COMPREHENSIVE ACTUARIAL REVIEW OF THE 2017 ACTUARIAL VALUATION OF THE MUNICIPAL POLICE EMPLOYEES' RETIREMENT SYSTEM

ACTUARIAL SERVICES
PRESENTED TO THE PUBLIC RETIREMENT SYSTEMS' ACTUARIAL COMMITTEE
FEBRUARY 22, 2018

February 5, 2018

Mr. Ben Huxen
Executive Director & General Counsel
Municipal Police Employees' Retirement System
7722 Office Park Boulevard, Suite 200
Baton Rouge, Louisiana 70809-7601

Re: Comprehensive Actuarial Review of the 2017 Actuarial Valuation

Dear Mr. Huxen:

To fulfill the requirements of R.S. 11:127(C) to the Public Retirement Systems' Actuarial Committee (PRSAC), the Louisiana Legislative Auditor (LLA) has arranged a staggered schedule to prepare Comprehensive Actuarial Reviews (CAR) every other year for each of the statewide retirement systems and Brief Actuarial Reviews (BAR) for the alternate years. However, an exception is being made for Municipal Police Employees' Retirement System (MPERS) this year. In the scheduled timing, we would not have prepared a full CAR this year. Though our actuary recommended approval of MPERS' 2016 actuarial valuation report, he indicated in testimony that he could not recommend approval of the 2017 valuation report if the investment return assumption were to remain at 7.50%, in light of the preponderance of expert opinions suggesting a significantly lower return assumption is more appropriate. Due to the fact that the return assumption was lowered only to 7.375% for the 2017 Funding Valuation, we decided we need to update our analysis with a full CAR.

The remainder of this letter contains the results of our comprehensive review of your June 30, 2017, actuarial valuation report (prepared by G.S. Curran & Company and dated November 20, 2017). More specifically, we have evaluated for reasonableness the actuarial assumptions and methods employed by the System and its actuary. Based on our review, we expect to recommend that PRSAC not accept the MPERS' 2017 funding valuation. Instead, we will recommend that PRSAC request MPERS to revise its actuarial valuation report including a significantly lower return assumption.

I would like to thank you and your staff for your cooperation and assistance with this review. Your formal response to this review has been incorporated in Appendix B of this letter.

Sincerely,

Daryl G. Purpera, CPA, CFE
Legislative Auditor

DGP:PTR:ch

cc: G.S. Curran & Company

2017 COMPREHENSIVE ACTUARIAL REVIEW FOR MPERS

Scope of Review

The 2017 Actuarial Valuation Report for MPERS for funding purposes (2017 Funding Valuation) was prepared by the actuary for MPERS, G.S. Curran & Company, and dated November 20, 2017.

This Comprehensive Actuarial Review (CAR) of that report was prepared by the actuary for the Louisiana Legislative Auditor, Mr. Paul Richmond, and includes evaluations and recommendations concerning key actuarial assumptions and methods for appropriateness. This CAR presents documented evidence for the opinions expressed herein concerning various assumptions and methods employed by the board and its actuary in the 2017 Funding Valuation.

Summary of Findings

A summary of our findings follows. Additional details are addressed in the remainder of this report.

1. **Gain-sharing Cost-of-Living Adjustments (COLAs)**. The cost of future COLAs is currently not included in the 2017 Funding Valuation. We recommend that the board (a) engage its actuary to model the likelihood and dollar amounts of future cost-of-living increases funded with "excess" investment earnings, as permitted by the statutory template and (b) incorporate permitted future cost-of-living increases in the measurement of the plan's costs and liabilities to the extent they are considered material for actuarial and accounting purposes.

   Refer to "Section 1: Cost-of-living Adjustments" of this report for details.

2. **Overly Optimistic Return Assumption**. The net inflation assumption, which is one of the building blocks included within the net investment return assumption, is an outlier and higher than the estimates from eight independent professional inflation forecasters. The board's 7.325% net investment return assumption is also outside the consensus mainstream of professional investment forecasters. It is, in our opinion, overly optimistic. A more appropriate net return assumption would be 6.25% per year. Even though the board and actuary lowered the return assumption from 7.5% in 2016 (with a plan of reaching 7.125% by 2019), the 7.325% in 2017 is still overly optimistic for use in the 2017 Funding Valuation. All valuation assumptions need to stand on their own each year.

   Refer to "Section 2: Overly Optimistic Return Assumption" of this report for details.

3. **Salary Scale Inconsistency.** The net return assumption for the 2017 Funding Valuation was reduced by the same amount as the inflation rate reduction. However, no similar reduction was made in the salary scale assumptions even though the 2017 Funding Valuation report indicates the new, lower inflation rate is embedded in the salary scale. For consistency and in accordance with the Actuarial Standards of Practice (ASOPs), it is our opinion that the salary scale assumption should be lowered in this case because the inflation assumption is lowered (in the absence of a full, new experience study on salary scales). Having a plan to address the salary scale in a future year is not relevant to the June 30, 2017 valuation because our actuarial review is limited to an examination of the 2017 Funding Valuation.

   Refer to "Section 3: Salary Scale Inconsistency"

4. **Mortality Assumption**. Careful analysis was undertaken by the board's actuary, in compliance with current actuarial literature, in assessing the degree of plan-specific mortality experience that should be recognized in the mortality tables assumed for the 2017 Funding Valuation. The current mortality assumption is acceptable.

   Refer to "Section 4: Mortality Assumption" of this report for details.

As a result of the findings summarized above, with particular regard for the overly optimistic return assumptions, I cannot endorse the actuarial valuation prepared by MPERS. I realize that other actuaries may have different opinions on the future than I have. However, I trust you will give consideration to the robust methodology and process by which I arrived at my opinion.

I relied on research provided by Gabriel, Roeder, Smith & Company (GRS); however, I am solely responsible for my opinions. GRS bears no responsibility for the opinions I have expressed in this report. I reviewed their work carefully, as I do for any other external resource, in forming my opinions and in drafting and signing this Comprehensive Actuarial Review. Please refer to my certification at the end of this report.

Section 1: Gain-sharing Cost-of-living Adjustments

Page 4 of the 2017 Funding Valuation states:

> "Although the Board of Trustees has authority to grant ad hoc Cost of Living Increases (COLAs) under limited circumstances, these COLAs have not been shown to have a historical pattern, the amounts of the COLAs have not been relative to a defined cost-of-living or inflation index, and there is no evidence to conclude that COLAs will be granted on a predictable basis in the future. Therefore, for purposes of determining the present value of benefits, these COLAs were deemed not to be substantively automatic and the present value of benefits excludes COLAs not previously granted by the Board of Trustees."

Certain Louisiana statutes are applicable to all state and statewide retirement systems and provide numerous rules, conditions, thresholds, and benefit levels governing the granting and paying of cost-of-living adjustments or permanent benefit increases. For the purpose of this letter report, we refer to both as COLAs.

For example, R.S. 11:241-248 provides substantive rules applicable broadly to many of Louisiana's retirement systems, including MPERS. Certain other Louisiana statutes are applicable to specific retirement systems. For example, R.S. 11:2225(A)(7) provides substantive COLA rules specifically for MPERS.

The broadly applicable rules and the specific system rules have changed over time; significant changes were most recently adopted in 2013 and 2014. Nevertheless, COLA statutes applicable to MPERS have been part of the framework for many years. This statutory history of providing a mechanism for MPERS' COLAs continues today.

Currently, the COLA statutes applicable to MPERS provide for (a) mathematical and logical rules for *when* the MPERS board is permitted to adopt a COLA and (b) mathematical and logical rules for *how much* COLA the MPERS board is permitted to adopt. There is not much, if any, discretion in the application of these mathematical rules.

When

The statutory mechanism for *when* the MPERS board is allowed to grant base COLAs and additional COLAs depends on whether the funded ratio is at or above certain percentage levels and on how long it has been since a COLA had previously been granted.

According to page 11 of the 2017 Actuarial Valuation, the funded ratio of MPERS was 71.39% as of June 30, 2017. According to the statutes, during the time while MPERS' funded ratio is at least 70% but below 80% a COLA is permitted every fourth year subject to the excess earnings rule determining the amount, as described below. The MPERS amortization policy expects the System to achieve a funded ratio of 80%, then 90%, before too long. A simple amortization schedule or an open group forecast valuation could demonstrate this. Once it reaches 90% or more, a COLA is expected to be permitted every other year subject to the excess earnings rule determining the amount. However, there may not be complete clarity on exactly how to apply the rule concerning how much time must pass between COLAs.

How much

The statutory mechanism for *how much* COLA the MPERS board may grant (assuming it is permitted to do so based on the conditions above) depends on (a) how far above the threshold the funded ratio is, (b) how far above the assumed valuation rate the actuarial valuation rate actually was during the year, (c) how much the present value of benefits for eligible members is measured to be, (d) whether it is a base gain-sharing COLA, in which case the increase amount for each eligible member can be <u>up to</u> 3.0% per year, (e) whether it is an additional gain-sharing COLA, in which case the additional increase amount can be 2% of the eligible member's initial commencement amount and (f) whether the A+B method in R.S. 11:241 is applied.

Discretion

If the conditions outlined above are satisfied and the MPERS board is permitted to grant a base gain-sharing COLA and possibly an additional gain-sharing COLA, the board must vote to actually grant the COLA. The board is free to vote for or against such a COLA when allowed, or not to vote at all. This is the discretionary aspect of the gain-sharing COLA-granting process. This discretionary step is what prevents the gain-sharing COLA from being considered "automatic." But consider the following internal and external forces at play which tend to press board members to grant gain-sharing COLAs whenever permitted:

a. While we have no personal knowledge of, or experience with, the MPERS board, generally speaking, retirement board members often have a sense of duty to serve the plan members. The MPERS retirement board of trustees is composed of individuals who have a natural constituency in plan members. There is a natural tendency to recommend COLAs when allowed. The minutes of the September 10, 2014 board meeting reflect the vote for the gain-sharing COLA to be unanimous.

b. Social Security gives a COLA almost every year. In any given future year, if MPERS retirees have not had a COLA in a couple years, and since they are not generally covered by Social Security, there is a natural tendency to want to recommend a COLA if allowed.

c. Furthermore, if other retirement systems, such as LASERS, TRSL, or other state or statewide systems give COLAs in a given year, MPERS' board members will feel pressure to recommend a COLA if allowed.

d. Finally, if the funded ratio of the System continues to improve as it is expected to do, board members might feel like sharing that success with the plan members by recommending a COLA.

On the other hand, the direction of the employer contribution rate (going upward or downward) also influences the willingness to recommend a COLA. Indeed, there are fiscal pressures that move board members at times to refrain from recommending COLAs when permitted if the employer contribution rate goes up by sufficient margins or if the funded ratio falls.

The following exhibit illustrates recent history of when MPERS' COLAs were allowed to be granted and how much. There is history and strong logical support for the presumption that the MPERS board will vote for a gain-sharing COLA whenever permitted to do so.

- In our opinion, a decision to not measure the likelihoods and magnitudes must be supported by more than an assertion that COLAs liabilities do not need to be calculated because COLAs are not automatic.

- Moreover, in our opinion, the lack of any guarantee or certainty about whether the board will adopt a COLA when permitted to do so is not relevant.

Of far greater importance is the relative magnitude of the liability and its relative effect on contribution requirements.

The likelihood, the *when*, and the *how much* are all actuarially measurable. Based on history and logic, and given the high degree of confidence that the board will grant COLAs whenever permitted, in our opinion, material costs and liabilities of future COLAs should be measured and included in the valuations.

Exhibit 1 The Statutory Template for Allowing COLAs is Actuarially Measurable The Pattern of Experience, History, and Politics Expect COLA Approvals Whenever Permitted					
Actuarial Valuation Date	Amount Permitted By Statutory Template	Amount Granted by Board	Approved by Board	Effective Date of COLA	Comments
6/30/2017	None	TBD			
6/30/2016	None	None			
6/30/2015	None	None			
6/30/2014	None	None			
6/30/2013	3.0%	3.0%	9/10/2014	11/1/2014	Granted and effective during fiscal year ending 2015. Note: delayed to the second fiscal year following the June 30 valuation date
6/30/2012	None	None			
6/30/2011	None	None			
6/30/2010	None	None			
Source: This information has been extracted from Title 11 of the Louisiana Revised Statute, information reported in MPERS' annual actuarial valuation reports and from minutes of MPERS' board meetings as posted on its website.					

Given the recent example of granting a COLA when allowed (measured at the fiscal year ending June 30, 2013), coupled with the analysis above, it is our opinion that there is a reasonable likelihood that the board will grant a COLA whenever allowed. It seems unreasonable to "assume" a 0% chance of granting a COLA in future years when otherwise allowed.

Legislative Framework Presumes COLAs

The COLA provisions are in the Louisiana statutes for a reason: To pay COLAs – sometimes. The sponsors and other legislators fully 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.

Something is Better Than Nothing

In the current and prior years, the board's actuary has posited (a) that one cannot know with any certainty when COLAs will be granted, (b) that no automatically segregated and accumulated (like the state systems) accounts are maintained for the purpose of payment of future cost of living increases and (c) that statutes limit the frequency permitted for granting COLAs. These have been put forth as support for not recognizing future COLAs in advance (the "No Recognition" approach).

Traditional actuarial methods model the payment of various plan benefits over time, none of which are known with certainty. For example: the times when members will terminate, become disabled, die, or retire are not known with certainty; how much employees' pensionable compensation will increase over time is not known with certainty; nor do we know with certainty what the future investment returns or future inflation will be.

Nevertheless, these uncertainties do not stop us from making reasonable projections using accepted actuarial techniques to measure future costs and liabilities associated with any given plan benefit provision. Decrement events and benefits do not need to be fully predictable before an actuary recognizes their likelihood within an actuarial valuation.

While gain-sharing COLA benefits are different from other benefit provisions in the events and conditions in which the actual benefits arise, they are the same as any other benefit provision in the sense that (a) they are a well-defined benefit payable to plan members, (b) all aspects of their eligibility and calculations can be programmed and calculated using accepted actuarial techniques, and (c) other aspects of their eligibility/approval may be discretionary but do have a reasonably high likelihood of being approved whenever allowed. Actuarially measuring the future costs and liabilities of gain-sharing COLA benefits (recognizing a degree of likelihood and timing) is consistent with our traditional practice of actuarially measuring on a scientific basis other plan benefit provisions (recognizing a degree of likelihood and timing).

Refer to the Appendix A at the end of this CAR for several citations from the Actuarial Standards of Practice (ASOPs) pertaining to the valuation of COLAs.

Given the size of MPERS' accrued liabilities and asset portfolio, reasonable scientific actuarial modelling methods are available to the board and its actuary. The modelling methods are affordable and cost-effective: producing information that better identifies the true cost of the MPERS benefit program.

Although scientific measurements are superior and preferred, even a rough non-scientific estimate is better than the "No Recognition" approach currently used by MPERS. Following the reasoning set forth in the pages above, it is reasonable to expect gains-sharing COLAs to be permitted every three to six years, in the amount of 2.0% to 5.0% for some or all eligible members each time granted.

Other Ad Hoc COLAs

Other plans around the country have no special provisions for COLAs, no well-defined criteria or hurdle to satisfy for granting COLAs, and have no history (or no discernible pattern) of granting ad hoc COLAs. Those are different. In those cases, there is no good reason to expect COLAs to be paid in the future, until or unless some pattern (even if erratic) of truly ad hoc COLAs emerges. But MPERS is different, as are other Louisiana retirement systems.

There is a long and specific statutory history with detailed conditions for granting COLAs, fully contemplating that COLAs would be granted. In the past eight years, the only time when a COLA was allowed to be granted for satisfying the statutory conditions, the board did indeed grant the specified COLA. That, together with other facts presented above, is a strong indicator that there is some likelihood that a COLA will be granted sometimes.

Reasonable Actuarial Estimates

There are at least two preferred approaches to actuarially measuring the cost and liabilities of MPERS' 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.

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., 3% or some other such percent load.

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

The first method presented above (single equivalent annual COLA assumption) provides a reasonable proxy for what would likely actually happen in the years to come. The value of X% annual COLA serves as the single equivalent COLA, and is treated in the valuation "as if" it is a regular annual COLA increase. The only challenge is to make a reasonable estimate of X% which scientific actuarial methods enable us to do.

Materiality

Assuming an actuarial study is prepared that models the future gain-sharing COLAs stochastically, it might turn out not to be material. If it is found not to be material for actuarial funding or for accounting purposes, then the future gain-sharing COLAs would not need to be measured.

Only an actual stochastic model simulating the future gain-sharing COLAs could demonstrate whether the statutory template is expected to produce sufficient future COLAs to be material. Estimating it would likely not be sufficient.

While not a trivial project, the model is fairly easy to build and test, especially if the framework could be used for other statewide systems as well. Refer to the Appendix A at the end of this CAR for a brief summary of the steps typically found in such a project.

Section 2: Overly Optimistic Return Assumption

In our opinion, the assumed rate of return used by MPERS and its actuary (7.325% as of June 30, 2017) is overly optimistic compared to a consensus of independent expert consultants and forecasters. Our rationale for this conclusion follows.

This section sets forth (a) our evaluation of MPERS' defense of 7.325% as a return assumption and (b) a disciplined process for setting a return assumption that ensures it is mainstream and defensible, and provides the details for how we arrived at 6.25% as the more appropriate net return assumption.

A Disciplined Process

The cost of being wrong is substantial, especially if it is over a 10-year or 30-year period, and could be detrimental to both plan members and taxpayers. To take this evaluation of MPERS' net return assumption a step further, consider the subsection below which describes a *process* for setting or evaluating a net return assumption that:

   a.   Is unbiased, objective, and free of agency risk;
   b.   Is disciplined and robust;
   c.   Is defensible; and
   d.   Improves intergenerational equity, contribution stability, and benefit security of plan members.

The most significant factors in setting or evaluating an assumed return are:

   a.   The horizon over which returns are expected to be satisfied;

   b.   Future rates of inflation (forward-looking), as expected by a *consensus of experts* in the field of inflation forecasting who are both independent and nationally recognized;

   c.   Current and future asset allocation percentages by asset class; and

   d.   Future investment performance (forward-looking) and other capital market assumptions for various asset classes, as expected by a *consensus of experts* in the field of investment forecasting who are both independent and nationally recognized.

Horizons

There is an ongoing debate over the time horizon that should be used to set the rate of return assumption. Some have posited that pension plans are long-term propositions and their return assumptions should reflect a long-term horizon, for example, 30 years. Others believe that a shorter time horizon should be used. It is our opinion that a forward-looking <u>mid-term horizon</u> (e.g., 10 years) should influence the final choices of return assumptions. Long-term horizon forecasts (e.g., 20-30 years) are useful for discussion purposes, but not to the exclusion of mid-term horizons. Pension funds are, indeed, usually long-term arrangements. However, in our opinion (for the reasons cited below), 30 years is too long for the selection of a pension fund's expected rate of return.

Some of the reasons supporting the use of a <u>mid-term horizon</u> are:

   a.   *Underperformance in the mid-term may not be sustainable.* If the forecasting experts are correct, there will be lower compounded returns over the next decade or two while waiting for the

following decades to bail out pension plans in order to achieve the higher long-term expectation. Undoubtedly, there will be occasional better-than-assumed years. But a consensus of independent experts says (in the support outlined below, in various investment periodicals and in retirement conferences across the country) the next decade is expected to see compound returns well below 7.00%; much lower than MPERS' current 7.325% assumed rate.

Anticipating higher returns in the long-term, while regularly suffering underperformance in the mid-term, is not sustainable. It causes repeated contribution rate increases and a lack of progress in paying down the unfunded actuarial liability. It will test the patience and tolerance of taxpayers, elected representatives, and budget directors, and may push them into serious consideration of proposed retirement plan designs that transfer all or some of the investment risk onto plan members.

b. *Forecasts for 30-year long-term horizons are the least reliable.* There is much less certainty in long-term forecasts than mid-term forecasts. In the face of uncertainty, investors become more conservative. Thus, decision-makers should consider being more conservative than the longest-term forecasts indicate because the longest-term forecasts are more uncertain. This is a truism, whether in financial forecasting, election forecasting, or hurricane forecasting. Long-term forecasts are less reliable than mid-term forecasts.

No one knows the future for certain. When in doubt, in our opinion, it is best to err on the side of conservatism (lower return assumptions).

c. *Duration of the liability.* The duration of MSERS' plan liabilities is approximately 10.50 years. The funded ratio is 71.39%. The plan currently disburses more than it takes in from contributions. The plan's current market value of assets is not sufficient to cover the liabilities for current inactive members (including retirees and survivors). Relying too much on a 30-year horizon for return expectations fails to recognize the mid-term cash demands upon the plan.

Perspectives

There are two types of perspectives to consider when defending or determining assumptions for a future net rate of return of a pension fund and a future rate of inflation. One is temporal – Do we look more to historical rates to inform decision-makers or more to forward-looking forecasts of the future? The other is social – Do we look more to what other retirement systems are doing or look more to what expert forecasters would expect for MPERS' own portfolio in the future?

Temporal. Historical rates of return and inflation are viewed more as mere information, than used to defend or determine a current net return or inflation 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. Certainly, past performance should not be a driver in decision-making.

The current domestic and global environments are not like the past 10, 30, or 50 years; and the future domestic and global environments are certain to be different from the past. 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 net return assumption being applied to the next 10-, 20-, or 30-year period is not valid.

Past performance is not an indicator of future performance.

Social. Looking to what other peer retirement systems have adopted for their own net return assumptions should not be a driver in decision-making. Other retirement systems have their own asset allocation and expense structure and their own set of politics, protectionism, budget issues, and agency risk. They are not the best source to turn for defense or determination of a system's own net return assumption.

Independent, unbiased, expert sources of inflation and investment return forecasts are the best places to look for input when setting a net return assumption for pension valuations. These are much more objective and unfiltered sources – obtained directly from the experts themselves, to guide decision-makers.

Adopting a *process* that looks to a consensus of external subject matter experts' forward-looking forecasts is the best way to avoid political and budget pressures that sometimes distract or influence assumption-setters away from their primary duty to set return assumptions as their unbiased best estimate of future.

Inflation

An assumed rate of future inflation is a major component of the assumed return assumption and the salary increase assumptions. When inflation rates are lowered, the return and salary increases should be lowered (unless there is a coincidental change in real returns or real salary increases that offset it). Conversely, when inflation rates are increased, the return and salary increases should be increased. Expected future inflation is a critical component of both assumptions. Therefore, much care and attention should be given to the expected future rates of inflation.

MPERS' 2017 Funding Valuation (page 4) states: "For 2017, an assumed rate of inflation of 2.7% was implicit in the assumed rate of return."

Having a plan to reduce the rate of inflation in a future year is not relevant to the June 30, 2017 valuation because our actuarial review is limited to an examination of the 2017 Funding Valuation. Based on the evidence presented below, the current 2.70% assumed rate of inflation is an outlier and serves to cause an overly optimistic return assumption.

We suggest an inflation assumption closer to the 2.25% supported by the research on expected inflation rates in Exhibits 3 and 4. An inflation assumption of 2.7% is an outlier compared to specified and authoritative forecasts.

Currently, expert professional sources for forward-looking inflation forecasts generally lie between 1.73% and 2.60%. Consider the forward-looking forecasts from the following subject matter experts.

Exhibit 2

Eight Major National Sources of Inflation Forecasts	
Bond Investors	Congressional Budget Office
Federal Reserve Bank of Philadelphia	Federal Reserve Bank of Cleveland
Federal Reserve Board	GRS Survey
HAS Survey	Social Security Trustees Report

Some of them provide multiple measures of inflation for different time horizons, making a total of 19 forecasts from eight reputable sources.

Exhibit 3

2017 Measures of Inflation		
Horizon	**Average**	**Number of Sources**
26.3 - 30 yrs	2.20%	7
20 yrs	2.06%	3
9.40 -15 yrs	2.16%	9

It has become increasingly difficult to support inflation assumptions greater than 2.50% in the face of so many opinions to the contrary from experts in the field of inflation forecasting.

The board's investment consultant indicated that its inflation assumption over the coming 30-year period is 2.75%[1]. Finding one source (an outlier compared to all others) that supports 2.7% is insufficient justification. That one outlier expectation should be evaluated for validity in light of the preponderance of other evidence of professional expectations. This is not intended to be disparaging of the investment consultant or the actuary. The evidence from many additional reputable subject matter experts presented in Exhibit 3 and Exhibit 4 strongly support a much lower rate of future inflation.

Our inflation assumption of 2.25% lies more comfortably near a consensus of the expectations in the summary table above and the detailed table below. In our opinion, outliers are not safe, conservative or mainstream assumptions.

Consider Exhibit 4, which shows inflation forecasts of these eight large reputable experts in the field of inflation forecasting.

---

[1] Refer to Page 41 of NEPC's MPERS Meeting Material, February 15, 2017.

Exhibit 4

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 (Since Jan 2012; Personal Consumer Expenditures)	2.00%
Congressional Budget Office: *The Budget and Economic Outlook*	
Overall Consumer Price Index (June 2017; Ultimate)	2.40%
Overall Consumer Price Index (June 2017; 11 Years)	2.36%
Personal Consumer Expenditures (June 2017; Ultimate)	2.00%
Personal Consumer Expenditures (June 2017; 11 Years)	1.98%
2017 Social Security Trustees Report	
CPI-W 15-Year Intermediate Assumption	2.60%
CPI-W 30-Year Intermediate Assumption	2.60%
GDP Deflator 15-Year Intermediate Assumption	2.20%
GDP Deflator 30-Year Intermediate Assumption	2.20%
Quarterly Survey of Professional Forecasters	
2Q2017 Federal Reserve Bank of Philadelphia 10-Year Forecast	2.30%
Federal Reserve Bank of Cleveland	
30-Year Expectation on June 1, 2017	2.13%
20-Year Expectation on June 1, 2017	1.97%
10-Year Expectation on June 1, 2017	1.73%
Bond Investors **(Excess Yield of Non-indexed Treasuries Over Indexed Treasuries)**	
30-Year Expectation on June 30, 2017	1.85%
Median 30-year Expectation over 6/30/12 - 6/30/17	2.09%
20-Year Expectation on June 30, 2017	1.77%
Median 20-year Expectation over 6/30/12 - 6/30/17	2.02%
10-Year Expectation on June 30, 2017	1.73%
Median 10-year Expectation over 6/30/12 - 6/30/17	1.96%
Investment Consultants and Forecasters	
2017 GRS Survey major national investment forecasters and consultants	
Median expectation among 8 firms (averaging 9.4 years)	2.25%
Median expectation among 4 firms (averaging 26.3 years)	2.21%
2017 HAS Survey of 12 investment advisors: Median (10 years)	2.32%
2017 HAS Survey of 12 investment advisors: Median (20 years)	2.44%

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.

In our evaluation of the board's net return assumption, we relied on the 13 target asset allocation percentages set forth in the System's formal Investment Policy Statement (IPS) last updated March 16, 2016.

Exhibit 5

2017 MPERS Target Asset Allocation			
Risk Assets		**Fixed Income Assets**	
Large Cap U.S. Equities	17.0%	Core Bonds	12.0%
Small to Mid Cap U.S. Equities	8.0%	High Yield Bonds	3.0%
International Equities	20.0%	Bank Loans	3.0%
Emerging Market Equities	8.0%	EMD (local currency)	3.0%
Private Equity	5.0%		
Real Estate	8.0%		
GTAA Composite	6.0%	Total Fixed Income Assets	*21.0%*
Hedge Funds	5.0%		
Real Assets - Liquid*	2.0%		
Total Risk Assets	*79.0%*	*Total Asset Allocation*	*100.0%*

Source: Current MPERS Investment Policy Statement (dated March 16, 2016)

Consensus of Professional Investment Forecasts

We applied the target asset allocations to the expectations in the GRS Survey of 10 major national investment consultants and forecasters. Eight of these 10 investment consultants/forecasters provided GRS with their mid-term (10 years) horizon forecasts, and four of them provided GRS with their longer-term (20- to 30-year) horizon forecasts. Given the brevity of the descriptions of the asset classes identified, our mapping of these 13 asset classes to the investment consultant's asset classes may not be exact.

Listed below are the national firms in our 2017 GRS Survey. These are very large and reputable investment consultants and forecasters.

Exhibit 6

10 Major National Investment Consultants and Forecasters in the GRS Survey			
Aon Hewitt	BNY/Mellon*	J. P. Morgan*	Marquette Asscoiates
Mercer*	NEPC *	Pension Consulting Alliance*	Principal
R.V. Kuhns	Voya		

Each firm has between $1 trillion and $10 trillion in worldwide assets under management or advisement; the others are large managers and advisors below $1 trillion.

We applied the investment forecasters' expected returns to MPERS' asset allocation. We replaced the investment forecasters' respective inflation assumptions with 2.25%, our preferred assumption based on the consensus of expert inflation forecasters' expectations presented above in order to normalize for a consistent inflation assumption across all forecasters.

We reduced the respective forecasts for MPERS by the expected investment-related expenses and added alpha back in to replace active management expenses above expected passive management expenses, as permitted and limited by Actuarial Standard of Practice No. 27. This leaves a net reduction estimated to be for passive investments.

This process results in normalized expected returns for any one given year in the forecast horizon (called the expected arithmetic return). 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.

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 accurate than any one of those experts.

Below are the results of this process for the <u>mid-term horizon</u>.

Exhibit 7
Expected Likelihood of Achieving Forecast Results
Based on a 10-year Time Horizon

| Investment Consultant 10 Year Horizon | Distribution of 10-Year Average Geometric-Compound Net Nominal Return (Percentiles) | | | Probability of exceeding |
	40th	50th	60th	7.325%
(1)	(2)	(3)	(4)	(5)
1	4.17%	5.22%	6.28%	30.78%
2	5.04%	5.94%	6.85%	34.97%
3	5.33%	6.21%	7.09%	37.47%
4	4.84%	5.92%	7.01%	37.21%
5	5.22%	6.36%	7.51%	41.53%
6	5.55%	6.62%	7.69%	43.34%
7	5.83%	6.83%	7.84%	45.08%
8	6.15%	7.10%	8.05%	47.58%
Average	**5.27%**	**6.27%**	**7.29%**	**39.75%**

There are three important takeaways from Exhibit 7:

a. Over the <u>mid-term horizon</u> the range of expectations of the 50th percentile of compound average return runs from 5.22% to 7.10%.

b. The 50th percentile consensus expert <u>mid-term</u> forecast is 6.27%, or rounded to 6.25%.

c. The consensus of these experts is that there is only a 39.75% chance of achieving at least the current 7.325% over the mid-term horizon. This does not mean a 39.75% chance of achieving the 7.325% assumption in any year during the horizon; it means that the compound return over the next 10 years has a 39.75% of achieving at least the 7.325% assumption.

This is why, actuarially speaking, the 6.27% rate of return is the preferred assumption for funding 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 6.27% when compounded over the next 10 years.

None of the eight major national investment consultants with <u>mid-term horizon</u> forecasts expect the 50th percentile of the compound return to be at or above the current 7.325% assumption over the next 10 years. There are good reasons for these professionals' bleak mid-term forecasts, the details of which are beyond the scope of this report.

If the independent experts are right, the next 10-year period will experience a substantial shortfall, while the board hopes to be bailed out in years 11 through 30.

Below are the results of this process for the <u>long-term horizon.</u>

Exhibit 8
Expected Likelihood of Achieving Forecast Results
Based on a 25-year Time Horizon

Investment Consultant 20-30 Year Horizon	Distribution of 25-Year Average Geometric-Compound Net Nominal Return (Percentiles)			Probability of exceeding 7.325%
	40th	50th	60th	
(1)	(2)	(3)	(4)	(5)
1	5.94%	6.56%	7.18%	37.83%
2	6.00%	6.62%	7.23%	38.53%
3	6.35%	7.03%	7.70%	45.54%
4	6.67%	7.30%	7.94%	49.66%
Average	6.24%	6.88%	7.52%	42.89%

There are three important takeaways from Exhibit 8:

a. Over the <u>long-term horizon</u> the range of expectations of the 50th percentile of compound average return runs from 6.56% to 7.30%.

b. The 50th percentile expectation of the consensus average for the <u>long-term horizon</u> is 6.88% or rounded to 7.00%.

c. The consensus of these experts is that there is only a 42.89% chance of achieving at least the current 7.325% over the long-term horizon. This does not mean a 42.89% chance of achieving the 7.325% assumption in any year during the horizon; it means that the compound return over the next 25 years has a 42.89% of achieving at least the 7.325% assumption.

None of the four consultants with longer term forecasts expects a 50-50 chance of achieving the 7.325% return over 25 years.

This makes the current 7.325% assumption an outlier among the mainstream investment forecasters. According to the capital market assumptions of these investment forecasters, there is only a 39.75% chance of achieving at least the 7.325% compound annual return over the next 10-year period and only a 42.89% chance over the next 25-year period.

For use in an actuarial valuation for pensions, where the entire measurement and funding model is built on compounding (present values and future values), the 50th percentile compound or geometric expectation over a <u>mid-term horizon</u> are the most appropriate choices of a net return assumption.

Again, no one knows the future for certain. When in doubt, in our opinion it is best to err of the side of conservatism (lower return assumptions), relying on the experts to form those opinions.

Section 3: Salary Scale Inconsistency

The 2016 Funding Valuation report stated (page 43):

> The gross rates including inflation and merit increases are as follows:

Years of Service	Salary Growth Rate
1-2	9.75%
3-23	4.75%
Above 23	4.25%

This salary scale was employed for the 2016 Funding Valuation, when the inflation assumption was 2.875%[2] which was embedded in the salary scale rates above.

The 2017 Funding Valuation report stated (page 42):

> Salary increases include 2.7% inflation and merit increases. The gross rates including inflation and merit increases are as follows:

Years of Service	Salary Growth Rate
1-2	9.75%
3-23	4.75%
Above 23	4.25%

This salary scale was employed for the 2017 Funding Valuation, when the inflation assumption was 2.7%. Notice the disclosure acknowledges that the 2.7% inflation assumption was embedded in the salary scale rates above. That is a change in the inflation assumptions. Yet the rates did not change.

For consistency and in accordance with the Actuarial Standards of Practice (ASOPs), it is our opinion that the salary scale assumption should be lowered in this case because the inflation assumption is lowered (in the absence of a full, new experience study on salary scales). As mentioned earlier, having a plan to address the salary scale in a future year is not relevant to the June 30, 2017 valuation because our actuarial review is limited to an examination of the 2017 Funding Valuation.

---

[2] Page 4 of the 2016 Funding Valuation report states: "An inflation rate of 2.875% was implicit in both the assumed rate of return and rate of salary increases"

Section 4: Mortality Assumption

The 2017 Actuarial Valuation (page 41) states that the mortality assumption for annuitant and beneficiary mortality is the "RP 2000 Combined Healthy with Blue Collar Adjustment Sex Distinct Tables Projected to 2029 using Scale AA for males and set back 1 year and Projected to 2029 using scale AA for females."

Base table

To evaluate the reasonableness of the mortality assumption, we reviewed the base mortality (RP2000 with Blue Collar Adjustments) separately from the projection scale (Scale AA).

We believe the use of the RP2000 with Blue Collar Adjustments as the base mortality table to be reasonable. The process we used to determine the reasonableness of the base mortality table is as follows:

1. Experience Study: An experience study (dated February 17, 2016) was prepared covering the period from July 1, 2009, through June 30, 2014. We reviewed the experience study report and found the section on mortality to be described with reasonable detail and careful recognition of relevant mortality experience.   The report describes reasonable applications of actuarial credibility principles.

2. Size of the plan: Due to the small size of the experience group and low number of deaths during the study period, the results of the experience study are not fully credible. Only partial credibility can therefore be given to the results of the experience study. A weighted average of the group's experience and that of a standard reference table is needed to obtain a final mortality assumption for valuation purposes.

3. Standard mortality table: Since the experience study is not fully credible, it is necessary to select a standard mortality table as a reference table to be used in the determination of the mortality assumption. Possible candidates for a standard reference table include:

   a. The mortality tables developed for LASERS or TRSL. However, an actuarial assessment would need to be made of the appropriateness of the actuarial methodology and the comparability of the groups covered before considering them for use as the standard reference table for this purpose.

   b. The RP2000 mortality table was published in or around the year 2000. It was developed by the Society of Actuaries based on national private sector pension data.

   c. RP2014 mortality table was published in October 2014. As for RP2000, this table was also developed by the Society of Actuaries based on national private sector pension data. It is the most recent reliable base mortality table available, for purposes of national estimates of mortality for pension plans.

4. Louisiana mortality rates: The Centers for Disease Control and Prevention (CDC) has published data[3] demonstrating that mortality rates in Louisiana are generally higher than national averages. Therefore, it would be more prudent not to use a current national mortality table (such as

---

[3] Refer to Table 3 in the *National Vital Statistics Reports* (Volume 60, Number 4) dated January 22, 2012, published by the U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics, National Vital Statistics System.

RP2014) as the standard reference table in the weighted average calculations described above without adjustment.

5. RP2000 with blue collar adjustment as the standard mortality table: The experience study states that RP2000 mortality table was selected as the standard base mortality table. The RP2014 mortality table, being the newest table available, was considered by the system's actuary. However, the RP2000 mortality table was ultimately selected to account for the higher mortality rates in Louisiana. We find this approach reasonable. We analyzed the data from CDC[1] and found that mortality rates in Louisiana are approximately 20% higher than national mortality rates. We found the mortality rates in RP2000 to be approximately 26% higher than those of RP2014 (representative of national rates). In our opinion, this is close enough for RP2000 to qualify as a reasonable standard reference table for reflecting general Louisiana mortality. The blue collar adjustments are also reasonable.

6. Credibility weights: Credibility weights were calculated separately by GSC for males and females based on the number of deaths observed in the experience study. Due to the low number of deaths, the weights assigned to the combined group's experience were low (44% for males and 32% for females). The associated weights assigned to the standard reference table were the compliments of those (56% for males and 68% for females). These weighting factors calculated by GSC used standard actuarial treatment required for developing weighted average mortality that recognizes the credibility level of data in an experience study with insufficient data of its own.

7. Credibility weighted mortality: The credibility weights were applied to (a) the experience study mortality rates and (b) standard reference table's mortality rate (RP2000 as projected to 2012) to obtain the weighted mortality rates. The average rate was 98% of the standard reference table for males and 92% of the standard reference table for females.

8. Set-forwards and set-backs: The credibility weighted mortality rates were compared to the standard reference table to set the appropriate set-forwards and set-backs to determine the best fitting table to use for the final mortality assumption. No adjustment to the standard reference table was determined to be the best fit for males and a set-back one year (in the RP2000 table with blue collar adjustments projected by Scale AA to 2029) was determined to be the best fit for females.

This is a fully appropriate treatment for deriving an appropriate mortality table. Therefore, we find the base table (before projection for future mortality) to be fully appropriate for the 2017 Actuarial Valuation.

Projection scales

Once the base table was found to be reasonable, we then reviewed the projection scale used in the mortality assumption (projection Scale AA). We believe the actuary's use of Scale AA projected to 2029 is not unreasonable.

However, there is an intermediate projection scale, Scale BB, which was developed to be used in connection with RP2000, pending subsequent creation and release of RP2014 and MP2014. Scale BB was released in September 2012 and available at the time of the experience study. Scale BB was developed after the results of the Society of Actuaries' analyses showed that the rates of mortality improvement in the U.S. over the then-recent past had differed significantly from those predicted by Scale AA. Scale BB would be a better choice for the projection of mortality improvements when coupled with RP2000.

Furthermore, there are two ways to reflect mortality improvement: (a) Project the improvements to a target year in the future or (b) Apply the improvement scale generationally. The first way applies the mortality rate for a 65-year old (for example) regardless of whether the member turns 65 in 2020 or turns 65 in 2040. The generational projection applies the improvements for the years between the observation year and 2020 for a member turning 65 in 2020, but applies the improvements for the years between the observation year and 2040 for a member turning 65 in 2040. While the actuarial literature permits the use of a static projection to a given future year, the actuarial profession is endorsing the generational approach as being preferable.

A more current approach to estimating mortality rates for valuation purposes would be to use either: (a) RP2000 projected generationally by Scale BB or (b) RP2014 loaded with 120% (for CDC data) and adjusted for partially credible plan-specific experience, then projecting generationally using MP2016 or MP 2017. While either of these two approaches would be more current and preferable methodologies, we do not find the mortality tables used in the MPERS 2017 actuarial funding valuation report to be unreasonable.

Actuarial Certification

This report is considered to be a Statement of Actuarial Opinion. Therefore, I make the following certification:

I, Paul Richmond, am the Manager of Actuarial Services for the Louisiana Legislative Auditor. I am a member of the American Academy of Actuaries, an Associate in the Society of Actuaries, an Enrolled Actuary, and I meet the Qualification Standards of the American Academy of Actuaries necessary to render the actuarial opinions contained herein.

_____   February 5, 2018
Paul T. Richmond, ASA, MAAA, EA, FCA   Date

Actuarial Standards of Practice

Cost-of-Living Actuarial Modelling

APPENDIX A

Actuarial Standards of Practice

ASOP No. 4 Section 3.5

3.5 Plan Provisions - When measuring pension obligations and determining **periodic costs** or **actuarially determined contributions**, the actuary should reflect all significant **plan provisions** known to the actuary as appropriate for the purpose of the measurement. However, if in the actuary's professional judgment, omitting a significant **plan provision** is appropriate for the purpose of the measurement, the actuary should disclose the omission in accordance with section 4.1(d).

ASOP No. 4 Section 3.5.3

3.5.3 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 plant 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.

The actuary should disclose the approach taken with any **plan provisions** of the type described in this section, in accordance with section 4.1(i).

ASOP No. 27 Section 3.11.2

3.11.2 Cost-of-Living Adjustments—Plan benefits or limits affecting plan benefits (including the Internal Revenue Code (IRC) section 401(a)(17) compensation limit and section 415(b) maximum annuity) may be automatically adjusted for **inflation** or assumed to be adjusted for **inflation** in some manner (for example, through regular plan amendments). However, for some purposes (such as qualified pension plan funding valuations), the actuary may be precluded by applicable laws or regulations from anticipating future plan amendments or future cost-of-living adjustments in certain IRC limits.

Cost-of-Living Actuarial Modelling

Following is a simplified step-by-step explanation of the actuarial simulation process.

An open group forecast valuation of the system forms the basis for a stochastic estimation of the current present values of future COLA benefits. There are other unforeseen benefits to an open group forecast that prove useful to both actuary and board members as they manage the funding of the system. Once the process solves for X%, the usual closed group valuation is then performed using the X% as a regular COLA.

An Excel spreadsheet can be developed with the necessary open group liability projections, projected fund values based on an investment return for each future year, and annual valuation calculations (annual gain/loss calculation, amortization bases and payments, administrative expense load, experience account balance maintenance, etc.) built into the spreadsheet. With the same expected return every year, the spreadsheet produces deterministic forecast valuations. But if Excel's random number generator selects return assumptions in a macro from its internal lognormal distribution function, the Fund's return varies from year to year, producing a stochastic forecast of future valuations.

Running that forecast valuation with and without COLAs, the single equivalent X% can be solved so as to approximate the present value of simulated COLAs.

This is not too complicated for an actuary to design, program, and run. It is being done more and more in many firms across the country. Furthermore, the cost should not be considered too much for a plan the size of MPERS (approximately $2 billion in assets) for the worthy benefit of obtaining a decent actuarial measure of the cost and liability for providing these COLA benefits. Furthermore, once it is built, it can be modified for use on behalf of other retirement systems, thereby spreading the costs.

However, even a rough estimate, not based on scientific or actuarial processes would be better than the "No Recognition" approach used by MPERS. Just following the reasoning set forth in the pages above, it is reasonable to expect COLAs to be allowed every few years, in the amount of 2.0% to 5.0% for some members each time granted.

Much of the description of the COLA conditions and benefits above are merely a summary and much involves interpretation of statutes. This Comprehensive Actuarial Review should not be considered a legal opinion. The statutes should be consulted for more detailed descriptions and we defer to legal counsel and other authoritative sources for legal interpretations.

APPENDIX B

Management's Response

G. S. CURRAN & COMPANY, LTD.

Actuarial Services

10555 N. Glenstone Place ● Baton Rouge, Louisiana 70810 ● (225) 769-4825

Gary S. Curran, FCA, MAAA, ASA, EA
Consulting Actuary

Gregory M. Curran, FCA, MAAA, ASA, EA
Consulting Actuary

January 31, 2018

Ben Huxen, CPA
Executive Director & General Counsel
Municipal Police Employees' Retirement System
7722 Office Park Boulevard, Suite 200
Baton Rouge, Louisiana 70809

Re: Comprehensive Actuarial Review of the 2017 Actuarial Valuation

Dear Ben:

Attached is our response to the issues discussed in the Louisiana Legislative Auditor's Comprehensive Actuarial Review of the 2017 Actuarial Valuation.

If you have any questions, please give me a call.

Sincerely yours,

Gregory M. Curran, FCA, MAAA, ASA
Consulting Actuary

The following represents G. S. Curran & Company's written response to the Comprehensive Actuarial Review (CAR) of the 2017 Municipal Police Employees' Retirement System (MPERS) Actuarial Valuation prepared by the Louisiana Legislative Auditor (LLA).

The handling of Cost-of-Living Adjustments within the funding valuation report

On page 1 of the CAR, the LLA states that COLAs may be funded with "excess" earnings. In truth, the MPERS legal construct does not fund COLAs with "excess" earnings. Instead, the law mentions "excess" earnings when setting up limits to the Board's ability to offer COLAs. In years where the fund's actuarial rate of return does not exceed the assumed rate of return by at least the lifetime cost of a COLA, the Board is restricted from granting any COLA. Although we recognize that formulas exist within the statutes that limit the payment of COLAs and set the maximum formula for the amount of COLA available when legislatively authorized, there is no automatic feature related to COLAs in the statutes and no portion of investment gains are automatically segregated for the purpose of the payment of future cost of living increases. This construct does not act as a guarantee that a portion of gains will be used to pay COLAs. Therefore, we disagree with the LLA's characterization of the applicable COLA provisions as gain-sharing.

The system's actuarial valuation report states that the present values do not include provisions for potential future increases not yet authorized by the Board of Trustees. Based on our determination that future cost of living increases are not substantively automatic or reasonably predictable, we do not believe that inclusion of future COLAs within the liabilities calculated is necessary. Despite the fact that actuarial standards of practice do not require MPERS to include the valuation of potential future COLAs within the plan's measurement of liabilities, we look forward to working with the system's Board of Trustees and staff to discuss the pros and cons of potential changes in the current valuation process.

In reviewing the possibility of recognizing future ad hoc cost of living increases in the System's actuarial valuations, we have considered the historical pattern of granting cost of living increases along with the contribution rate environment at the time of previous increases versus the rates in effect in recent years and projected over the near future. We do not believe that the ad hoc cost of living increases payable by MPERS are substantively automatic and therefore have not elected to add a measure of liability related to potential future cost of living increases. In fact, MPERS has only paid one COLA in the past 8 years.

The LLA report states, "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. Again, we simply disagree. The COLA statutes have existed alongside the funding formulas within statutes for decades. If the purpose of the statutes were to recognize the potential liabilities related to future COLAs before they are paid, a simple statutory provision within the funding formula would suffice. This comment does touch on an important question – Who should set policy with regard to funding of things that are not guaranteed? Actuarial funding would require funding directly for termination benefits, retirement benefits, disability benefits, death/survivor benefits, and DROP benefits because they are part of the plan in a way that ad hoc COLAs are not. No Board can act to deprive a member of any benefit promised in the statutes. This sets these benefits apart from the COLAs applicable to MPERS. The Board of Trustees could choose to never again approve an ad hoc COLA. Therefore, in our opinion, we intend to work with the Board of Trustees and the Legislature to determine the "purpose of the statutes" and to set funding policy with regard to ad hoc COLAs.

"Overly Optimistic Return Assumption"

The Comprehensive Actuarial Review of the 2017 Actuarial Valuation expresses a significant difference in opinion between the actuaries employed by the LLA and G. S. Curran & Company with regard to the valuation interest rate (or investment return assumption). This significant difference stems from a few separate items: a lower net inflation assumption, the use of 10 year expected rates of return to develop the return assumption, and a tendency to develop a single point estimate return assumption as opposed to determining a reasonable range for return assumptions.

The LLA discusses the need for a disciplined process to setting the return assumption. It is my belief that the LLA is well aware that G. S. Curran & Company does use a disciplined process of collecting and analyzing information from many expert investment consultants and forecasters. The expert information utilized includes expected real rates of return for each available asset class, standard deviations of returns for each available asset class, and the correlations between asset classes. G. S. Curran & Company has consistently used such expert information to formally adopt a reasonable range of assumed rates of return based directly on the system's own target asset allocation. As asset allocations have changed and as expert opinions have changed, G. S. Curran & Company has provided revised recommendations to its Boards of Trustees. Since MPERS' assumed rate of return was 7.5% at the beginning of this decade, the recommendation to lower the system's assumed rate of return came last year. In response, the Board of Trustees has adopted a plan to reduce its assumed rate of return over the next few years.

To set the expected nominal rate of return, we first project the expected real rate of return determined based on the target asset allocation set by the Board. One significant difference in our approach is the use of 20-30 year projections instead of 10 year projections for setting these economic assumptions. We simply do not agree with the LLA with regard to the appropriate time horizon to consider in setting either the assumed rate of return or inflation rate. We have reviewed inflation expectations of many experts and have used that information to develop our reasonable range for the long-term inflation assumption. Our ongoing review of this long-term inflation assumption has led us to tend toward reducing the assumption as economists and forecasters have brought their expectations lower, but our review has found reason to be concerned that inflation forecasting has often been influenced by static analysis with regard to tax policy and future economic growth. A survey of economists finds sharp disagreement as to the potential impact of the structural changes being made to the U.S. tax code. Many believe that such a change could cause increased growth in the U.S. economic output. Others focus on concerns related to the U.S. deficit. Business leaders like the J.P. Morgan chief U.S. economist suggest that the tax bill is supportive of inflation and further Federal Reserve rate hikes. Due to the politics of tax law changes, forecasts are often clouded by political ideology. This is evident in the vastly differing opinions of economic impact estimates of the tax changes produced by economists.

All of the backup evidence that we previously provided to the Legislative Auditor related to our inflation assumptions was produced prior to changes in the tax rates. We believe that it will take time for these changes to be contained within published forecasts by the Federal Reserve and Social Security Administration. Further, when we review the vast set of expert opinions related to expected long-term future inflation, what is most evident is the degree of uncertainty. This is demonstrated by the remarks of Federal Reserve Chair Janet Yellen on September 26, 2017 at the 59th Annual Meeting of the National Association for Business Economics. In her remarks, the Fed Chair discussed inflation expectations and the many inputs to be considered. Although her remarks

did not settle the issue related to expected inflation, they did clearly show that the Federal Reserve recognizes how difficult it is to predict inflation. Within her remarks are suggestions that inflation may remain low, but she includes statements like, "Key among current uncertainties are the forces driving inflation, which has remained low in recent years despite substantial improvement in labor market conditions." Also, she states, "Some of the recent decline in inflation, although not all, reflects idiosyncratic shifts in the prices of some items, such as the large decline in telecommunication service prices seen earlier in the year, that are unlikely to be repeated." Ms. Yellen adds, "Although we judge that inflation will most likely stabilize around 2 percent over the next few years, the odds that it could turn out to be noticeably different are considerable."

With this level of uncertainty, which has always existed around such economic assumptions, it has been our policy to slowly move our long-term assumptions in a direction supported by a majority of expert opinions while remaining within what we consider the reasonable range for long-term inflation. Ms. Yellen suggests that the Federal Reserve uses the same method to adjust monetary policy when she says, "How should policy be formulated in the face of such significant uncertainties? In my view, it strengthens the case for a gradual pace of adjustments. Moving too quickly risks overadjusting policy to head off projected developments that may not come to pass."

Therefore, although the 2.875% inflation assumption utilized in our 2016 actuarial valuation was within our reasonable range of long-term inflation assumptions, we recognized that our preference was to reduce the assumption given evidence drawn from many sources. Therefore, as the assumed long-term rate of return used to discount plan liabilities decreases, we expect to further decrease the assumed rate of future inflation as long as we do not see changes to the future expected real rates of return on investments held by the system's board of trustees or economic changes that increase inflationary pressures. This reduction will be gradual and will continually be reviewed with the goal of not over adjusting the assumption.

With regard to the return assumption, we believe that our process of reviewing the assumed rate of return based on the system's particular target asset allocation and a collection of data from many investment consulting firms with regard to long-term expected rates of return, standard deviations of return, and correlations for each asset class is more than defensible. It would appear that the main reason for the difference in our range of reasonable return assumptions with that developed by the Louisiana Legislative Auditor is time frame. We, in keeping with a majority of public plan actuaries, believe that the appropriate return assumption is based on expected rates of return and inflation over the long-term (20 – 30 years). The LLA has suggested that a 10 year assumption is more appropriate. In our opinion, the use of mid-term assumptions will lead to frequent changes in assumptions as markets go up and down and assumptions are adjusted for expected near and mid-term performance. We believe that assumptions based on 10 year time horizons will be more volatile and will tend to build in recent experience so that recent out-performance will tend to result in lower 10 year forecasts. In addition, long-term forecasts are not necessarily less reliable than mid-term assumptions. Although determining a reliable long-term point estimate of future returns is difficult, forecasting over longer periods has the advantage of the averaging process to reduce the volatility of outlier returns.

The LLA performed a Comprehensive Actuarial Review on only one of the statewide retirement systems in 2017 and 2018 – the Firefighters' Retirement System. We find the drastic change in the LLA's own recommendation for this system after only one year to be a concerning sign of how volatile mid-term assumptions and simple point estimates can be. A comparison of the two Comprehensive Actuarial Reviews show that the 6.7% consensus expectation stipulated in 2017 has

been reduced to 6.0% just one year later. Such volatility in recommended discount rates shows how dependent the end result is on the inputs to the process.

The LLA states that the board's 7.325% net investment return assumption is outside the consensus mainstream of investment forecasters. We believe that our assumption is within the consensus mainstream of professional investment forecasters for long-term return assumptions. Although we do not set our return assumption by looking at the assumptions used by other public plans, when considering whether our assumption is "mainstream" it can be instructive to compare to other public plans. In this case, the system's assumed rate of return is below the mean and median return assumptions of the 152 public employee retirement systems represented in the most recent NASRA survey and is set by Board decision to be further reduced in the coming years. It's simply unreasonable to claim that the Board's assumed rate of return is outside the consensus mainstream.

"Salary Scale Inconsistency"

Within the fiscal 2017 actuarial valuation report, the assumed rate of return was lowered by 0.175% and the assumed rate of inflation was reduced from 2.875% to 2.7%, also 0.175%. The change in assumed rate of inflation by an amount equal to the change in the assumed rate of return is a recognition that the reduction in the assumed rate of return is not based on a reduction in the long-term expected real rates of return for asset classes within the system's target allocation, but a reduction in the underlying inflation rate. Consistency is important between the salary scale assumption and the inflation assumption. If you assume that assumptions are exact point estimates, you would reduce the salary scale by an amount equal to the reduction in the plan's assumed rate of inflation. When you determine a reasonable range for an assumption such as the rate of inflation, and you change the assumed rate of inflation to a slightly lower point within that range, it is not inconsistent to leave the salary scale assumption unchanged. In fact, maintaining the salary scale assumption is more conservative than reducing the assumption. Since the system is expected to have a full experience study performed within two years and since the current salary scale assumption is not inconsistent with the updated inflation assumption, we do not feel that it is necessary or advisable to simply make a change in the salary scale assumption without completing a more in-depth analysis.

The Mortality Assumption

G. S. Curran & Company provided detailed information with regard to the method of setting mortality assumptions and since the LLA found the tables in use to be reasonable, we have not provided further discussion. We will, of course, continue to review the plan's mortality assumption as part of the experience study process. Changes to account for updated information related to mortality experience of the plan, mortality improvement scales, and even the use of static vs. generational mortality will be considered within each future experience study.