LACERS
LOS ANGELES CITY EMPLOYEES' RETIREMENT SYSTEM

Report to Board of Administration

Agenda of: **JULY 11, 2017**

From: Thomas Moutes, General Manager ITEM: **III-A**

SUBJECT: **ECONOMIC ASSUMPTIONS REVIEW AND POSSIBLE BOARD ACTION**

Recommendations:

That the Board adopt the following assumption changes:

- Inflation assumption: 3.00%
- Inflation component of the salary increase assumption: 3.00%
- Real across-the-board pay increases component of the salary increase assumption: 0.50%
- Payroll increase assumption: 3.50%
- Credit rate for employee contribution: 3.00%
- Investment return assumption: 7.25%, contingent on further review in 2018 after an asset allocation exercise is conducted, otherwise 7.00%.

It is further recommended that the Board instruct staff to have LACERS' consulting actuary conduct a full actuarial experience study in 2018, to include both economic and demographic assumptions.

Discussion:

Actuarial assumptions are used in the actuarial valuation process for measuring the costs/liabilities of the plan and the contribution requirements of the plan sponsor. While the City Charter requires that an actuarial experience study be completed at least once every five years, the typical time frame between experience studies has been three years. LACERS' last experience study was conducted in 2014. In May of 2015, the Board approved a change in the timing for the completion of the next experience study from 2017 to the first half of 2018 to help alleviate the tight time frames between the adoption of the assumption changes following the triennial experience study, and the immediate implementation of those changes for the actuarial valuation. However, at its March 14, 2017 meeting, the Board adopted a two-phase approach:

Phase A: All economic assumptions, including investment return, inflation, salary increase, and cost of living adjustment (COLA), will be conducted in 2017. Changed economic assumptions will be included in the June 30, 2017 actuarial valuation and reflected in the City contribution rates for fiscal year 2018-19.

Phase B: Demographic assumptions, such as termination, retirement, and mortality, will be conducted in first half of 2018. Changed demographic assumptions will be included in the June 30, 2018 actuarial valuation and reflected in the City contribution rates for fiscal year 2019-20.

Pursuant to the Board's decision, our consulting actuary, Segal Consulting (Segal), has completed the review of all economic assumptions (Attachment A) and recommended changes to most of them, specifically:

- Inflation assumption: reduce from 3.25% to 3.00%
- Inflation component of the salary increase assumption: reduce from 3.25% to 3.00%
- Real across-the-board pay increases component of the salary increase assumption: reduce from 0.75% to 0.50%
- Payroll increase assumption: reduce from 4.00% to 3.50%
- Credit rate for employee contribution: reduce from 3.25% to 3.00%
- Investment return assumption: reduce from 7.50% to 7.00%. Segal also provided an alternate assumption of 7.25%

Investment Return Assumption

To develop the assumed rate of return Segal uses the building-block approach, which includes four components: inflation, real rate of return, expense adjustment, and risk adjustment. The table below, reproduced from the Segal report, provides a comparison of Segal's recommended investment return assumption with its alternative assumption (differences in bold font):

Assumption Component	Segal Recommended Assumption	Segal's Alternative Assumption (Staff's Recommendation)
Inflation	3.00%	3.00%
Plus Portfolio Real Rate of Return	5.54%	5.54%
Minus Expense Adjustment	(0.60%)	(0.60%)
Minus Risk Adjustment	**(0.94%)**	**(0.69%)**
Total	**7.00%****	**7.25%****
Confidence Level	**61%**	**58%**
Cost Impact as a Percent of Payroll*	**5.18%**	**2.09%**

* Increase in City contribution rate for both the retirement and health benefits

** The Board-adopted investment return assumption will be used for funding purposes, financial reporting purposes, and for some benefit calculations.

The real rate of return component contained in Segal's building-block model, 5.54%, is very close to the 5.59% developed in the 2014 experience study. This similarity mainly is due to the asset allocation being used to determine the real rate of return this year is the same one used three years ago. Now that LACERS has retained a new general fund investment consultant, a new asset allocation is expected to be adopted by the Board within a year. The new asset allocation may impact (positively or negatively) the real rate of return component of the investment return assumption. With the new asset allocation, the investment return assumption should be re-examined sooner than 2021, which would be the timing of the next scheduled review. Therefore, staff recommends that a full experience study of both economic assumptions and the demographic assumptions, instead of just the demographic assumptions, be conducted in the first half of 2018. All changed assumptions from the 2018 experience study will be included in the June 30, 2018 actuarial valuation and reflected in the City contribution rates for fiscal year 2019-20.

The main difference of Segal's recommendation of a 7.00% assumed rate of return and its alternative recommendation of 7.25% is the size of the risk adjustment, which causes a difference in the confidence level (61% vs. 58%). The confidence level, in the context of this risk adjustment, is defined by Segal

as “the likelihood that the actual average return would equal or exceed the assumed value over a 15-year period”. While staff appreciates the merit of a higher confidence level, staff does not believe that the 3% increase in the confidence level is necessary if another economic assumptions review is conducted next year after the Board adopts a new asset allocation. Said differently, staff considers adoption of the 7.25% rate of return assumption along with another review of the economic assumptions after a new asset allocation is completed in 2018 to currently be a better way to address the risk of the assumption than lowering the assumption directly to 7.00% without further scheduled review until 2021.

Paul Angelo of Segal Consulting will present the review of economic assumptions.

This report was prepared by Li Hsi, Assistant General Manager.

TM:LH

Attachment: Segal Economic Assumptions Review Report

Segal Consulting

Los Angeles City Employees' Retirement System

ECONOMIC ASSUMPTIONS REVIEW

Review of Economic Actuarial Assumptions for the June 30, 2017 Actuarial Valuation

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June 30, 2017

Board of Administration
Los Angeles City Employees' Retirement System
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Re: Review of Economic Actuarial Assumptions for the June 30, 2017 Actuarial Valuation

Dear Board Members:

We are pleased to submit this report of our review of the June 30, 2017 economic actuarial assumptions for the Los Angeles City Employees' Retirement System. This report includes our recommendations and the analysis supporting their development.

It has been the practice of the Board of Administration to review both the economic and non-economic[1] actuarial assumptions every three years and the last triennial experience study was performed as of June 30, 2014. In this report, we have only performed a review of the economic assumptions for the June 30, 2017 Retirement Plan and Health Plan valuations. As the non-economic assumptions will not be reviewed until after the June 30, 2017 valuations, we will continue to apply the same non-economic assumptions used in the June 30, 2016 valuations for the June 30, 2017 valuations.

We are members of the American Academy of Actuaries and we meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein.

We look forward to reviewing this report with you and answering any questions you may have.

Sincerely,

Paul Angelo, FSA, MAAA, FCA, EA
Senior Vice President and Actuary

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Vice President and Actuary

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[1] The non-economic assumptions include rates of retirement, termination, post-retirement mortality, salary increases, etc.

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Economic Assumptions Review
Review of Economic Actuarial Assumptions
for the June 30, 2017 Actuarial Valuation

I. Introduction, Summary, and Recommendations

To project the cost and liabilities of the Retirement System, assumptions are made about all future events that could affect the amount and timing of the benefits to be paid and the assets to be accumulated. Each year actual experience is compared against the projected experience, and to the extent there are differences, the future contribution requirement is adjusted.

If assumptions are changed, contribution requirements are adjusted to take into account a change in the projected experience in all future years. There is a great difference in both philosophy and cost impact between recognizing the actuarial deviations as they occur annually and changing the actuarial assumptions. Taking into account one year's gains or losses without making a change in the assumptions in effect assumes that experience was temporary and that, over the long run, experience will return to what was originally assumed. Changing assumptions reflects a basic change in thinking about the future, and it has a much greater effect on the current contribution requirements than recognizing gains or losses as they occur.

The use of realistic actuarial assumptions is important in maintaining adequate funding, while paying the promised benefit amounts to participants already retired and to those near retirement. The actuarial assumptions used do not determine the "actual cost" of the plan. The actual cost is determined solely by the benefits and administrative expenses paid out, offset by investment income received. However, it is desirable to estimate as closely as possible what the actual cost will be so as to permit an orderly method for setting aside contributions today to provide benefits in the future, and to maintain equity among generations of participants and taxpayers.

This study was undertaken in order to review the economic actuarial assumptions. The study was performed in accordance with Actuarial Standard of Practice (ASOP) No. 27 "Selection of Economic Assumptions for Measuring Pension Obligations." This Standard of Practice puts forth guidelines for the selection of the economic actuarial assumptions utilized in a pension plan actuarial valuation.

We are recommending changes in the assumptions for investment return, inflation, and across-the-board salary increases. Our recommendations for the economic actuarial assumptions for the June 30, 2017 actuarial valuation are as follows:

Pg #	Actuarial Assumption Categories	Recommendation
4	**Inflation:** Future increases in the cost-of-living index, which drives investment returns and active member salary increases, as well as cost-of-living adjustments (COLAs) for retirees.	Reduce the assumed rate of price inflation from 3.25% per annum to 3.00% per annum as discussed in Section (III)(A).

Pg #	Actuarial Assumption Categories	Recommendation
6	**Investment Return:** The estimated average future net rate of return on current and future assets of the System as of the valuation date. This rate is used to discount liabilities.	Reduce the current investment return assumption from 7.50% per annum to 7.00% per annum as discussed in Section (III)(B). A 7.00% assumption would provide a margin that is consistent with the practice followed in prior studies under the risk-adjusted model used by Segal to evaluate this assumption. As a decrease from 7.50% to 7.00% is a significant reduction in the long-term investment return assumption, we have also developed an alternative assumption of 7.25% that would provide a smaller margin than prior studies (except for 2011) under the risk-adjusted model. We also recommend that the same investment return assumption that is adopted by the Board for funding purposes (i.e., either 7.00% under our recommended assumption or 7.25% under our alternative assumption) be used for GASB financial reporting purposes.
14	**Individual Salary Increases:** Increases in the salary of a member between the date of the valuation to the date of separation from active service. This assumption has three components: • Inflationary salary increases • Real "across the board" salary increases • Merit and promotional increases	Reduce the current inflationary salary increase assumption from 3.25% to 3.00% consistent with our recommended general inflation assumption, and reduce the current real "across the board" salary increase assumption from 0.75% to 0.50%. This means that the combined inflationary and real "across the board" salary increases will decrease from 4.00% to 3.50% per annum. The current merit and promotional increase assumption ranges from 6.50% to 0.40%. The merit and promotional increases will remain unchanged; they were reviewed in the last triennial experience study as of June 30, 2014 and will be reviewed again at the next triennial experience study to be performed after the June 30, 2017 valuations.

We have estimated the impact of the proposed assumption changes as if they were applied to the June 30, 2016 Retirement Plan and Health Plan actuarial valuations. In particular, if all of the proposed economic assumption changes recommended in this report (including the 7.00% investment return assumption) were implemented, the aggregate employer contribution rate would have increased by 4.07% and 1.11% of payroll for the Retirement Plan and the Health Plan, respectively.

If the alternative 7.25% investment return assumption is adopted, together with all the other proposed assumption changes recommended in this report, then the aggregate employer contribution rate would have increased by 1.51% and 0.58% of payroll for the Retirement Plan and the Health Plan, respectively.

Section II provides some background on the basic principles and methodology used for the review of the economic actuarial assumptions. A detailed discussion of each of the economic assumptions and reasons for the proposed changes are found in Section III. The cost impact of the proposed changes is detailed in Section IV.

II. Background and Methodology

In this report, we analyzed the "economic" assumptions only. The primary economic assumptions reviewed are inflation, investment return, and salary increases.

Economic Assumptions

Economic assumptions consist of:

- **Inflation:** Increases in the price of goods and services. The inflation assumption reflects the basic return that investors expect from securities markets. It also reflects the expected basic salary increase for active employees and drives increases in the allowances of retired members.

- **Investment Return:** Expected long-term rate of return on the System's investments after expenses. This assumption has a significant impact on contribution rates.

- **Salary Increases:** In addition to inflationary increases, it is assumed that salaries will also grow by real "across the board" pay increases in excess of price inflation. It is also assumed that employees will receive raises above these average increases as they advance in their careers. These are commonly referred to as merit and promotional increases. Payments to amortize any Unfunded Actuarial Accrued Liability (UAAL) are assumed to increase each year by the price inflation rate plus any real "across the board" pay increases that are assumed.

The setting of these economic assumptions is described in Section III.

III. Economic Assumptions

A. Inflation

Unless an investment grows at least as fast as prices increase, investors will experience a reduction in the inflation-adjusted value of their investment. There may be times when "riskless" investments return more or less than inflation, but over the long term, investment market forces will generally require an issuer of fixed income securities to maintain a minimum return which protects investors from inflation.

The inflation assumption is long term in nature, so our analysis included a review of historical information. Following is an analysis of 15 and 30-year moving averages of historical inflation rates:

HISTORICAL CONSUMER PRICE INDEX – 1930 TO 2016
(U.S. City Average - All Urban Consumers)

	25th Percentile	Median	75th Percentile
15-year moving averages	2.5%	3.4%	4.5%
30-year moving averages	3.1%	3.9%	4.8%

The average inflation rates have continued to decline gradually over the last several years due to the relatively low inflationary period over the past two decades. Also, the later of the 15-year averages during the period are lower as they do not include the high inflation years of the mid-1970s and early 1980s.

Based on information found in the Public Plans Data website, which is produced in partnership with the National Association of State Retirement Administrators (NASRA), the median inflation assumption used by 142 large public retirement funds in their 2015 fiscal year valuations was 3.00%. In California, CalPERS, CalSTRS, Contra Costa County, Los Angeles County, and two other 1937 Act CERL systems use an inflation assumption of 2.75% while LADWP, LAFPP, Orange County, and nine other 1937 Act CERL systems use an inflation assumption of 3.00%.

LACERS' investment consultant, Wilshire, anticipates an annual inflation rate of 1.97%, while the average inflation assumption provided by Wilshire and seven other investment advisory firms retained by Segal's California public sector clients was 2.37%. Note that, in general, investment consultants use a time horizon for this assumption that is shorter than the time horizon we use for the actuarial valuation.

To find a forecast of inflation based on a longer time horizon, we referred to the 2016 report on the financial status of the Social Security program. The projected average increase in the Consumer Price Index (CPI) over the next 75 years under the intermediate cost assumptions used in that report was 2.60%. We also compared the yields on the thirty-year inflation indexed U.S. Treasury bonds to comparable traditional U.S. Treasury bonds. As of May 2017, the difference in yields is about 1.97%, which provides a measure of market expectations of inflation.

Based on all of the above information, we recommend that the current 3.25% annual inflation assumption be reduced to 3.00% for the June 30, 2017 actuarial valuation.

Crediting Rate for Employee Contributions

We note that the interest crediting rate for employee contributions is based on the average rates of a five-year U.S. Treasury Note. Currently, an assumption of 3.25% is used to approximate that crediting rate, and the 3.25% crediting rate assumption is tied to the current inflation assumption.

In conjunction with our recommendation to lower the current 3.25% annual inflation assumption to 3.00% for the June 30, 2017 valuation, as discussed above, we also recommend that the interest crediting rate assumption for employee contributions be lowered from 3.25% to 3.00% for the 2017 valuation.

Retiree Cost of Living Increases

In our last experience study, consistent with the 3.25% annual inflation assumption adopted by the Board for that valuation, the Board maintained the 3.00% retiree cost-of-living adjustment for Tier 1 (and subsequently a 2.00% retiree cost-of-living adjustment for Tier 3, after its adoption effective February 21, 2016).

We are recommending that the current retiree cost-of-living assumptions (i.e., 3.00% per year for Tier 1 and 2.00% per year for Tier 3) be continued in the June 30, 2017 valuation.

In developing the COLA assumption, we also considered the results of a stochastic approach that would attempt to account for the possible impact of low inflation that could occur before COLA banks (applicable to Tier 1 only) are able to be established for the member. Although the results of this type of analysis might justify the use of a lower COLA assumption, we are not recommending that at this time. The reasons for this conclusion include the following:

- The results of the stochastic modeling are significantly dependent on assuming that lower levels of inflation will persist in the early years of the projections. If this is not assumed, then the stochastic modeling will produce results similar to our proposed COLA assumptions.
- Using a lower long-term COLA assumption based on a stochastic analysis would mean that an actuarial loss would occur even when the inflation assumption of 3.00% is met in a year. We question the reasonableness of this result.

We do not see the stochastic possibility of COLAs averaging less than those predicted by the assumed rate of inflation as a reliable source of cost savings that should be anticipated in our COLA assumptions. Therefore, we continue to recommend setting the COLA assumptions based on the long-term annual inflation assumption, as we have in prior years.

B. Investment Return

The investment return assumption is comprised of two primary components, inflation and real rate of investment return, with adjustments for investment expenses and risk.

Real Rate of Investment Return

This component represents the portfolio's incremental investment market returns over inflation. Theory has it that as an investor takes a greater investment risk, the return on the investment is expected to also be greater, at least in the long run. This additional return is expected to vary by asset class and empirical data supports that expectation. For that reason, the real rate of return assumptions are developed by asset class. Therefore, the real rate of return assumption for a retirement system's portfolio will vary with the Board's asset allocation among asset classes.

The following is the System's current target asset allocation and the assumed real rate of return assumptions by asset class. The first column of real rate of return assumptions are determined by reducing Wilshire's total or "nominal" 2017 return assumptions by their assumed 1.97% inflation rate. The second column of returns (except for Credit Opportunities, Public Real Assets, and Private Equity) represents the average of a sample of real rate of return assumptions, where each firm's nominal returns have been reduced by that firm's assumed inflation rate. The sample includes the expected annual real rates of return provided to us by Wilshire and seven other investment advisory firms retained by Segal's California public sector retirement system clients. We believe these averages are a reasonable consensus forecast of long-term future market returns in excess of inflation.[2]

[2] Note that, just as for the inflation assumption, in general the time horizon used by the investment consultants in determining the real rate of return assumption is shorter than the time horizon we use for the actuarial valuation.

LACERS' TARGET ASSET ALLOCATION AND ASSUMED ARITHMETIC REAL RATE OF RETURN ASSUMPTIONS BY ASSET CLASS AND FOR THE PORTFOLIO

Asset Class	Percentage of Portfolio	Wilshire's Assumed Real Rate of Return[3]	Average Assumed Real Rate of Return from a Sample of Consultants to Segal's California Public Sector Clients[4]
U.S. Large Cap Equity	19.68%	5.85%	5.58%
U.S. Small Cap Equity	4.32%	5.85%	6.34%
Developed International Equity	22.33%	6.32%	6.93%
Emerging Markets Equity	6.67%	6.32%	8.91%
Core Bonds	16.53%	1.76%	1.10%
High Yield Bonds	2.47%	1.76%	3.41%
Private Real Estate	5.00%	4.26%	4.36%
Cash	1.00%	-0.41%	-0.18%
Credit Opportunities	5.00%	3.51%	3.51%[5]
Public Real Assets	5.00%	2.53%	2.53%[5]
Private Equity	12.00%	10.35%	10.35%[5]
Total	**100.00%**	**5.32%**	**5.54%**

The above are representative of "indexed" returns and do not include any additional returns ("alpha") from active management. This is consistent with the Actuarial Standard of Practice No. 27, Section 3.8.3.d, which states:

> "Investment Manager Performance - Anticipating superior (or inferior) investment manager performance may be unduly optimistic (or pessimistic). The actuary should not assume that superior or inferior returns will be achieved, net of investment expenses, from an active investment management strategy compared to a passive investment management strategy unless the actuary believes, based on relevant supporting data, that such superior or inferior returns represent a reasonable expectation over the measurement period."

The following are some observations about the returns provided above:

1. The investment consultants to our California public sector clients have each provided us with their expected real rates of return for each asset class, over various future periods of time. However, in general, the returns available from investment consultants are projected over time periods shorter than the durations of a retirement plan's liabilities.

2. Using a sample average of expected real rate of returns allows the System's investment return assumption to reflect a broader range of capital market information and should help reduce year-to-year volatility in the investment return assumption.

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[3] Derived by reducing Wilshire's nominal rate of return assumptions by their assumed 1.97% inflation rate.

[4] These are based on the projected arithmetic returns provided by Wilshire and seven other investment advisory firms serving the Los Angeles City Employees' Retirement System and 18 other district, city, and county retirement systems in California. These return assumptions are gross of any applicable investment expenses.

[5] For these asset classes, Wilshire's assumption is applied in lieu of the average because there is a larger disparity in returns for these assets classes among the firms surveyed and Wilshire's assumption should more closely reflect the underlying investments made specifically at LACERS.

3. Therefore, we recommend that the 5.54% portfolio real rate of return be used to determine the System's investment return assumption. This is 0.05% lower than the return that was used three years ago in the review to prepare the recommended investment return assumption for the June 30, 2014 valuation. The difference is primarily due to changes in the real rate of return assumptions provided to us by the investment advisory firms.

System Expenses

For funding purposes, the real rate of return assumption for the portfolio needs to be adjusted for investment expenses expected to be paid from investment income. Current practice for LACERS also adjusts for expected administrative expenses.

Based on information provided by the System, we have shown in the following table the expenses in relation to the market value of assets for the five years ending June 30, 2016.

ADMINISTRATIVE AND INVESTMENT EXPENSES
AS A PERCENTAGE OF MARKET VALUE OF ASSETS
(Dollars in 000's)

Year Ending June 30	Market Value of Assets[6]	Administrative Expenses[7]	Investment Expenses[8]	Administrative %	Investment %	Total %
2012	$10,693,604	$15,926	$20,673	0.15	0.19	0.34
2013	10,595,701	16,549	21,036	0.16	0.20	0.36
2014	11,922,539	15,765	56,189	0.13	0.47	0.60
2015	13,935,772	19,878[9]	62,595	0.14	0.45	0.59
2016	14,124,760	19,727[9]	66,540	0.14	0.47	0.61
			3-Year Average	**0.14%**	**0.46%**	**0.60%**
			5-Year Average	**0.14%**	**0.36%**	**0.50%**

Based on this experience, we recommend that the System's future expense component of the investment return assumption be increased from 0.40% to 0.60%.

The investment expenses for each of the last three years (i.e., fiscal years ending June 30, 2014 through 2016) had more than doubled compared with the expenses over the previous two years (i.e., fiscal years ending June 30, 2012 and 2013). We understand that as a result of an internal audit at LACERS, two items have been reclassified by LACERS and are now included as part of the investment management fees, starting with the fiscal year ended June 30, 2014. These two items are real estate management fees and expenses, and private equity management fees and

[6] At beginning of plan year.

[7] Note that some California public retirement systems (including LAFPP) have taken the approach of including an explicit charge for administrative expenses instead of a reduction in the investment return assumption to implicitly defray the administrative expenses.

[8] Includes investment management expense and investment related administrative expense.

[9] Includes LACERS' share of the City's pension contributions of approximately $2.9 million for the year ended June 30, 2015 and $3.3 million for the year ended June 30, 2016.

expenses. The inclusion of these two items in the investment expenses is the main reason for our recommendation to increase the future expense component of the investment return assumption.

Note related to investment expenses paid to active managers – As cited above, under Section 3.8.3.d of ASOP No. 27, the effect of an active investment management strategy should be considered "net of investment expenses…unless the actuary believes, based on relevant supporting data, that such superior or inferior returns represent a reasonable expectation over the measurement period." For LACERS, about 1/3 of the investment expenses were paid for expenses associated with active managers.

We have not performed a detailed analysis to measure how much of the investment expenses paid to active managers might have been offset by additional returns ("alpha") earned by that active management. In our prior review of the economic assumptions for LACERS in 2014, we noted that in September 2013, Wilshire conducted a prospective review of active versus passive investment management. In their 2013 review, Wilshire pointed out the potential of alpha returns from active management, but they also indicated that such amounts are uncertain and alpha may even become negative.

Subsequently, we have been provided with an attachment from Wilshire dated August 11, 2015 regarding Public Market Asset Class Structures and Rebalancing Recommendations. In that attachment, Wilshire provided the prospective expected excess returns for the various asset classes held by LACERS, which we understand to be the alpha for those classes of investments. We note that a discussion on alpha, similar to that found in the September 2013 review, was not included in the August 2015 attachment. However, we would like to caution that in the September 2013 review, Wilshire mentioned that pure alpha is difficult to capture and that not all excess returns are true alpha, but rather unmeasured beta (i.e., market risk).

Lastly, we observe based on information provided in LACERS' Comprehensive Annual Financial Report (CAFR) for the fiscal year ended June 30, 2016 that the annualized total fund return on a gross of investment expense basis was higher than the policy benchmark by about 0.3% over the last five years.

We could work with the System's staff to determine whether future studies might potentially exclude some level of investment expenses for active managers that could be expected to be offset by excess investment returns.[10] For now, we have continued to use the current approach that any "alpha" that may be identified would be treated as an increase in the risk adjustment and corresponding confidence level. For example, 0.25% of alpha would increase the confidence level by 3% (see discussions that follow on definitions of risk adjustment and confidence level).

Risk Adjustment

The real rate of return assumption for the portfolio is adjusted to reflect the potential risk of shortfalls in the return assumptions. The System's asset allocation determines this portfolio risk, since risk levels are driven by the variability of returns for the various asset classes and the

[10] As noted above, about 1/3 of the investment expenses for LACERS were paid for expenses associated with active managers. As investment expenses have averaged about 0.46% of the beginning of year market value of assets over the last three years, a 1/3 reduction in the investment expense component of the investment return assumption would be about a 0.15% reduction in that component. This could lead to a corresponding 0.15% increase in the investment return assumption, if future studies exclude the level of investment expenses for active managers that could be expected to be offset by excess investment returns, for example.

correlation of returns among those asset classes. This portfolio risk is incorporated into the real rate of return assumption through a risk adjustment.

The purpose of the risk adjustment (as measured by the corresponding confidence level) is to increase the likelihood of achieving the actuarial investment return assumption in the long term.[11] The 5.54% expected real rate of return developed earlier in this report was based on expected mean or average arithmetic returns. This means there is a 50% chance of the actual return in each year being at least as great as the average (assuming a symmetrical distribution of future returns). The risk adjustment is intended to increase that probability somewhat above the 50% level. This is consistent with our experience that retirement plan fiduciaries would generally prefer that returns exceed the assumed rate more often than not. Note that, based on the investment return assumptions recently adopted by systems that have been analyzed under this model, we observe a confidence level generally in the range of 50% to 60%.

In our model, the confidence level associated with a particular risk adjustment represents the likelihood that the actual average return would equal or exceed the assumed value over a 15-year period. For example, if we set our real rate of return assumption using a risk adjustment that produces a confidence level of 60%, then there would be a 60% chance (6 out of 10) that the average return over 15 years will be equal to or greater than the assumed value. The 15-year time horizon represents an approximation of the "duration" of the fund's liabilities, where the duration of a liability represents the sensitivity of that liability to interest rate variations.

Three years ago, the Board opted to lower the investment return assumption from 7.75% to 7.50%, which implied a risk adjustment of 0.94%. Together with an annual portfolio standard deviation of 12.67% (provided by Wilshire in 2014), this reflected a confidence level of about 61% that the actual average return over 15 years would not be less than the assumed return, assuming that the distribution of returns over that period follows the normal statistical distribution.[12]

If we use the same 61% confidence level from our last study to set this year's risk adjustment, based on the current long-term portfolio standard deviation of 12.87% provided by Wilshire in 2017, the corresponding risk adjustment would be 0.95%. Together with the other investment return components, this would result in an investment return assumption of 6.99%, which is lower than the current assumption of 7.50%. Based on the general practice of using one-quarter percentage point increments for economic assumptions, we evaluated the effect on the confidence level of a 7.00% investment return assumption. In particular, a net investment return assumption of 7.00%, together with the other investment return components, would produce a risk adjustment of 0.94%, which when rounded corresponds to a confidence level of 61%. This is the same confidence level implicit in the investment return assumption adopted by the Board in the last study.

With that said, we note that a confidence level of 61% is at the upper end of the range of about 50% to 60% that corresponds to the risk adjustments currently determined for most of Segal's other California public retirement system clients. Under the most recent reviews of the investment return assumption for LADWP and LAFPP, when they adopted their 7.25%

[11] This type of risk adjustment is sometimes referred to as a "margin for adverse deviation."

[12] Strictly speaking, future compounded long-term investment returns will tend to follow a log-normal distribution. However, we believe the normal distribution assumption is reasonable for purposes of setting this type of risk adjustment.

investment return assumptions, the confidence levels for those two systems were 52% and 55%, respectively. Based on all of this information, we have developed an alternative assumption for the investment return for LACERS of 7.25%. A net investment return assumption of 7.25%, together with the other investment return components, would produce a risk adjustment of 0.69%, which corresponds to a confidence level of 58%.

The table below shows LACERS' investment return assumptions, the risk adjustments and corresponding confidence levels for the current and prior studies.

HISTORICAL INVESTMENT RETURN ASSUMPTIONS, RISK ADJUSTMENTS AND CONFIDENCE LEVELS BASED ON ASSUMPTIONS ADOPTED BY THE BOARD

Year Ending June 30	Investment Return	Risk Adjustment	Corresponding Confidence Level
2005	8.00%	1.14%	65%
2008	8.00%	1.29%	66%
2011	7.75%	0.57%	57%
2014 (Alternative)	7.75%	0.69%	58%
2014 (Adopted)	7.50%	0.94%	61%
2017 (Alternative)	7.25%	0.69%	58%
2017 (Recommended)	7.00%	0.94%	61%

As we have discussed in prior years, the risk adjustment model and associated confidence level is most useful as a means for comparing how the System has positioned itself relative to risk over periods of time.[13] The use of a confidence level of 61% or 58% should be considered in context with other factors, including:

- As noted above, the confidence level is more of a relative measure than an absolute measure, and so can be reevaluated and reset for future comparisons.
- A lower level of inflation should reduce the overall risk of failing to meet the investment return assumption.
- The confidence level is based on the standard deviation of the portfolio that is determined and provided to us by Wilshire. The standard deviation is a statistical measure of the future volatility of the portfolio and so is itself based on assumptions about future portfolio volatility and can be considered somewhat of a "soft" number.
- While a confidence level of 61% (associated with a 7.00% investment return assumption) is at the upper end of the range of about 50% to 60% that corresponds to the risk adjustments used by most of Segal's other California public retirement system clients, LACERS has not set an investment return that resulted in a confidence level below 60% during the past several experience studies, except in 2011.

[13] In particular, it would not be appropriate to use this type of risk adjustment as a measure of determining an investment return rate that is "risk-free."

- Most public retirement systems that have recently reviewed their investment return assumptions have seen decreases in their confidence level even though they adopted more conservative investment return assumptions for their valuations.

- While Segal has not taken any alpha into account in recommending the investment return assumption, the Board could choose to anticipate some alpha based on a report provided by Wilshire in August 2015 and on information found in the recent CAFR. As we outlined earlier in this report, anticipation of 0.25% of alpha could increase the 58% confidence level associated with the 7.25% investment return assumption shown above to 61%.

- As with any model, the results of the risk adjustment model should be evaluated for reasonableness and consistency. This is discussed in the later section on "Comparison with Other Public Retirement Systems".

Recommended Investment Return Assumption

Taking into account the factors above, we have developed our recommended investment return assumption and an alternative investment return assumption for LACERS' consideration. Our recommendation is to reduce the net investment return assumption from 7.50% to 7.00%. As noted above, this return implies a risk adjustment of 0.94%, reflecting a confidence level of 61% that the actual average return over 15 years would not fall below the assumed return. This reduction in the net investment return assumption from 7.50% to 7.00% reflects the lower inflation expectation (by 0.25%), the 0.20% increase in the expense assumption resulting from reclassification of two items by LACERS as investment expenses, and a 0.05% reduction in the real rate of return from the portfolio.

Our alternative assumption is a reduction in the net investment return assumption from 7.50% to 7.25%. This alternative return implies a risk adjustment of 0.69%, reflecting a confidence level of 58% that the actual average return over 15 years would not fall below the assumed return.

The following table summarizes the components of the investment return assumption developed in the previous discussion. For comparison purposes, we have also included similar values from the prior four studies.

CALCULATION OF INVESTMENT RETURN ASSUMPTION

Assumption Component	June 30, 2017 Recommended Value	June 30, 2017 Alternative Value	June 30, 2014 Adopted Value	June 30, 2014 Alternative Value
Inflation	3.00%	3.00%	3.25%	3.25%
Plus Portfolio Real Rate of Return	5.54%	5.54%	5.59%	5.59%
Minus Expense Adjustment	(0.60%)	(0.60%)	(0.40%)	(0.40%)
Minus Risk Adjustment	(0.94%)	(0.69%)	(0.94%)	(0.69%)
Total	**7.00%**	**7.25%**	**7.50%**	**7.75%**
Confidence Level	**61%**	**58%**	**61%**	**58%**

Assumption Component	June 30, 2011 Adopted Value	June 30, 2008 Adopted Value	June 30, 2005 Adopted Value
Inflation	3.50%	3.75%	3.75%
Plus Portfolio Real Rate of Return	5.22%	5.94%	5.79%
Minus Expense Adjustment	(0.40%)	(0.40%)	(0.40%)
Minus Risk Adjustment	(0.57%)	(1.29%)	(1.14%)
Total	**7.75%**	**8.00%**	**8.00%**
Confidence Level	**57%**	**66%**	**65%**

Based on this analysis, we recommend that the investment return assumption be decreased from 7.50% to 7.00% per annum. Alternatively, a lower confidence level under the risk-adjusted model used by Segal that is more in line with our other California public retirement system clients would result in a 7.25% investment return assumption.

We also recommend that the same investment return assumption that is adopted by the Board for funding purposes (i.e., either 7.00% under our recommended assumption or 7.25% under our alternative assumption) be used for GASB financial reporting purposes.

Comparing with Other Public Retirement Systems

One final test of the recommended investment return assumption is to compare it against those used by other public retirement systems, both in California and nationwide.

We note that a 7.00% investment return assumption is becoming more common among California public sector retirement systems. In particular, six County employees' retirement systems (Contra Costa, Fresno, Mendocino, Sacramento, San Mateo and Santa Barbara) use a 7.00% earnings assumption. Furthermore, the CalPERS Board has approved a reduction in the earnings assumption from 7.50% to 7.00% over the next three years. In addition, CalSTRS recently adopted a 7.25% earnings assumption for the 2016 valuation (down from 7.50%) and a 7.00% earnings assumption for the 2017 valuation. With the exception of the retirement systems stated above, most of the public sector retirement systems in California are using a 7.25% earnings assumption. Both LADWP and LAFPP have adopted a 7.25% assumption.

The following table compares LACERS' recommended net investment return assumption against those of the nationwide public retirement systems that participated in the National Association of State Retirement Administrators (NASRA) 2016 Public Fund Survey for 142 large public retirement funds in their 2015 fiscal year valuations (after excluding one low outlier):

		NASRA 2016 Public Fund Survey		
Assumption	**LACERS (recommended)**	**Low**	**Median**	**High**
Net Investment Return	7.00%	5.50%	7.50%	8.50%

The detailed survey results show that more than one-half of the systems have an investment return assumption in the range of 6.75% to 7.75%, and over half of those systems have used an assumption of 7.50%. The survey also notes that several plans have reduced their investment return assumption during the last year. State systems outside of California tend to change their economic assumptions less frequently and so may lag behind emerging practices in this area.

In summary, we believe that both the risk adjustment model and other considerations indicate a lower earnings assumption. The recommended assumption of 7.00% is consistent with the System's current practice.

C. Salary Increase

Salary increases impact plan costs in two ways: (i) by increasing members' benefits (since benefits are a function of the members' highest average pay) and future normal cost collections; and (ii) by increasing total active member payroll which in turn generates lower UAAL contribution rates. The components of the salary increase assumptions are discussed below:

As an employee progresses through his or her career, increases in pay are expected to come from three sources:

1. **Inflation:** Unless pay grows at least as fast as consumer prices grow, employees will experience a reduction in their standard of living. There may be times when pay increases lag or exceed inflation, but over the long term, labor market forces may require an employer to maintain its employees' standards of living.

   As discussed earlier in this report, we are recommending that the assumed rate of inflation be reduced from 3.25% to 3.00% per annum. This inflation component is used as part of the salary increase assumption.

2. **Real "Across the Board" Pay Increases:** These increases are typically termed productivity increases since they are considered to be derived from the ability of an organization or an economy to produce goods and services in a more efficient manner. As that occurs, at least some portion of the value of these improvements can provide a source for pay increases. These increases are typically assumed to extend to all employees "across the board". The State and Local Government Workers Employment Cost Index produced by the Department of Labor provides evidence that real "across the board" pay increases have averaged about 0.6% - 0.9% annually during the last ten to twenty years.

We also referred to the annual report on the financial status of the Social Security program published in June 2016. In that report, real "across the board" pay increases are forecast to be 1.2% per year under the intermediate assumptions.

The real pay increase assumption is generally considered a more "macroeconomic" assumption that is not necessarily based on individual plan experience. However, recent salary experience with public systems in California as well as anecdotal discussions with plans and plan sponsors indicate lower future real wage growth expectations for public sector employees. We note that for LACERS' active members, the actual average inflation plus "across the board" increase (i.e., wage inflation) over the five-year period ending June 30, 2016 was 2.26%.

Valuation Date	Actual Average Increase[14]	Actual Change in CPI[15]
June 30, 2012	1.35%	2.67%
June 30, 2013	3.50%	2.04%
June 30, 2014	4.61%[16]	1.08%
June 30, 2015	0.99%	1.35%
June 30, 2016	0.87%	0.91%
Five Year Average	**2.26%**	**1.61%**

Considering these factors, including the most recent history of actual changes in CPI outpacing the actual average increases in salaries, we recommend reducing the real "across the board" salary increase assumption from 0.75% to 0.50% for the June 30, 2017 actuarial valuation. This means that the combined inflation and "across the board" salary increase assumption will decrease from 4.00% to 3.50%.

3. **Merit and Promotional Increases:** As the name implies, these increases come from an employee's career advances. This form of pay increase differs from the previous two, since it is specific to the individual. For LACERS, there are service-specific merit and promotional increases. These assumptions will be reviewed during our triennial review of the non-economic assumptions.

All three of these forces are incorporated into a salary increase assumption that is applied in the actuarial valuation to project future benefits and future normal cost contribution collections.

Active Member Payroll

Projected active member payrolls are used to develop the UAAL contribution rate. Future values are determined as a product of the number of employees in the workforce and the average pay for all employees. The average pay for all employees increases only by inflation and real "across the board" pay increases. The merit and promotional increases are not an influence, because this average pay is not specific to an individual.

[14] Reflects the increase in average salary for members at the beginning of the year versus those at the end of the year. It does not reflect the average salary increases received by members who worked the full year.

[15] Based on the change in the annual average CPI for the Los Angeles-Riverside-Orange County Area compared to the prior year.

[16] Restated after the June 30, 2014 valuation data was finalized.

We recommend that the active member payroll increase assumption be decreased from 4.00% to 3.50% annually, consistent with the recommended inflation plus real "across the board" salary increase assumptions.

IV. Cost Impact

Retirement Plan

The table below shows the changes in the total normal cost and actuarial accrued liability for the Retirement Plan due to the proposed assumption changes, as if they were applied in the June 30, 2016 actuarial valuation. If all of the proposed assumption changes were implemented, including the 7.00% investment return assumption, the total normal cost for the Retirement Plan would have increased by about $19.2 million and the actuarial accrued liability would have increased by about $881.1 million. The funded percentage would have decreased from 71.39% to 67.95%.

If the alternative 7.25% investment return assumption is adopted, together with all the other proposed assumption changes recommended in this report, the total normal cost for the Retirement Plan would have decreased by about $1.7 million and the actuarial accrued liability would have increased by about $327.7 million. The funded percentage would have decreased from 71.39% to 70.07%.

	Change in Plan Liabilities as of June 30, 2016		
	Current Assumptions	**Recommended Assumptions**	**Increase / (Decrease)**
Total Normal Cost	$340,758,622	$359,953,717	$19,195,095
Actuarial Accrued Liability	$17,424,996,329	$18,306,132,510	$881,136,181
	Current Assumptions	**Alternative Assumptions**	**Increase / (Decrease)**
Total Normal Cost	$340,758,622	$339,054,227	$(1,704,395)
Actuarial Accrued Liability	$17,424,996,329	$17,752,700,622	$327,704,293

If all of the proposed assumption changes were implemented, the aggregate beginning-of-the year employer contribution rate would have increased by 4.07% of payroll under the recommended assumptions and by 1.51% of payroll under the alternative assumptions.

	Employer Contribution Rate Impact (% of Payroll at Beginning of the Year)	
Contributions	**Recommended Assumptions**	**Alternative Assumptions**
Normal Cost	0.99%	(0.06)%
UAAL	3.08%	1.57%
Total	**4.07%**	**1.51%**

Health Plan

The table below shows the changes in the total normal cost and actuarial accrued liability for the Health Plan due to the proposed assumption changes, as if they were applied in the June 30, 2016 actuarial valuation. If all of the proposed assumption changes were implemented, including the 7.00% investment return assumption, the total normal cost for the Health Plan would have increased by about $8.0 million and the actuarial accrued liability would have increased by about $212.0 million. The funded percentage would have decreased from 80.49% to 74.82%.

If the alternative 7.25% investment return assumption is adopted, together with all the other proposed assumption changes recommended in this report, the total normal cost for the Health Plan would have increased by about $3.1 million and the actuarial accrued liability would have increased by about $116.2 million. The funded percentage would have decreased from 80.49% to 77.28%.

	Change in Plan Liabilities as of June 30, 2016		
	Current Assumptions	**Recommended Assumptions**	**Increase / (Decrease)**
Total Normal Cost	$68,385,120	$76,355,225	$7,970,105
Actuarial Accrued Liability	$2,793,688,955	$3,005,639,394	$211,950,439
	Current Assumptions	**Alternative Assumptions**	**Increase / (Decrease)**
Total Normal Cost	$68,385,120	$71,462,263	$3,077,143
Actuarial Accrued Liability	$2,793,688,955	$2,909,876,039	$116,187,084

If all of the proposed assumption changes were implemented, the aggregate beginning-of-the year employer contribution rate would have increased by 1.11% of payroll under the recommended assumptions and by 0.58% of payroll under the alternative assumptions.

	Employer Contribution Rate Impact (% of Payroll at Beginning of the Year)	
Contributions	**Recommended Assumptions**	**Alternative Assumptions**
Normal Cost	0.41%	0.16%
UAAL	0.70%	0.42%
Total	**1.11%**	**0.58%**