COMPREHENSIVE ACTUARIAL REVIEW OF THE MUNICIPAL POLICE EMPLOYEES' RETIREMENT SYSTEM'S 2019 ACTUARIAL VALUATION

ACTUARIAL SERVICES

PRESENTED TO THE PUBLIC RETIREMENT SYSTEMS' ACTUARIAL COMMITTEE
FEBRUARY 12, 2020

January 14, 2020

Mr. Benjamin A. Huxen, II
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 2019 Actuarial Valuation

Dear Mr. Huxen:

To fulfill the requirements of R.S. 11:127(C) to the Public Retirement Systems' Actuarial Committee for 2019, the Louisiana Legislative Auditor has conducted a Comprehensive Actuarial Review for the Municipal Police Employees' Retirement System (System).

The remainder of this letter contains the results of our comprehensive review of your June 30, 2019 actuarial valuation (prepared by G.S. Curran & Company and dated November 18, 2019). More specifically, we have evaluated for reasonableness the actuarial assumptions and methods employed by the System and its actuary.

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

DGP:JJR:ch

cc: G.S. CURRAN & COMPANY

LLA'S COMPREHENSIVE ACTUARIAL REVIEW OF MPERS' 2019 ACTUARIAL VALUATION

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Scope of Review

The June 30, 2019, Actuarial Valuation Report for Municipal Police Employees' Retirement System (MPERS or System) for funding purposes (2019 Funding Valuation) was prepared by the actuary for MPERS' retirement board, G.S. Curran & Company (GSC), and dated November 18, 2019.

This Comprehensive Actuarial Review (CAR) of that report was prepared jointly by James J. Rizzo, Senior Consultant and Actuary employed by Gabriel, Roeder, Smith and Company (GRS), and by Piotr Krekora, Consultant and Actuary also employed by GRS. GRS is under contract with the Louisiana Legislative Auditor (LLA) to provide backup, research, calculations, actuarial services and advice to the LLA.

This CAR includes evaluations for appropriateness of certain actuarial assumptions and methods employed in the valuation report as well as documented support for opinions presented herein.

However, a full actuarial valuation replicating the MPERS actuary's results was not performed; nor was a full actuarial valuation performed using recommended assumptions and methods.

Summary of Findings

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

1. **Overly Optimistic Return Assumption**. We consider the System's 2019 investment return assumption to be overly optimistic, considering the fund's asset allocation and cash flow. Refer to *Section 1: Overly Optimistic Return Assumption* for more details.

2. **Treatment of Cost-of-Living Adjustments (COLAs)**. The cost of future COLAs is currently not included in the 2019 Funding Valuation. We recommend that the board of trustees consider their likelihood of granting a COLA when permitted to do so. 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 2: Treatment of Cost-of-Living Adjustments* for more details.

3. **Salary Scale Inconsistency**. The board's assumption for inflation was reduced from the prior year However, no similar reduction was made in the assumed salary scale increase rates, even though the 2019 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 assumed salary scale increase rates should be lowered in this case because the inflation assumption is lowered (in the absence of a full, new experience study on salary scales merit increases). Having

a plan to address the salary scale in a future year is not relevant to the June 30, 2019 valuation. Refer to *Section 3: Salary Scale Inconsistency* for more details.

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 2019 Funding Valuation. However, in our opinion, the mortality table should be updated to rely on a more current mortality table as the standard reference table, without waiting for the next experience study. Refer to *Section 4; Mortality Assumption* for more details.

5. **Financing Calculations.** We reviewed the 2019 Funding Valuation with additional emphasis on the exhibits presenting the financing calculations. All relevant and material financing calculations were complete and accurate.

Section 1: Overly Optimistic Return Assumption

This section sets forth a disciplined process for setting a return assumption that ensures it is mainstream and defensible, and provides the details for how we arrived at 6.50% as the most appropriate net return assumption, compared to MPERS' current 7.125% return.

A Disciplined Process

The cost of being wrong is substantial, whether it is over a 10-year period or a 30-year period, and could be detrimental to both plan members and taxpayers. Consider the subsections below which describe a *process* for setting, recommending, evaluating or defending a net return assumption that:

a. is unbiased, objective, free of agency risk, and not influenced by what the municipalities think is affordable;
b. is disciplined and robust;
c. is defensible; and
d. improves intergenerational equity, contribution stability, and benefit security of plan members.

This is the framework of our evaluation of the MPERS actuarial assumptions as adopted for the 2019 Funding Valuation.

Some of the most significant factors in setting or evaluating an assumed return are:

a. the forecast-horizon over which net investment returns are expected;
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;
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; and
e. expected benefit cash flow.

Forecast-horizons

There is an ongoing discussion over the time horizon for investment return forecasts that should be used to set the rate of return assumption for pension valuations.

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> should influence the final choice of return assumptions. Investment forecasters generally issue 10-year horizon forecasts, while some issue 20- or 30-year horizon forecasts. Thus, the closest to a mid-term horizon would be to use the available 10-year horizon forecasts.

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

Reason #1: Underperformance in the mid-term is not sustainable.

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

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

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

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

Reason #2: Over-reliance on reversion to mean returns.

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

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

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

This weakness of long-term forecasts is not, by itself, sufficient to disregard experts' long-term forecasts of the future entirely. But it should inform us not to rely on it to the exclusion of mid-term forecasts.
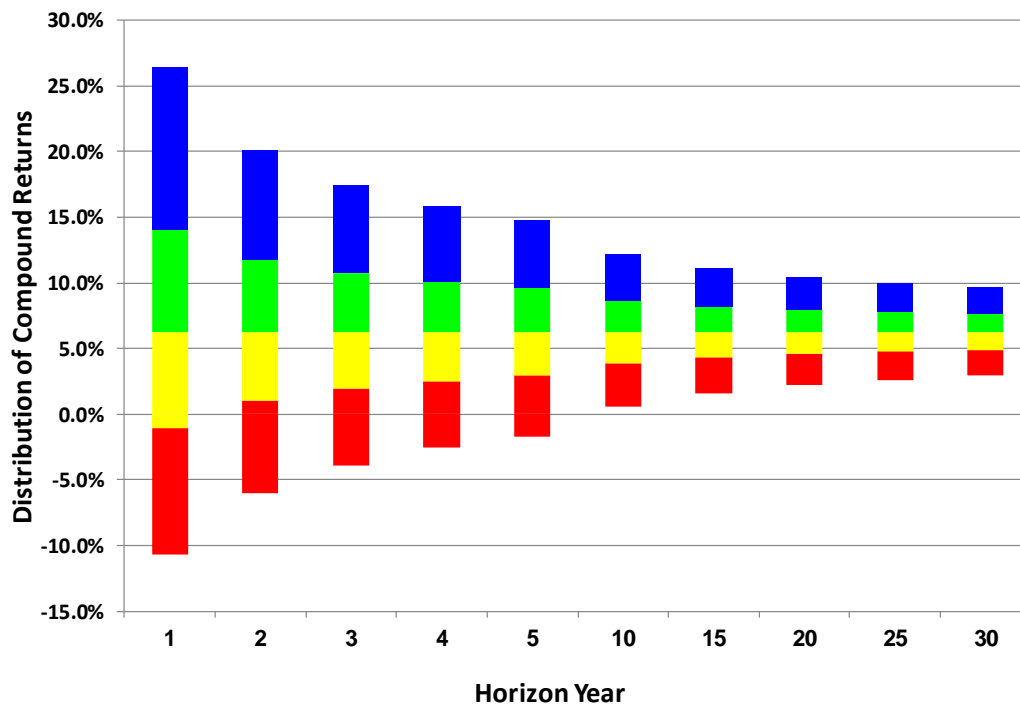
Reason #3: Return forecasts over a longer-term horizon are less reliable.

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

There are two types of statistical errors in forecasting –
1. error around the mean (some have called this "risk") and
2. error in the mean (and some call this "uncertainty").

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

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

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

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

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

Reason #4: The system's own cash flow demands.

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

- The most obvious factor is to incorporate a system's own investment policy's asset allocation, as required by Actuarial Standards of Practice (ASOP) No. 27 Section 3.8.3(a).
- Secondly, a system's own cash demands upon the fund should explicitly be incorporated into the assumption-setting math, as required by ASOP No. 27 Section 3.8.3(f). The timing of when benefit and expense payments place a drain on the fund affects how much the fund should be expected to earn while those assets are still in the fund.

Experts currently forecast investment returns to be lower over the mid-term horizon (years 1-10) than over the long-term (years 1-30). This means they must expect the later years to boost the compound average over 30 years compared to the compound average over the first 10 years.

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

Cash flow hypothetical No. 1: Consider a newly formed retirement system (system A) that is expected to pay very little in benefits over the mid-term horizon and most of its benefits beginning in year 25. Consider another retirement system (system B) that is a "mature" retirement system. A mature retirement system is expected to pay a significant amount of its

current accrued benefits over years 1-10. Mature retirement systems often pay out more in benefits than they take in from contributions (from employees, employers, or other sources).

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

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

One way to identify a "mature" retirement system is to compare the amount of benefits and expenses leaving the fund to the amount of contributions deposited into the fund. MPERS is a mature system with a negative cash flow. Mature retirement systems should give more consideration to mid-term forecasts than to long-term forecasts.

Cash flow hypothetical No. 2: Consider a state-run program that has been operational for 50 years and is fully expected to continue in operation. It is a "long-term proposition" (as is often said to describe pension systems). Since inception, this program has received a large infusion of capital at the beginning of each of the past 10-year periods, then pays disbursements every month until the end of the 10-year period when the assets are depleted. This infusion and payout occur in each 10-year period and are expected to continue in the same pattern. While this state-run program is a long-term proposition, program managers should be using mid-term and short-term investment forecasts for their calculations because of the mid-term and short-term cash flows.

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

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

There are two useful actuarial calculations that take into account a plan's own cash flow and which support the use of a mid-term forecast-horizon:

1. *Duration of the Benefit Cash Flow Liability.* MPERS' benefit "duration" is approximately 10.5 years. "Duration" is the present value weighted average length of time until the benefits are paid. This emphasizes the usefulness of the 10-year forecasts as representative of a mid-term outlook. 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, this does not mean that a long-term forecast-horizon is more appropriate for setting a return assumption for pension valuation.

2. *Single Equivalent Rate of Return.* Assume the experts are right that the next 10 years will provide much lower returns than the following 20 years (years 11-30). The present value of all benefit payments, discounted from their respective year of payment to the present based on the experts' expected return over each of those respective time frames would result in discounted benefit values at rates that range from the short-term to mid-term to long-term. The single equivalent rate would be a blend of short-term, mid-term, and long-term rates – closer to the mid-term rate, or possibly slightly higher. For the vast majority of retirement systems, that single equivalent rate would be slightly higher than the 10-year expected geometric return (or the 50th percentile of expected compound returns expected over the 10-year period), but less than the 20-30 year expected geometric return. This is consistent with the duration calculation discussed above.

In summary of Reason #4, a system's own cash flow should be explicitly integrated into the determination of a single return assumption for valuation, just as a system's own target asset allocations should be explicitly integrated into the determination.

Adopting a return assumption without recognizing a system's own expected cash flow and simply using investment consultants' broadly published long-term forecasts, even when that same forecaster publishes a mid-term forecast as well, is missing an important actuarial step.

Conclusion -- These four reasons suggest that using a 10-year mid-term forecast-horizon (or slightly higher) is most appropriate.

Perspectives

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

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. 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. In our opinion, 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. The LLA takes a forward-looking perspective of inputs into the process of setting a return assumption.

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 for determination or defense of a system's 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 the future performance of its pension fund.

Inflation

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

MPERS' 2019 Funding Valuation (page 4) states: "For 2019, an assumed rate of inflation of 2.5% was implicit in the assumed rate of return."

We find an inflation assumption closer to the 2.16% is more supported by the research on expected inflation rates as illustrated in the exhibits below.

Currently, expert professional forward-looking inflation forecasts generally lie between 1.67% and 2.58% across mid-term and long-term horizons. Actuaries are not generally qualified to forecast future rates of inflation. Therefore, consider the forward-looking forecasts from the following subject matter experts.

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

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

June 2019 Forward-looking Forecasts of CPI Inflation		
Horizon	Average	Sources
27 - 30$^+$ yrs	2.25%	5
20 yrs	1.81%	2
10 -15 yrs	2.16%	10

Our preferred inflation assumption would currently be 2.16% for the mid-term horizon.

Consider the following exhibit which shows the detailed inflation forecasts of these 10 large reputable expert organizations in the field of inflation forecasting. A 2.50% inflation expectation currently employed by the System lies at the upper end (or even above) of the range of professional forecasters presented in the summary table above and the detailed table below.

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

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, MPERS' asset allocation is a core element in process of setting and evaluating assumed future returns.

In our development of a most appropriate return assumption for MPERS, we first relied on the 11 target asset allocation percentages set forth in System's formal Investment Policy Statement (IPS) last updated February 20, 2019.

2019 MPERS Target Asset Allocation				
Risk-oriented Assets		**Fixed Income Assets**		
Large Cap U.S. Equities	17.0%	Core Bonds	25.0%
Small to Mid Cap U.S. Equities	7.0%	High Yield Bonds	1.5%
International Equities	17.0%	Bank Loans	1.5%
Emerging Market Equities	7.5%	EMD (local currency)	5.5%
Private Equity	5.0%		
Real Estate	8.0%		
Hedge Funds	5.0%	*Total Fixed Income Assets*	*33.5%*
Total Risk-oriented Assets	*66.5%*		
		Total Asset Allocation	*100.0%*

Source: Current MPERS Investment Policy Statement (dated February 20, 2019)

Consensus of Professional Investment Forecasts

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

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

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

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

We applied MPERS' target asset allocations to the expectations of these 14 major national investment forecasters. Given the brevity of the descriptions of the asset classes identified, our mapping of MPERS' 11 asset classes to the investment forecaster's asset classes may not be exact. We replaced the investment forecasters' respective inflation assumptions with 2.16%, 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' portfolio 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 ASOP 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 the correlation among asset classes and the 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 mid-term horizon.

Investment Forecaster	Distribution of 10-Year Compound Average Percentile Expectations			Probability of exceeding 7.125%
	40th	50th	60th	
(1)	(2)	(3)	(4)	(5)
1	3.67%	4.61%	5.55%	25.14%
2	4.62%	5.58%	6.54%	34.21%
3	4.68%	5.62%	6.57%	34.39%
4	5.01%	5.76%	6.51%	32.29%
5	5.20%	6.12%	7.04%	39.14%
6	5.45%	6.26%	7.07%	39.31%
7	5.34%	6.35%	7.37%	42.33%
8	5.49%	6.38%	7.28%	41.66%
9	5.47%	6.40%	7.33%	42.17%
10	5.59%	6.49%	7.39%	42.85%
11	5.98%	6.81%	7.65%	46.19%
12	5.90%	6.82%	7.74%	46.67%
13	6.13%	7.03%	7.93%	48.91%
14	6.38%	7.23%	8.09%	51.24%
Average	**5.35%**	**6.25%**	**7.15%**	**40.46%**

There are three important takeaways from the exhibit above:

a. Over the <u>mid-term horizon</u> the range of expectations of the 50th percentile of compound average return runs from 4.61% to 7.23%.

b. The 50th percentile consensus average <u>mid-term</u> forecast is 6.25%.

c. The consensus of these experts is that there is only a 40.46% chance of achieving at least the current 7.125% adopted by MPERS over the mid-term horizon. This does not mean a 40.46% chance of achieving the 7.125% assumption in any year during the horizon; it means that the compound return over the next 10 years has a 40.46% chance of achieving at least the 7.125% assumption.

This is why, actuarially speaking, the 6.25% 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 6.25% when compounded over the next 10 years.

For use in an actuarial valuation for pensions, where the entire measurement and funding model is built on compounding (present values and future values), we believe the 50th percentile compound or geometric expectation over a mid-term horizon is the most appropriate choice 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.

Adjustment for Benefit Outflow

The section above on *Forecast-horizons* discusses four reasons not to use a long-term horizon for pension valuations. Reason #4 addresses how a plan's own expected benefit outflow should be recognized in the determination of the most appropriate return assumption.

Due to the limited nature of this CAR, only an estimate can be provided for recognizing the benefit cash flow. The duration of the plan's benefit stream is approximately 10.50 years; thus, we estimate the cash flow adjusted return assumption would be raised from 6.25% to approximately 6.50%.

Based on this analytical process for setting the return assumption, we consider 6.50% to be the most appropriate net return assumption.

<u>Conclusion</u> -- Considering this analysis, we consider MPERS' current return assumption for its 2019 valuation of 7.125% to be overly optimistic for funding purposes.

Section 2: Treatment of Cost-of-living Adjustments

The cost of future COLAs is currently not included in the 2019 Funding Valuation, even though there is a high likelihood that they will be permitted and that they will be granted when allowed. Future COLAs are currently recognized in the calculations of costs and liabilities only after they are granted.

The COLAs available to MPERS are "Gain-sharing COLAs". This is a COLA granted when the actuarial earnings exceed the actuarial assumption.

There are many other rules for COLAs relating to: How often and when they may be granted, minimum and maximum percentage and dollar increases granted, and who is eligible to receive the increases.

When there is a reasonable expectation (not a guaranteed expectation) of "Gain-sharing COLAs" being granted in the future, an actuary should recognize the likelihood and magnitude of future "Gain-sharing COLAs" in the measurement of system costs and liabilities for both funding and accounting purposes. This is clear in both actuarial and accounting standards.

The likelihood, the timing, and the magnitude are all actuarially measurable. Based on professional forecasters and logic, and given the likelihood that the board of trustees would grant COLAs when permitted, in our opinion, material costs and liabilities of future COLAs should be measured and included in the valuations

The following exhibit illustrates the recent history of tests and rules relating to gain-sharing COLAs. This exhibit illustrates the two statutory rules that govern how the statutes have not permitted the board of trustees to grant a gain-sharing COLA:

1. *The Window Rule*. This rule prevents a COLA from being permitted every year based on the funded ratio of the plan. Based on the current funded ratio of 72.89%, a COLA may be granted (provided other conditions are satisfied) as long as a COLA has not been granted in any of the three most recent fiscal years. The window is now "open" and would then "close" for a few years after a COLA is granted, then re-open. As the funded ratio improves in future years, the number of years the window remains closed becomes shorter, so that the window is open more frequently.

2. *The Sufficient Actuarial Return Rule*. For each of the five years ending June 30, 2019, the pension fund's actuarial rate of return has been insufficient – it has not exceeded the system's assumption. That has prevented the board of trustees from being permitted to grant a gain-sharing COLA.

    For the 2019 Actuarial Valuation, the board of trustees and its actuary assume the long-term average rate of return to be 7.125%. As such, they expect the returns in any given future year to exceed that level often and fall below it often, leaving the average at 7.125%. By applying the actuarial smoothing process, the actuarial rate of return is also expected to exceed 7.125% at times in the future and fall below it other times.

Therefore, board of trustees and its actuary, reasonably expect the Sufficient Actuarial Return Rule will be satisfied numerous times in the future, i.e., the actuarial rate of return will exceed the assumption numerous times in the future.

The fund's failure to exceed the assumption in the recent past is no indicator that it will continuously fail to exceed the assumption in the future.

	COLA History for the Municipal Police Employees' Retirement System							
	Statutory Conditions for Gain-Sharing COLA Under:		Authorizing COLA Statute Pct and Recipients[2]					
Actuarial Measurement Date	The Window Rule[3]	The Sufficient Actuarial Return Rule[4]	R.S. 11:2225(A)(7) COLA [Up to 3%, to All Elg]	R.S. 11:246 COLA [2% or Nothing, to Elg Over 65]	Amount Granted by Board	Date Approved by Board	Effective Date of COLA	Comments
6/30/2019	Satisfied (For YE 2020)	Not Satisfied (4.5% vs. 7.2%)	None Permitted [To All Eligibles]	None Permitted [To Elg Over 65]	NA	NA	NA	None permitted for failure of Sufficient Investment Return
6/30/2018	Satisfied (For YE 2019)	Not Satisfied (5.6% vs. 7.325%)	None Permitted [To All Eligibles]	None Permitted [To Elg Over 65]	NA	NA	NA	None permitted for failure of Sufficient Investment Return
6/30/2017	Not Satisfied (For YE 2018)	Not Satisfied (5.7% vs. 7.5%)	None Permitted [To All Eligibles]	None Permitted [To Elg Over 65]	NA	NA	NA	None permitted for failure to satisfy both Rules
6/30/2016	Not Satisfied (For YE 2017)	Not Satisfied (3.1% vs. 7.5%)	None Permitted [To All Eligibles]	None Permitted [To Elg Over 65]	NA	NA	NA	None permitted for failure to satisfy both Rules
6/30/2015	Not Satisfied (For YE 2016)	Not Satisfied (6.7% vs. 7.5%)	None Permitted [To All Eligibles]	None Permitted [To Elg Over 65]	NA	NA	NA	None permitted for failure to satisfy both Rules
6/30/2014[5]	Not Satisfied (For YE 2015)	Satisfied (8.8% vs. 7.5%)	None Permitted [To All Eligibles]	None Permitted [To Elg Over 65]	3.0% Granted [To All Eligibles]	9/10/2014	11/1/2014	Granted per one-time legislative permission. Effective during fiscal year ending 2015; delayed to the second fiscal year following the June 30, 2013 valuation date.

[2] Per R.S. 11:2225(A)(7), the Board is authorized to provide a COLA of up to 3% to all eligible pensioners. Additionally, per R.S. 11:246, the Board is authorized to provide an additional COLA of 2% to eligible pensioners over age 65. No COLA may be provided during any fiscal year until the lapse of at least one-half of the fiscal year.

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

[4] Per R.S. 11:2225(A)(7), the Board is authorized to use interest earnings on investments of the system in excess of normal requirements to provide a supplemental COLA of up to 3% to all eligible pensioners. Additionally, per R.S. 11:246, the Board has the authority to provide an additional COLA of 2% to eligible pensioners over age 65 if there is sufficient excess interest earnings to fund the entire 2% additional COLA.

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

Legislative Framework Presumes COLAs

Presumably, the COLA provisions are in the Louisiana statutes so that boards of trustees (such as MPERS) would be permitted to pay COLAs – sometimes.

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 provisions are 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 actuarial practice, knowing with certainty that specific future events will occur is not a requirement for inclusion in projected benefits. This is also true of future COLAs in particular.

Traditional actuarial methods model the payment of various types of plan benefits over time, none of which is 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. Benefits do not need to be fully predictable before an actuary recognizes their likelihood within an actuarial valuation.

In the future, whenever the statutory Rules are satisfied, the board of trustees may grant COLAs. While we do not know with certainty, we believe it is likely that COLAs will be granted when permitted (as long as they are not paid out of a Funding Deposit Account).

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 benefits 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 reasonable likelihood of being approved when permitted. Even if they are assumed to granted half the time permitted, that is better (more realistic) than nothing.

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). It has been fundamental in actuarial practice for decades that a retirement plan's benefits should be recognized in actuarial valuations when they are (a) legally authorized and enforceable, (b) material, (c) actuarially measurable, and (d) reasonably likely to occur in future years.

Refer to the Appendix 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 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.

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.

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.* Information about the frequency and magnitude of each year's permitted gain-sharing COLA can be captured during the simulations. 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., 7%, 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 measurable 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.

Conclusion: The LLA recommends an actuarial study be prepared that models the future gain-sharing COLAs stochastically. Based on the studies we have prepared for the four state systems and two other statewide systems, the LLA expects MPERS' gain-sharing COLA benefits to be material.

Section 3: Salary Scale Inconsistency

The assumed rate of inflation is an important building block component in both the investment return assumption and salary increases assumption for each active member.

The 2016 valuation employed a 2.875% inflation assumption. It was then reduced to 2.70% for 2017 and 2.60% for 2018, and now to 2.50% for 2019. That is a total reduction of 0.375% over the three-year period. However, the gross assumed rates of salary increase did not drop by similar amounts. No parallel change was made in tandem to the assumed rates of salary increase. This makes the salary increase assumption inconsistent with the embedded inflation assumption.[6]

The 2018 Funding Valuation report stated (page 42):

> "Salary increases include 2.6% 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 2018 Funding Valuation, when the inflation assumption was 2.60% which was embedded in the salary scale rates above.

The 2019 Funding Valuation report stated (page 42):

> "Salary increases include 2.5% 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%"

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[6] Actuarial Standard of Practice (ASOP) No. 27, section 3.12 states:
Consistency among Economic Assumptions Selected by the Actuary for a Particular Measurement—With respect to any particular measurement, each economic assumption selected by the actuary should be consistent with every other economic assumption selected by the actuary for the measurement period, unless the assumption, considered individually, is not material, as provided in section 3.5.2. A number of factors may ASOP No. 27—September 2013 14 interact with one another and may be components of other economic assumptions, such as inflation, economic growth, and risk premiums. In some circumstances, consistency may be achieved by using the same inflation, economic growth, and other relevant components in each of the economic assumptions selected by the actuary. Consistency is not necessarily achieved by maintaining a constant difference between one economic assumption and another. For each measurement date, the actuary should reevaluate the individual assumptions and the relationships among them, and make appropriate adjustments.

This salary scale was employed for the 2019 Funding Valuation, when the inflation assumption was 2.5%. Notice the disclosure acknowledges that the 2.5% inflation assumption was embedded in the salary scale rates above. That is a change in the inflation assumptions. Yet the gross rates did not change.

Conclusion: For consistency and in accordance with 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 scale merit components).

As mentioned earlier, having a plan to address the salary scale in a future year is not relevant because our actuarial review is examining the 2019 Funding Valuation.

Section 4: Mortality Assumption

The 2019 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 with no set back and Projected to 2029 using Scale AA for females with a one year set back."

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).

The base rates were selected in an experience study (dated February 17, 2016) 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.

While we find the process of setting mortality assumptions to employ reasonable applications of actuarial credibility principles, we do not find the RP2000 with Blue Collar Adjustments to continue being a reasonable selection of the base mortality table.

We base our opinion on the fact that the Pub-2010 Mortality Tables, the most recently developed broad-based mortality tables, were issued by the Retirement Plans Experience Committee of the Society of Actuaries and published in January 2019. These tables constitute the most recent and reliable standard reference tables available for purposes of national estimates of mortality for public pension plans and include tables reflecting variations in mortality due to job category and above- or below-median income levels.

Conclusion -- A more current approach to estimating mortality rates for valuation purposes would be to use PubS-2010(B) adjusted for partially credible plan-specific experience, then projecting generationally using MP2018 or MP 2019. Using the below-median rates (Table B) for public safety plans is suggested as a proxy for geographic and job category adjustments.

Actuarial Certification

This Actuarial Review report constitutes a Statement of Actuarial Opinion. It has been prepared by actuaries who have substantial experience valuing public employee retirement systems. To the best of our knowledge the information contained in this report is accurate and fairly presents information it is purported to present. All calculations have been made in conformity with generally accepted actuarial principles and practices and with the Actuarial Standards of Practice issued by the Actuarial Standards Board.

James J. Rizzo and Piotr Krekora are members of the American Academy of Actuaries. These actuaries meet the Academy's Qualification Standards to render the actuarial opinions contained herein.

The signing actuaries are independent of the Municipal Police Employees' Retirement System.

_____   <u>January 13, 2020</u>
James J. Rizzo, ASA, EA, MAAA   Date
Senior Consultant and Actuary
Gabriel, Roeder, Smith & Company

_____   <u>January 13, 2020</u>
Piotr Krekora, ASA, EA, MAAA, PhD   Date
Consultant and Actuary
Gabriel, Roeder, Smith & Company

APPENDIX

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 advantages 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.

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

This process is not too complicated to design, program, and run. It is being done more and more in many actuarial firms across the country. Furthermore, the cost should not be considered too much for a plan the size of MPERS (more than $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.

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 or all 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 CAR 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.