."

SamCERA.org News, 7/6/16

Appendix G: Press Clippings for Retirement Systems Lowering Return Assumptions

North Carolina
"We need to make realistic assumptions regarding our ability to achieve expected returns in the future. We owe it to the General Assembly, taxpayers, public employees and future generations to be transparent and realistic about the true valuation of the pension plans," pionline.com, 5/1/18, State Treasurer Dale Folwell

Texas Teachers
Brian Guthrie, TRS executive director, told trustees the consensus among outside parties was that market returns will be significantly lower, and he stressed that "not taking action" to lower the assumed rate of return would not be prudent. Cypen & Cypen E-Newsletter, 8/16/18

Ohio Public Employees
"We are long-term investors, but investment returns over the next 10 to 15 years are very important to our plan," said Karen Carraher, executive director, in the news release. pionline.com, 10/22/18

Colorado
In the race for Colorado treasurer, Republican Brian Watson is in favor or raising the retirement age to at least to 67 — to match Social Security — as well as reducing or freezing cost-of-living adjustments and dropping Colorado PERA's assumed rate of return from 7.25% to something more "realistic," according to his campaign website. pionline.com, 10/30/18

Other Positive Statements about Lowering the Return Assumption
Harrisburg cannot take advantage of the Act 44 MMO reduction and does not set unrealistically high investment return assumptions which, Mr. McAneny said, has been a key factor in its success in managing its pension funds. Scranton Times-Tribune, 7/9/15
“If we do lower that assumed rate, that would certainly be a conservative approach. And one that I think would be reasonable,” he continued. “The stock market can’t stay up as high as it has forever. I think being a little more conservative would be prudent.” pension360.org, 7/24/15, quotes from Thomas DiNapoli
“But with the volatile market environment we have seen this year, and will likely see for the next several years, changing the assumed rate of return was a prudent decision," stated Chief Investment Officer Craig Husting [of Missouri’s school and teacher retirement systems]. psrs.peers.org 6/17/16
The $7.8 billion pension fund’s board approved the change at its June 16 meeting, Ms. Smith said, to “put the system on a path that reflects the current and expected low-return capital markets and to ensure adequate funding to pay future benefits.” pionline.com, 7/13/16, quote from Candy Smith, Spokeswoman for the Missouri State Employees’ RS
“This more conservative assumption will require additional state investments into the retirement systems, helping to ensure that available funds will be sufficient to pay the benefits that have been earned,” said a summary of the governor's proposed budget changes. pionline.com, 2/10/17, Michigan Gov. Rick Snyder

Appendix G: Press Clippings for Retirement Systems Lowering Return Assumptions

General
"The use of such high assumptions is deceptive because it keeps the funded level looking higher than it should be," said David Crane, public policy lecturer at Stanford University who worked as an adviser to former California Gov. Arnold Schwarzenegger. "Too high a return is dishonest." news.bna.com, 8/19/15
A lower rate of return can force issuers to face up to their funding commitments," said Tom Aaron, vice president with Moody's Investors Service. news.bna.com, 8/19/15
Lockhart also discussed the correlation between macroeconomic growth and pension funding. He recommended that public pension funds align their overall investment return assumptions with realistic assumptions related to macroeconomic momentum and trends. frbatlanta.org, 8/28/15, quote from Dennis Lockhart, President and CEO of Atlanta Federal Reserve Bank

Florida
Senate Appropriations Chairman Rob Bradley, a Clay County Republican, says he supports efforts to continue to lower the assumed rate, although it could impact the budgets of the various governments that rely on the fund. But he says a lower rate is more realistic given the fact that the pension investment returns may not be as robust if the economy declines in the long term. "It's always a concern when you create policies that require cash to be produced in a short period of time for governments that don't have a lot of cash," Bradley said in an interview with the Florida Phoenix. "That being said, what I do see is an economy that will inevitably cool off. "Therefore, at the end of the day, it doesn't bother me that we moved down the assumption rate a little bit because I think it's reasonable in light of what I think is ahead when I look at the overall health of the economy," he said. Floridapheonix.com, 11/06/19
As state analysts debated their pension recommendations last month, Ben Watkins, head of the state Division of Bond Finance, warned that the state's top-level credit ratings could be in jeopardy if the credit-rating agencies believe Florida's pension projections were built on unrealistic financial expectations. "What I see is this is that our credit rating is vulnerable because of the assumptions and the methodologies that we're using that are inconsistent with what they say are prudent and responsible approaches to funding the pension," Watkins said in support of adjusting the pension fund calculations. Floridapheonix.com, 11/06/19