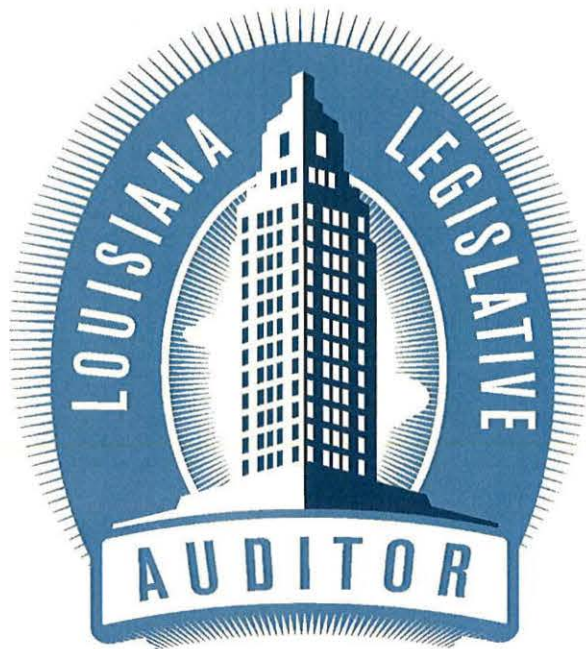


COMPREHENSIVE ACTUARIAL REVIEW OF THE
2016 ACTUARIAL VALUATION OF THE
LOUISIANA STATE POLICE RETIREMENT SYSTEM



ACTUARIAL SERVICES
PRESENTED TO THE PUBLIC RETIREMENT SYSTEMS' ACTUARIAL COMMITTEE
FEBRUARY 13, 2017



LOUISIANA LEGISLATIVE AUDITOR
DARYL G. PURPERA, CPA, CFE

February 3, 2017

Mr. Irwin L. Felps, Jr.
Louisiana State Police Retirement System
9224 Jefferson Highway
Baton Rouge, LA 70809

Re: Comprehensive Actuarial Review of the 2016 Actuarial Valuation

Dear Mr. Felps:

To fulfill the requirements of R.S. 11:127(C), the Louisiana Legislative Auditor will prepare a comprehensive actuarial review every other year for each of the statewide retirement systems. Your system, the Louisiana State Police Retirement System (LSPRS or System), is scheduled to receive a comprehensive review for funding valuations associated with even numbered years.

The remainder of this letter contains the results of our comprehensive review of your June 30, 2016, Actuarial Valuation. More specifically, we have evaluated for reasonableness the actuarial assumptions and methods employed by the System and its actuary. Based on this review, we expect to recommend at the February 13, 2017, meeting of PRSAC (the Public Retirement Systems' Actuarial Committee) that the Actuarial Valuation prepared by Hall Actuarial Associates (HAA) for June 30, 2016, and dated November 3, 2016, be approved.

I would like to thank you and your staff for your cooperation and assistance with this review.

Sincerely,

Daryl G. Purpera, CPA, CFE
Legislative Auditor

cc: Hall Actuarial Associates

Comprehensive Actuarial Review of the 2016 Actuarial Valuation of the Louisiana State Police Retirement System

1. Net Expected Rate of Return (eROR)

According to the 2016 Actuarial Valuation, the net eROR used in the determination of the discount rate for the System's actuarial valuation as of June 30, 2016, was 7.00%. It is stated to be net of investment-related expenses.

We would prefer to see a net eROR assumption closer to the 6.30% consensus expectation for the 15-year compound return (see below for more details). However, we find the use of 7.00% in the LSPRS funding valuation to be reasonable for the purpose at hand. It is just under the 7.05% consensus expectation for any one year during the mid-term horizon (again, see below for more details).

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

- Expected future inflation (forward-looking) and
- Current and future asset allocation percentages by asset class and
- Professional forecasts of future performance (forward-looking) over the selected horizon and other capital market assumptions for the different asset classes comprising the asset allocation.

Inflation

The 2016 Actuarial Valuation (page 30) states "The (2008-2012) Experience Study recommended a reduction back to 7.0% based upon reductions in the inflation forecast at 2.75%." We would prefer to see an inflation assumption closer to the 2.25% suggested by the expected inflation rates in the exhibit below. An inflation assumption of 2.75% appears to be an outlier compared to authoritative forecasts.

Because arithmetic or geometric rates are relatively easy to calculate, and are therefore readily available, it is tempting to rely on historical rates based on the consumer price index. However, there are many professional sources available to actuaries and investment consultants that forecast inflation on a forward-looking basis. In our opinion, forward-looking forecasts are much more appropriate than historical rates. Actuarial Standards of Practice (ASOP) No. 27 section 3.4 states:

"Relevant Data—To evaluate relevant data, the actuary should review appropriate recent and long-term historical economic data. The actuary should not give undue weight to recent experience. The actuary should consider the possibility that some historical economic data may not be appropriate for use in developing assumptions for future periods due to changes in the underlying environment."

There are many reasons to rely far more on forward-looking forecasts than historical. The past history of inflation rates in the U.S. (whether the past 10, 25, 50, or 100 years) may be interesting and useful in understanding inflation forces, but they should not supplant forward-looking expectations from inflation-forecasting experts and should not be used to defend or support a current valuation assumption concerning future inflation rates.

Expert professional sources for forward-looking inflation forecasts are generally much lower than 2.75%. Consider the forward-looking forecasts from expert professionals presented on the following page.

**Comprehensive Actuarial Review of the 2016 Actuarial Valuation of the
Louisiana State Police Retirement System**

Forward-looking Annual Inflation Forecasts (From Professional Experts in the Field of Forecasting Inflation)	
Federal Reserve Board's Federal Open Market Committee Long-run Price Inflation Objective (Since Jan 2012)	2.00%
Congressional Budget Office: <i>The Budget and Economic Outlook</i> Overall Consumer Price Index (Aug 2016; Ultimate) Overall Consumer Price Index (Aug 2016; 11 Years) Personal Consumer Expenditures (Aug 2016; Ultimate) Personal Consumer Expenditures (Aug 2016; 11 Years)	2.40% 2.33% 2.00% 1.95%
2016 Social Security Trustees Report CPI-W 15-Year Intermediate Assumption CPI-W 30-Year Intermediate Assumption GDP Deflator 15-Year Intermediate Assumption GDP Deflator 30-Year Intermediate Assumption	2.50% 2.55% 2.13% 2.17%
Quarterly Survey of Professional Forecasters 2Q2016 Federal Reserve Bank of Philadelphia 10-Year Forecast	2.20%
Federal Reserve Bank of Cleveland 30-Year Expectation on June 1, 2016 20-Year Expectation on June 1, 2016 10-Year Expectation on June 1, 2016	2.04% 1.87% 1.63%
Bond Investors (Excess Yield of Non-indexed Treasuries Over Indexed Treasuries) 30-Year Expectation on June 30, 2016 Median 30-year Expectation over 1/1/11 - 6/30/16 20-Year Expectation on June 30, 2015 Median 20-year Expectation over 1/1/11 - 6/30/16 10-Year Expectation on June 30, 2015 Median 10-year Expectation over 1/1/11 - 6/30/16	1.60% 2.28% 1.33% 2.27% 1.40% 2.14%
Investment Consultants and Forecasters 2016 GRS Survey major national investment forecasters and consultants Median expectation among 8 firms (6 to 20 Years) Median expectation among 2 firms (30 Years) 2016 HAS Survey of 12 investment advisors: Median (10 years) 2016 HAS Survey of 12 investment advisors: Median (20 years)	2.23% 2.38% 2.22% 2.31%

It has become much harder to defend inflation assumptions greater than or equal to 2.5% in the face of so many opinions to the contrary from experts in the field of inflation forecasting. Our preferred inflation

Comprehensive Actuarial Review of the 2016 Actuarial Valuation of the Louisiana State Police Retirement System

assumption currently would be 2.25% because it lies more comfortably within a consensus of the expectations above. Outliers may not be reasonable.

Asset Allocation

It has been generally accepted for many years that a fund's asset allocation to specified asset classes is responsible for over 90% of a fund's investment performance. Therefore, the asset allocation of the System is a core element in setting and evaluating the assumed future eROR.

In our evaluation of the actuary's net eROR assumption, we relied on the twelve target asset allocation percentages set forth in the System's formal Investment Policy Statement last updated October 2015. These percentages agree with the targets presented in the System's Asset Allocation Report dated July 7, 2016.

Professional Investment Forecasts

We applied those target asset allocations to the expectations in the Gabriel, Roeder, Smith & Company survey of eight major national investment consultants and forecasters. Given the brevity of the descriptions of the asset classes identified, our mapping of these seven asset classes to the investment consultant's asset classes may not be exact.

We applied the investment consultants' expected returns. We replaced the investment consultants' respective inflation assumptions with 2.25%, our preferred assumption based on the inflation forecasters' expectations presented above. We reduced the respective forecasts by the expected investment-related expenses and added alpha for active management (above expected passive management expenses) back in as permitted and limited by ASOP No. 27. 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. Following are the results of this process.

**Comprehensive Actuarial Review of the 2016 Actuarial Valuation of the
Louisiana State Police Retirement System**

Investment Consultant	Distribution of 15-Year Average Geometric Net Nominal Return			Probability of exceeding 7.00%
	40th	50th	60th	
(1)	(2)	(3)	(4)	(5)
1	4.58%	5.40%	6.23%	31.24%
2	5.25%	6.01%	6.78%	37.28%
3	5.13%	5.95%	6.78%	37.39%
4	5.46%	6.29%	7.14%	41.62%
5	5.75%	6.53%	7.32%	43.98%
6	5.56%	6.43%	7.31%	43.46%
7	5.99%	6.82%	7.65%	47.82%
8	6.09%	6.93%	7.78%	49.17%
Average	5.48%	6.30%	7.12%	41.49%

Notice the 50th percentile expectation of the consensus average is 6.30%. That can be considered the bottom of a range of reasonableness (unless additional conservatism is desired). Actuarially speaking, it is the preferred assumption because it is the 50th percentile expectation of compound returns over time.

Following is the backup showing the development of the one-year arithmetic returns.

Investment Consultant	Investment Consultant Expected Nominal Return	Investment Consultant Inflation Assumption	Expected Real Return (2)-(3)	Actuary Inflation Assumption	Expected Nominal Return (4)+(5)	Investment and Active Management Expenses	Recognized Value for Active Management	Expected Nominal Return Net of Expenses (6)-(7)+(8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1	6.60%	2.50%	4.10%	2.25%	6.35%	0.30%	0.10%	6.15%
2	6.81%	2.20%	4.61%	2.25%	6.86%	0.30%	0.10%	6.66%
3	6.90%	2.25%	4.65%	2.25%	6.90%	0.30%	0.10%	6.70%
4	7.03%	2.00%	5.03%	2.25%	7.28%	0.30%	0.10%	7.08%
5	6.72%	1.56%	5.16%	2.25%	7.41%	0.30%	0.10%	7.21%
6	7.48%	2.25%	5.23%	2.25%	7.48%	0.30%	0.10%	7.28%
7	7.79%	2.26%	5.53%	2.25%	7.78%	0.30%	0.10%	7.58%
8	7.86%	2.20%	5.66%	2.25%	7.91%	0.30%	0.10%	7.71%
Average	7.15%	2.15%	5.00%	2.25%	7.25%	0.30%	0.10%	7.05%

Notice the one-year arithmetic average consensus is 7.05%. This can be considered the top end of a range of reasonableness.

Comprehensive Actuarial Review of the 2016 Actuarial Valuation of the Louisiana State Police Retirement System

For use in an actuarial valuation for pensions, where the entire measurement and funding model is built on compounding (forward or backward), the 50th percentile compound geometric expectation is the most appropriate choice of a net eROR assumption. Nevertheless, while we would prefer to see 6.30%, we believe the System's 7.0% net eROR assumption is reasonable.

However, none of the eight major national investment consultants expects the 50th percentile of the compound return over time to be at or above the current 7.00% assumption. Some might consider this an outlier. According to the capital market assumptions of these investment consultants, there is only a 41.49% chance of achieving at least the 7.00% compound annual return over the next 15 years.

2. Treatment of Administrative Expenses

According to page 30 of the 2016 Actuarial Valuation, the Investment Rate of Return is "7.0%, Net Investment Expenses."

The report (page 6) states "The annual required contribution is the normal cost, plus an amortization payment of the Unfunded Actuarial Liability (UAL), plus administrative expenses." The report (page 30) also states that "Act 94 of 2016 includes administrative expenses as a component of the employer contribution rate. Previously, administrative expenses were excluded from explicit funding rules and were treated annually as a contribution experience loss, amortized over thirty years." The report (page 11) includes estimated administrative expenses of \$712,000 in the calculation of the Projected Employer Contribution for Fiscal 2017.

It is therefore our understanding that the administrative expenses are recognized in advance for funding purposes by way of a load of expected administrative expenses on the normal cost. That process is consistent with a Actuarial Standards of Practice (ASOPs), including:

Actuarial Standards of Practice (ASOP) No. 4 section 3.13(c) states:

"Expenses should be considered when assigning periodic costs or actuarially determined contributions to time periods. For example, the expenses for a period may be added to the normal cost for benefits or expenses may be reflected as an adjustment to the investment return assumption or the discount rate. As another example, expenses may be reflected as a percentage of pension obligation or normal cost."

Actuarial Standards of Practice (ASOP) No. 27 section 3.8.3(e) states:

"Investment and Other Administrative Expenses—Investment and other administrative expenses may be paid from the plan assets. To the extent such expenses are not otherwise recognized, the actuary should reduce the investment return assumption to reflect these expenses."

Actuarial Standards of Practice (ASOP) No. 35 section 3.6.1 states:

"Administrative Expenses Charged to the Plan—The actuary should take into account expenses such as investment advisory, investment management, or insurance advisory services, to the extent that the costs of these services are not reflected in the investment return assumption; premiums paid to

Comprehensive Actuarial Review of the 2016 Actuarial Valuation of the Louisiana State Police Retirement System

the Pension Benefit Guaranty Corporation (PBGC); accounting and auditing services; actuarial services; plan administration services; legal services; and trustee services. Formats for this assumption may include a dollar amount, a specific percentage of assets, a specific (and explicitly disclosed) reduction in the investment return assumption, or a percentage of benefit obligation or normal cost.”

In conclusion, we concur with the actuary that the June 30, 2016, discount rate should be based on the net eROR without any reductions for administrative expenses since they are included explicitly in the calculation of the actuarially required contributions.

This approach used in the 2016 Actuarial Valuation is reasonable and appropriate.

3. Mortality

The 2016 Actuarial Valuation (page 29) states that the mortality assumption, preretirement and postretirement, is the “RP-2000 Sex Distinct Mortality Table with mortality improvements projected to 2025.”

This is an incomplete description of the mortality table. However, we compared the table of probabilities found on page 31 of the Actuarial Valuation and found them to be derived from the RP2000 Combined Healthy table (not the tables split by Employee and Healthy Annuitants and not the tables with adjustments for collar or amount).

Base table

To evaluate the reasonableness of the mortality assumption, we reviewed the base mortality (RP2000) separately from the any projection scale for mortality improvements.

We believe the use of the RP2000 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 April 25, 2013) was prepared covering the period from July 1, 2007, through June 30, 2012. Page 7 of the 2016 actuarial funding report states that “There have been no changes to the actuarial assumptions or methods since the preceding measurement date which did incorporate my recommended changes contained in the five year Experience Study. . .”. The experience study report disclosed that there were only seven (7) male deaths and 76 female deaths during the five-year period. This is too few to draw any conclusions or comparisons with confidence.
2. Size of the plan: Due to the small size of the experience group and low number of total deaths likely during the study period, the results of the experience study are not fully credible (unlike LASERS, which was fully credible). Only partial credibility can therefore be given to the results of the experience study. Therefore, the use of a standard reference table is needed to obtain a final mortality assumption for valuation purposes.

Comprehensive Actuarial Review of the 2016 Actuarial Valuation of the Louisiana State Police Retirement System

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 Louisiana FRS, MPERS and/or SPR. 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. Police officers and firefighters are often combined or otherwise considered as having the same mortality rates.
 - 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 data¹ 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 RP2014) as the standard reference table in the weighted average calculations described above without adjustment.
5. RP2000 as the standard mortality table: The experience study states that RP2000 mortality table was selected as the standard base mortality table. At the time of the Experience Study, the RP2014 mortality table (the newest table currently available) was not published. But at the time of the 2016 actuarial funding report, the RP2014 mortality table was published and available (the report does not mention if that table was considered by the system's actuary). However, the RP2000 mortality table was ultimately selected and we believe it is reasonable since it accounts for the higher mortality rates in Louisiana. We analyzed data from the CDC¹ 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 RP-2014 (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.
6. Credibility weighting: Standard actuarial techniques give partial credibility to a small-to-medium size plan's experience data. Typically, the approach is to develop weighting factors to apply to the group's experience and to the standard reference tables (separately to males and females). Although, if the group or subgroup is too small, the benefit gained from the exercise is not worth the trouble. If the standard actuarial techniques were applied in this case, they would not move the needle very far from the standard reference table because the credibility factors for the group's own experience would be so low.

¹ 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.

Comprehensive Actuarial Review of the 2016 Actuarial Valuation of the Louisiana State Police Retirement System

No conclusions at all should be drawn from comparing the group's experience to expected rates from the RP2000 table.

Without any credible data or even partially credible data available relating to this group's experience, therefore, we find the base table selected (before projection for future mortality) to be acceptable for the 2016 Actuarial Valuation.

Projection scales

Once the base table was found to be reasonable, we then turned our attention to the projection scale used in the mortality assumption to reflect expected mortality improvements over time. The experience study report and the 2016 Actuarial Valuation stated that the RP2000 table was projected for mortality improvements to 2025. However, neither report indicated what projection scale was applied. We compared the table of probabilities found on page 31 of the 2016 Actuarial Valuation and found they correspond to the RP2000 Combined Healthy table projected by Scale AA.

However, there is an intermediate projection scale, Scale BB, which was developed to be used in connection with RP2000, pending 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 have been (and still is) 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. This overstates the rates prior the projection date and understates them thereafter. The generational projection applies the improvements for the four years between 2016 and 2020 for a member turning 65 in 2020, but applies the improvements for the 24 years between 2016 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 general Louisiana experience) and projecting generationally using MP2016. While either of these two approaches would be more current and preferable methodologies, we do not find the mortality tables used in the LSPRS 2016 actuarial funding valuation report to be unreasonable.

While there are more current and appropriate means for projecting future mortality improvements, we believe the actuary's use of Scale AA projected to 2025 is not unreasonable.

Comprehensive Actuarial Review of the 2016 Actuarial Valuation of the Louisiana State Police Retirement System

4. Cost of Living Adjustments

Page 30 of the 2016 Actuarial Valuation states:

“Cost-of-living Raises or Permanent Benefit Increases (PBI) may be granted from the Experience Account provided there are sufficient funds needed to offset the increase in the actuarial liability and the plan has met the criteria and eligibility requirements outline by ACT 399 of 2014. COLA’s/PBI’s are considered Ad Hoc raises and therefore, no projections for future increases are considered in the liabilities.”

Certain Louisiana statutes are applicable to all state 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 provides substantive rules applicable broadly to many of Louisiana’s retirement systems, including LSPRS. This statute has been around for a very long time. Certain other Louisiana statutes are applicable to specific retirement systems. For example, R.S. 11:1331.1-1332 provide substantive COLA rules specifically for LSPRS. Again, these specific statutes have been around a long time.

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

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

When

LSPRS has a complex benefit provision that transfers “excess investment earnings” in certain circumstances to an Experience Account for the subsequent granting of cost of living adjustments if approved by various parties and governing bodies. This benefit provision was first instituted in 2007 with a major amendment to the complexities in 2014 (Act 399).

The statutory mechanism for *when* a COLA may be granted has a two-step process:

1. Transfers into the Experience Account depend on: (a) whether there are excess investment earnings, (b) whether the excess earnings exceed a given threshold and (c) the annual cap on the experience account balance.
2. Freedom to recommend and grant a COLA’s depends on: (a) whether there are sufficient reserves in the Experience Account, (b) whether the funded ratio is at or above certain percentage levels and (c) how long it has been since a COLA had previously been granted; there

Comprehensive Actuarial Review of the 2016 Actuarial Valuation of the Louisiana State Police Retirement System

is an every-other-year permission in the statutory mechanism whenever the funded ratio is at least 55% but less than 85% (at or over 85%, COLAs may be granted every year).

According to pages 2 and 11 of the 2016 Actuarial Valuation, the funded ratio of LSPRS was 69.5% as of June 30, 2016. According to the statutes, this allows a COLA to be granted every other year as long as all other conditions are satisfied.

In our opinion, COLAs will likely be *allowed* for LSPRS every two or three years.

Discretion

If the conditions outlined in the second step above satisfied, the System's COLA benefits require the approval of four parties: (a) The LSPRS board recommends an increase to the president of the Senate and the speaker of the House of Representatives, (b) the actuary for the Legislative Auditor concurs that the COLA is allowed in the amount proposed, (c) the Legislature approves a bill granting the increase and (d) the Governor signs the bill,

The LSPRS COLAs are not automatic and are considered ad hoc because of these four points of discretion.

The board is free to vote in recommendation for or against a COLA when allowed, or not to vote at all. This is the discretionary aspect of the COLA-granting process. This discretionary step is what prevents the COLA from being considered "automatic." But consider the following internal and external forces at play which tend to press board members to recommend COLAs when allowed:

- While we have no personal knowledge or experience with the LSPRS board, generally speaking, retirement board members often have a sense of duty to serve the plan members. The LSPRS retirement board of trustees is composed of individuals who have a natural constituency in plan members. There is a natural inclination to recommend COLAs when allowed.
- Social Security gives a COLA almost every year. In any given future year, if LSPRS 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.
- Furthermore, if other retirement systems, such as LASERS, TRSL or other state or statewide systems give COLAs in a given year, LSPRS board members will feel pressure to recommend a COLA if allowed.
- 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.

These are some forces that are likely to press board members to recommend COLAs whenever allowed.

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 at the times when allowed if the employer contribution rate goes up by sufficient margins or if the funded ratio falls.

**Comprehensive Actuarial Review of the 2016 Actuarial Valuation of the
Louisiana State Police Retirement System**

The following table illustrates recent history of when LSPRS COLAs were allowed to be granted and how much.

LSPRS COLAs Granted			
Evaluated June 30	Effective July 1	Allowed to Grant COLA?	% COLA Granted
2016	2017	No	0% ¹
2015	2016	Yes	4.0% ²
2014	2015	No	0.00%
2013	2014	Yes	1.5% ³
2012	2013	No	0.00% ⁴

¹ According to the statutory mechanism, even if there are funds in the experience account, the Board of Trustees is not permitted to recommend to the Legislature that a COLA be granted to be effective July 1, 2017 (based on the 2016 experience account balance).

² The application of the statutory mechanism available to the 2016 Legislature would have allowed only a 0.1% COLA due to the limitation of the Consumer Price Index. However, the 2016 Legislature overrode the template (Act 93) and allowed for a 2% COLA.

³ In Act 399 the 2014 Legislature adopted a template limiting the frequency and level of COLAs to be recommended while the Plan is less than 80% funded or when the actual actuarial rate of return is below 7.25%. Act 101 of 2014 granted a 1.5% COLA in accordance with that newly adopted template.

⁴ Experience Account has a zero balance.

Given the recent examples of granting a COLA when allowed, coupled with the analysis above, in our opinion that there is a reasonable probability that all four approval points will opt to grant a COLA whenever allowed; maybe not every time (100%), but half the time (50%) would be a reasonable estimate (on the low side). It seems inappropriate to “assume” a 0% chance of granting a COLA in future years when otherwise allowed. The board members themselves may dispute that assumption about their future behavior toward plan members’ benefits.

Important and material plan provisions like these COLA provisions require objective analysis, careful attention and reasonable actuarial judgement of the future to appropriately measure the cost and liability of a retirement plan.

How much

The statutory mechanism for how much COLA the LSPRS board may recommend (assuming it is allowed to do so based on the conditions above) depends on (a) the funded status of the system, (b) if the actuarial valuation rate earned during the year was above the assumed valuation rate, (c) whether it is a base COLA, (d) whether it is an additional COLA, in which case the additional increase amount is 2% of the eligible member’s initial commencement amount and (e) whether the A+B method in R.S. 11:241 is applied. and (d) how much the CPI-U increased for the previous year (e) benefits in relation to a \$60,000 cap (indexed).

Comprehensive Actuarial Review of the 2016 Actuarial Valuation of the Louisiana State Police Retirement System

Legislative Framework Expects COLAs

The COLA provisions are in the Louisiana statutes for a reason: To pay COLAs -- sometimes. The sponsors and other legislators fully expect COLAs to be granted periodically, even if only every two or three 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 two years or three years. That is why we believe the statutory provision is there. Failure to recognize (even if making only a rough estimate) the cost and liability of the statutes' COLA provisions is to deny the purpose.

Something is Better Than Nothing

Traditional actuarial methods model the payment of various plan benefits over time, none of which are known with certainty either. 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 in reasonable calculations of the future costs and liabilities associated with any given plan benefit provisions. Decrement events and benefits do not need to be fully predictable before an actuary recognizes their likelihood within an actuarial valuation.

While 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) certain aspects of their eligibility and calculations can be programmed and calculated, and (c) other aspects of their eligibility/approval may be discretionary but they do have a reasonably likely chance of being approved whenever allowed. Actuarially measuring the future costs and liabilities of COLA benefits (recognizing a degree of likelihood and timing) is consistent with our traditional practice of actuarially measuring other legal plan benefit provisions (recognizing a degree of likelihood and timing).

Refer to the Appendix at the end of this letter for several citations from the Actuarial Standards of Practice (ASOPs).

Other Truly 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 of truly ad hoc COLAs emerges. But LSPRS 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 five years, the only two times when COLAs were allowed to be granted for satisfying the statutory conditions, the state legislature did indeed approve 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.

Comprehensive Actuarial Review of the 2016 Actuarial Valuation of the Louisiana State Police Retirement System

Reasonable Actuarial Estimates

There are at least two approaches to actuarially measuring the cost and liabilities of LSPRS's COLA provision: stochastic modelling and rough estimating. Both methods result in assuming that an annual or biennial COLA increase of X% serves as a reasonable proxy for what would likely actually happen in the years to come. The value of X% serves as the single equivalent COLA, and is treated in the valuation "as if" it is a regular COLA increase. The only challenge is to make a reasonable estimate of X%.

1. 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 liability projections, projected fund values based on an investment return for each future year, and annual valuation calculations 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.

Some have argued that this is too complicated and expensive for a small plan. However, this is not too complicated for an actuary to design 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 LSPRS (approximately \$670 million 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 adjusted for use on behalf of other retirement systems, thereby spreading the costs.

The actuary for the Legislative Auditor has prepared this type of stochastic analysis for LASERS and TRSL, which have similar COLA mechanisms. The result was to assume an equivalent annual COLA of 0.40% and 0.50%, respectively. This proxy produces a reasonable approximation to the actual COLA cost expected.

2. However, even a rough estimate would be better than nothing. Just following the reasoning set forth in the pages above, it is reasonable to expect COLAs to be allowed every other year, in the amount of 1.5% to 5.0% for some members each time granted. With an assumption of granting every time allowed, that might work out to a single equivalent annual COLA of approximately 2.0% to 3.0% over the next 30 years. If only a 50-50 chance of granting when allowed, that might work out to be a single equivalent annual COLA of approximately 1.0% to 1.50%.

Although, not very scientific and a more detailed version of this rough estimate is contemplated, this is better than nothing.

**Comprehensive Actuarial Review of the 2016 Actuarial Valuation of the
Louisiana State Police Retirement System**

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

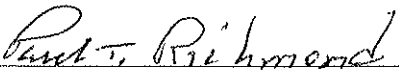
5. Calculations and Exhibits

We did not perform an actuarial audit and replication of the results. However, we reviewed the calculations presented in the 2016 Actuarial Valuation to ensure there were no mathematical errors. Based on our review, we believe all the calculations in the report were done correctly and without any mathematical errors.

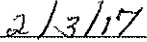
This communication should not be construed to provide tax advice, legal advice, or investment advice.

6. Actuarial Certification

Although assisted by other actuaries, the actuarial opinions expressed in this report are the opinions of Paul T. Richmond, Manager of Actuarial Services for the LLA. This report was prepared under Mr. Richmond's supervision. He received support from actuaries employed by Gabriel, Roeder, Smith & Company. Mr. Richmond is a member of the American Academy of Actuaries and meets the qualification standards of the Academy necessary to render the professional actuarial opinions contained herein. His supporting actuaries are also members of the Academy and meet the qualification standards that allow Mr. Richmond to rely on their advice and work products.



Paul T. Richmond, ASA, MAAA, EA, FCA



Date

APPENDIX

ACTUARIAL STANDARDS OF PRACTICE (ASOPs)

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.