CHEIRON

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City of San José Police and Fire Department Retirement Plan

Actuarial Valuation Report as of June 30, 2018

Produced by Cheiron

November 2018

www.cheiron.us 1.877.CHEIRON (243.4766)

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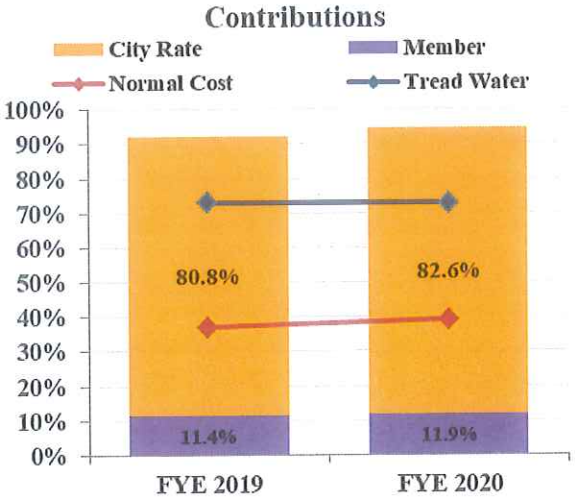
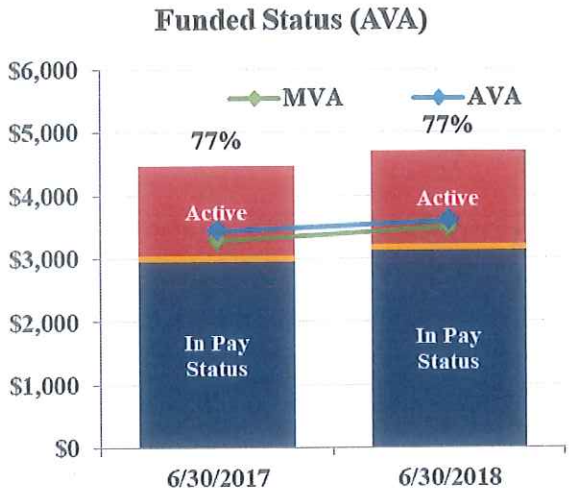
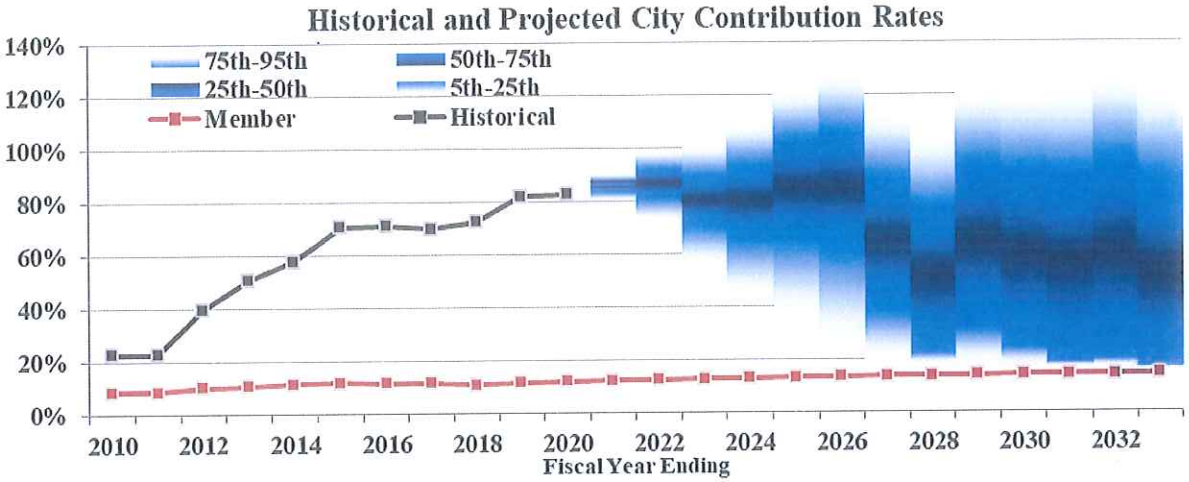
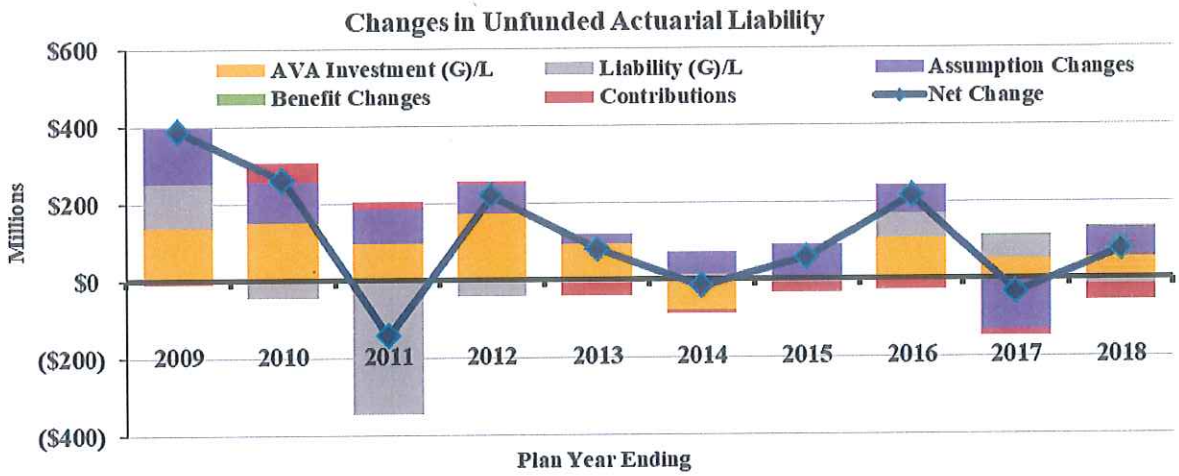
SECTION I – BOARD SUMMARY









SECTION I – BOARD SUMMARY

Membership

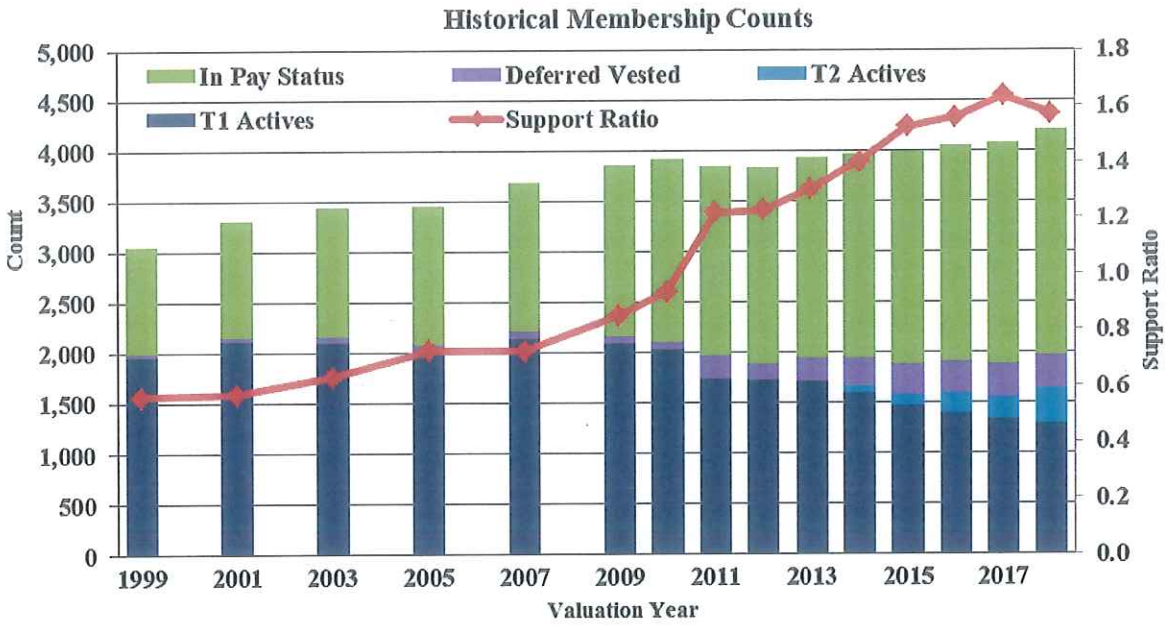
As shown in Table I-1 below, total membership grew 3.5% from 2017 to 2018, and active membership increased 6.1%. Active membership is shifting from Tier 1 to Tier 2. Tier 1 active membership decreased by 53 members while Tier 2 active membership increased by 147 members. Total expected payroll increased by 7.2% in aggregate, with Tier 1 payroll decreasing 1.0% and Tier 2 payroll increasing 57.5%.

Table I-1

	Total Membership		
	June 30, 2018	June 30, 2017	Change
Active Members			
Tier 1	1,280	1,333	-4.0%
Tier 2	358	211	69.7%
Total Actives	1,638	1,544	6.1%
Terminated Members	324	333	-2.7%
Members In Pay Status	2,250	2,192	2.6%
Total	4,212	4,069	3.5%
Active Member Payroll			
Tier 1	$ 173,436	$ 175,250	-1.0%
Tier 2	44,993	28,567	57.5%
Total	$ 218,429	$ 203,816	7.2%

Dollar amounts in thousands

As shown in the chart on the following page, the number of active members remained around 2,000 from 1999 through 2009, at which point active membership declined significantly. The decline leveled around 2015 and the growth this year resulted in the largest active population since 2014. At the same time, the number of members in pay status has more than doubled from 1,060 in 1999 to 2,250 in 2018. As a result, the number of members in pay status or with deferred benefits that each active member has to support if there are actuarial losses has increased from approximately 0.6 in 1999 to 1.6 in 2018. An increase in this ratio is to be expected for a maturing plan, but the impact of the recession accelerated the trend significantly. As there are more retirees to be supported by each active member, contributions tend to become more volatile and sensitive to gains and losses. This year's growth in the number of active members slightly reversed this trend.



Funded Status

This report measures assets and liabilities for funding purposes. These measures are not appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations. Table I-2 on the next page summarizes the Actuarial Liability, assets, and related ratios as of June 30, 2017 and 2018.

SECTION I – BOARD SUMMARY

Table I-2

Actuarial Liability, Assets and Funded Status	June 30, 2018	June 30, 2017	Change
1. Actuarial Liability			
a. Actives	$ 1,468,569	$ 1,413,531	3.9%
b. Deferred Vested	98,084	91,756	6.9%
c. In Pay Status	3,129,775	2,959,115	5.8%
d. Total	$ 4,696,428	$ 4,464,402	5.2%
2. Market Value of Assets (MVA)	$ 3,496,190	$ 3,293,257	6.2%
3. UAL - MVA Basis (1.d. - 2.)	$ 1,200,238	$ 1,171,145	2.5%
4. Funding Ratio - MVA Basis (2. ÷ 1.d.)	74.4%	73.8%	0.7%
5. Actuarial Value of Assets (AVA)	$ 3,596,590	$ 3,439,922	4.6%
6. UAL - AVA Basis (1.d. - 5.)	$ 1,099,838	$ 1,024,480	7.4%
7. Funding Ratio - AVA Basis (5. ÷ 1.d.)	76.6%	77.1%	-0.5%
8. Expected Payroll	$ 218,429	$ 203,816	7.2%
9. Asset Leverage Ratio (2. ÷ 8.)	16.0	16.2	-0.9%
10. Actuarial Liability Leverage Ratio (1.d. ÷ 8.)	21.5	21.9	-1.8%
11. Interest on UAL - MVA Basis	$ 78,413	$ 77,884	0.7%
12. Interest Cost as Percent of Payroll (11. ÷ 8.)	35.9%	38.2%	-2.3%

Dollar amounts in thousands

The Actuarial Liability represents the target amount of assets the plan should have in the trust as of the valuation date based on the actuarial cost method. The Actuarial Liability increased 5.2% and the Market Value of Assets increased 6.2%. As a result, the Unfunded Actuarial Liability (UAL) measured on the Market Value of Assets increased 2.5% from approximately $1,171.1 million to $1,200.2 million, and the funding ratio on an MVA basis increased from 73.8% to 74.4%.

The asset smoothing method deferred 80% of the investment gain while recognizing 20% of the prior four years' gains and losses, resulting in a 4.6% increase in the Actuarial Value of Assets. The UAL measured on the Actuarial Value of Assets increased 7.4% from approximately $1,024.5 million to $1,099.8 million and the funding ratio decreased from 77.1% to 76.6%. The Market Value of Assets is smaller than the actuarial value, so if the investment return assumption is met in the future, we expect an increase in contribution rates as the deferred asset losses are recognized in the Actuarial Value of Assets.

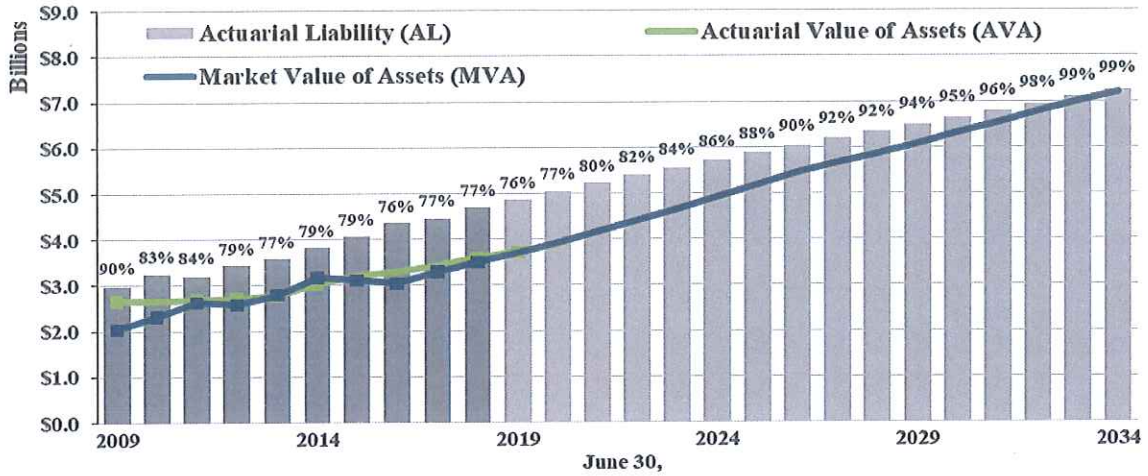
SECTION I – BOARD SUMMARY

The asset leverage ratio of 16.0 means that if the Plan experiences a 10% loss on assets compared to the discount rate of 6.75% (-3.25% return), the loss would be equivalent to 160% of payroll. Interest payments on such a loss would be approximately 10.8% of payroll.

Interest payments on the current UAL are approximately 36% of payroll, decreasing from 38% of payroll in the prior year due to the increased payroll. As the Plan becomes better funded, the asset leverage ratio will increase, and if it was 100% funded, the leverage ratio would be 21.5. This leverage ratio is extremely high compared to other plans indicating that this plan is far more sensitive to investment gains and losses and assumption changes than other large public pension plans.

The chart below shows the historical and projected trends for assets (both market and smoothed actuarial) versus the Actuarial Liability, and also shows the progress of the funding ratios (based on the Actuarial Value of Assets) since 2009. The historical Actuarial Liability is shown in dark gray while the projected Actuarial Liability is shown in a lighter gray. From 2009 to 2013, (with the exception of 2011), the funding ratio declined primarily because the plan experienced lower than expected investment returns on the Actuarial Value of Assets and reduced its assumption of future investment returns. If all assumptions are met in the future, the funded status is expected to reach 99% by 2034.

Historical and Projected Assets and Actuarial Liability



While the funded status is expected to improve, the UAL is dependent on actual investment returns, changes in assumptions and actuarial gains and losses, so there is potentially a wide range for the projected UAL.

More detail on the assets can be found in section IV of this report, and more detail on the measures of liability can be found in section V of this report.

Changes in UAL

The chart on the dashboard and Table I-3 below show the historical changes to the UAL, including investment gains and losses on the Actuarial Value of Assets, liability gains and losses, assumption changes, benefit changes, and contributions compared to normal cost plus interest on the UAL. It is worth noting that 2014 and 2015 are the only years in the last 10 years in which there were investment gains on the Actuarial Value of Assets. Four years in the last ten: 2009, 2014, 2016, and 2017, experienced a liability loss. Last year was the first valuation in the last 10 in which assumption changes were adopted that reduced the measure of liability. A decrease to the discount rate this year increased the liability by about $76 million.

Over the last 10 years, the UAL has increased about $1.1 billion. Investment experience increased the UAL about $778 million and assumption changes (primarily reducing the discount rate) increased the UAL about $606 million. Gains on other assumptions and contributions toward the UAL reduced the UAL by about $295 million.

Table I-3

Changes in Unfunded Actuarial Liability	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Discount Rate	**8.00%**	**7.75%**	**7.50%**	**7.25%**	**7.125%**	**7.00%**	**7.00%**	**6.875%**	**6.875%**	**6.750%**	
Source											
AVA (G)/L	$ 138.4	$ 149.6	$ 96.5	$ 172.8	$ 91.3	$ (78.5)	$ (2.8)	$ 106.8	$ 50.9	$ 53.6	$ **778.5**
Liability (G)/L	113.5	(43.9)	(346.1)	(39.4)	(9.9)	14.7	(7.3)	61.3	61.8	(15.1)	**(210.5)**
Assumptions	145.4	104.2	89.1	75.2	28.2	56.3	90.0	72.7	(131.8)	76.4	**605.7**
Benefit Changes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3	0.2	**4.5**
Contributions	(9.9)	49.9	17.1	(24.6)	2.2	(9.9)	(23.4)	(27.0)	(19.6)	(39.7)	**(85.0)**
Total UAL Change	**$ 387.3**	**$ 259.8**	**$ (143.5)**	**$ 184.0**	**$ 111.9**	**$ (17.4)**	**$ 56.5**	**$ 213.7**	**$ (34.4)**	**$ 75.4**	**$ 1,093.2**

Dollar amounts in millions

Table I-4 on the following page shows the breakdown of the changes in UAL during the last year by source. In total, there was an increase in the UAL of approximately $75 million, mostly attributed to a change to the discount rate and investment losses offset by liability gains and contributions. The total change in the UAL is about 1.6 percent of the Actuarial Liability.

Table I-4

Sources of FYE 2018 Change in UAL			
Source		**Amount**	**% of AL**
Investment experience	$	53,615	1.1%
Liability experience			
Salary experience		(8,207)	-0.2%
Retirement experience		(4,121)	-0.1%
Other experience		(2,797)	-0.1%
Total Liability Experience		(15,124)	-0.3%
Assumption changes		76,425	1.6%
Measure F		191	0.0%
Contributions	$	(39,749)	-0.8%
Total	$	75,358	1.6%

Dollar amounts in thousands

Contribution Amounts and Rates

As shown in the upper left corner of the dashboard, the total City contribution rate reported in the actuarial valuation increased from 80.8% to 82.6%. The red line is the normal cost (including administrative expenses), represents the benefits attributable to the next year of service. Contributions above the red line are to pay for the UAL. The blue line represents the tread water rate (normal cost plus interest on the Market Value UAL). Contributions equal to the tread water rate are needed to prevent the UAL from growing as a dollar amount if all assumptions are met. Because the total contribution rate is greater than the tread water rate, the principal of the UAL is expected to be reduced if all assumptions are met.

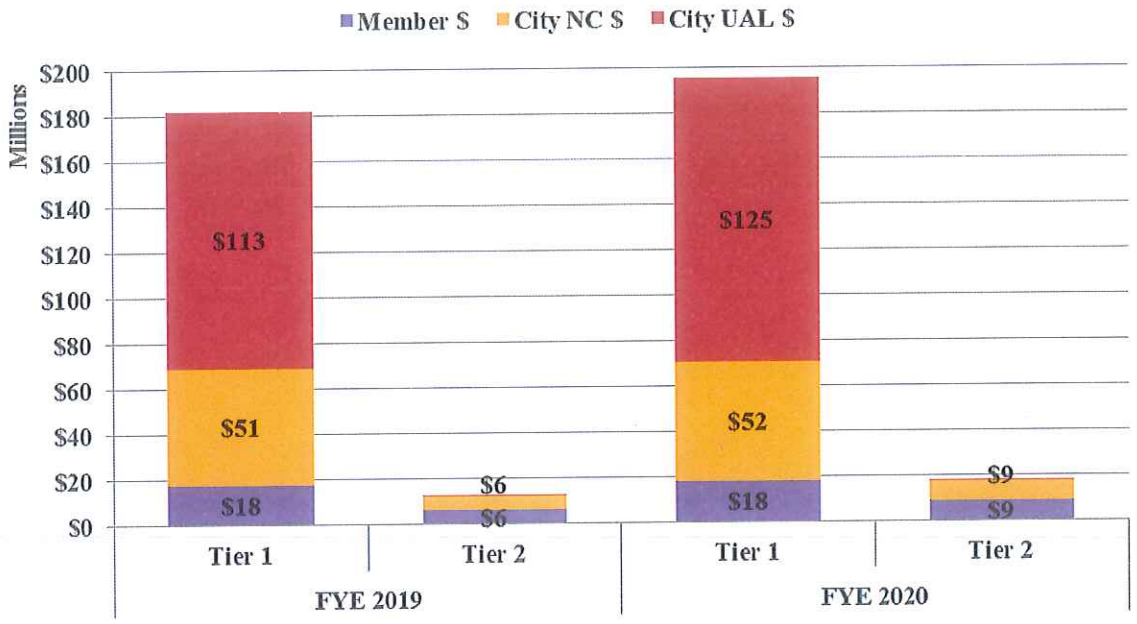
Table I-5 and the chart on the next page summarize the contribution rates and contribution amounts by Tier for the fiscal years ending in 2019 and 2020 as reported in the valuation. Tier 1 rates increased from 2019 to 2020, reflecting the investment losses and assumption changes offset by the liability gains. The increase in Tier 2 contribution rates for FYE 2020 is largely attributable to the assumption change. The aggregate city rate increased slightly as a result.

SECTION I – BOARD SUMMARY

Table I-5

Contribution Rates and Amounts (Middle of Year)	FYE 2019	FYE 2020
Member Rates		
Tier 1	10.6%	11.0%
Tier 2	14.1%	14.4%
Aggregate	11.4%	11.9%
City Contributions		
Tier 1 UAL	$ 112,671	$ 125,055
Tier 1 Normal Cost	$ 51,386	$ 52,487
	30.7%	31.8%
Tier 2 Contribution	$ 6,053	$ 8,717
	14.1%	14.4%
Aggregate	$ 170,110	$ 186,259
	80.8%	82.6%

Dollar amounts in thousands

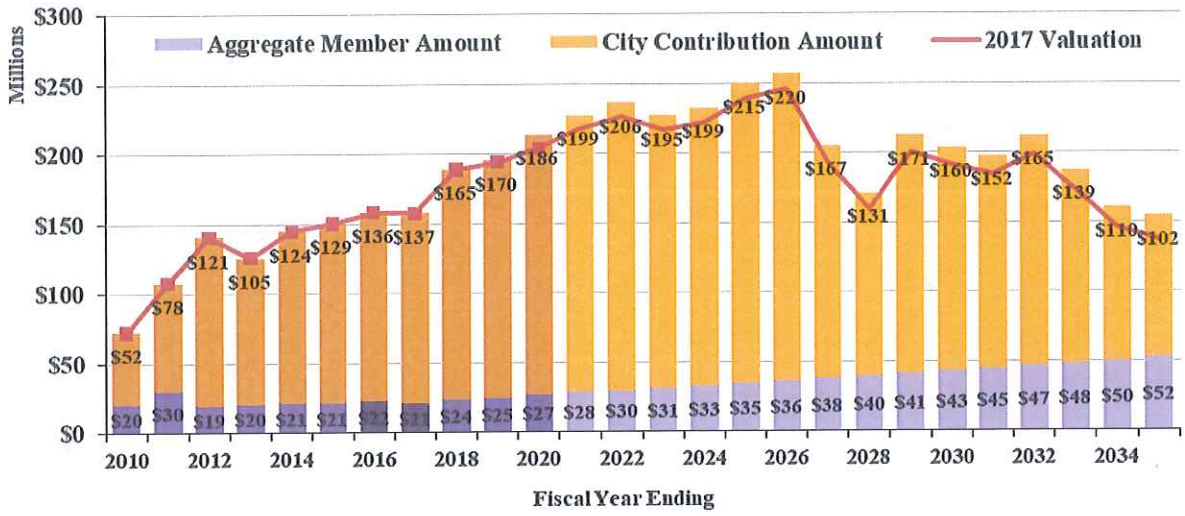


SECTION I – BOARD SUMMARY

As shown in the dashboard, City contribution rates have risen dramatically since FYE 2010 from 22.5% of payroll to 82.6% of payroll for FYE 2020. Future City contribution rates are expected to remain relatively level in the short term before declining significantly when portions of the UAL are fully amortized. However, there is a wide range of contribution rates due to the potential volatility of investment returns. As a result, the range of contribution rates from the 5th to the 95th percentile in FYE 2026 (based on a valuation six years from now), is from 21% of payroll to 130% of payroll. Such a wide range is due to the combination of the size of the assets compared to payroll and the standard deviation of the investment portfolio. For these projections, we used Meketa's capital market assumptions over a 10-year horizon (6.0% expected return and 11.8% standard deviation.)

The chart below shows historical and projected aggregate contribution amounts for the Plan compared to those projected in the prior valuation. The purple bars are member contribution amounts for Police and Fire for both Tier 1 and Tier 2. The gold bars are city contribution amounts for Police and Fire for both Tier 1 and Tier 2. The darker shaded bars represent historical amounts and the lighter shades represent projected amounts. The projected amounts assume that all assumptions are met. The red line represents the projection from the prior valuation.

Historical and Projected Aggregate Contribution Amounts



Since the last valuation, projected City contribution amounts have increased slightly, primarily due to the reduction in the discount rate.

Section VI of this report provides additional detail on the contribution rates and the amortization schedules separately by Tier and for Police and Fire.

SECTION II – IDENTIFICATION AND ASSESSMENT OF RISK

Actuarial valuations are based on a set of assumptions about future economic and demographic experience. These assumptions represent a reasonable estimate of future experience, but actual future experience will undoubtedly be different and may be significantly different. This section of the report is intended to identify the primary risks to the plan, provide some background information about those risks, and provide an assessment of those risks.

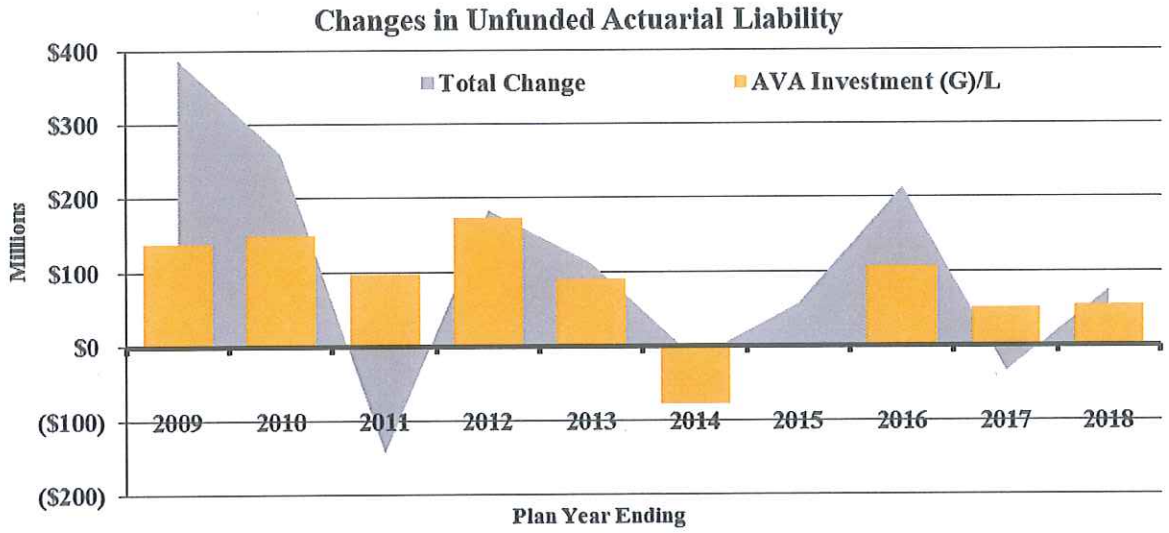
Identification of Risks

As we have discussed with the Board, the fundamental risk to the Plan is that the contributions needed to pay the benefits become unaffordable. While there are a number of factors that could lead to contribution amounts becoming unaffordable, we believe the primary risks for this Plan are:

- Investment risk,
- Interest rate risk,
- Longevity and other demographic risks, and
- Assumption change risk.

Other risks that we have not identified may also turn out to be important.

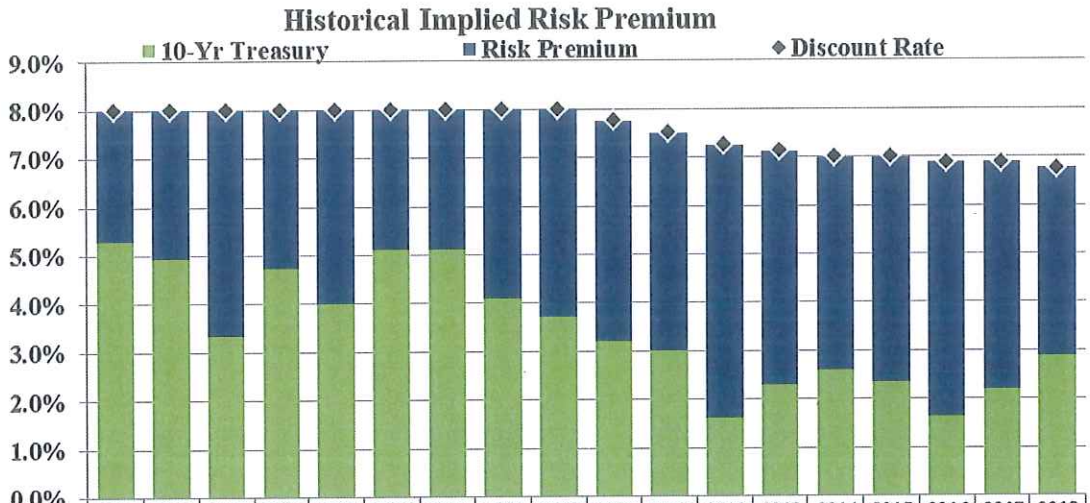
Investment Risk is the potential for investment returns to be different than expected. Lower investment returns than anticipated will increase the Unfunded Actuarial Liability necessitating higher contributions in the future unless there are other gains that offset these investment losses. The potential volatility of future investment returns is determined by the Plan's asset allocation and the affordability of the investment risk is determined by the amount of assets invested relative to the size of the plan sponsor.



SECTION II – IDENTIFICATION AND ASSESSMENT OF RISK

The chart on the previous page shows the impact of investment gains and losses on the smoothed Actuarial Value of Assets over the last 10 years compared to the Plan's total change in UAL. Investment losses have been a significant contributor to the growth in the UAL.

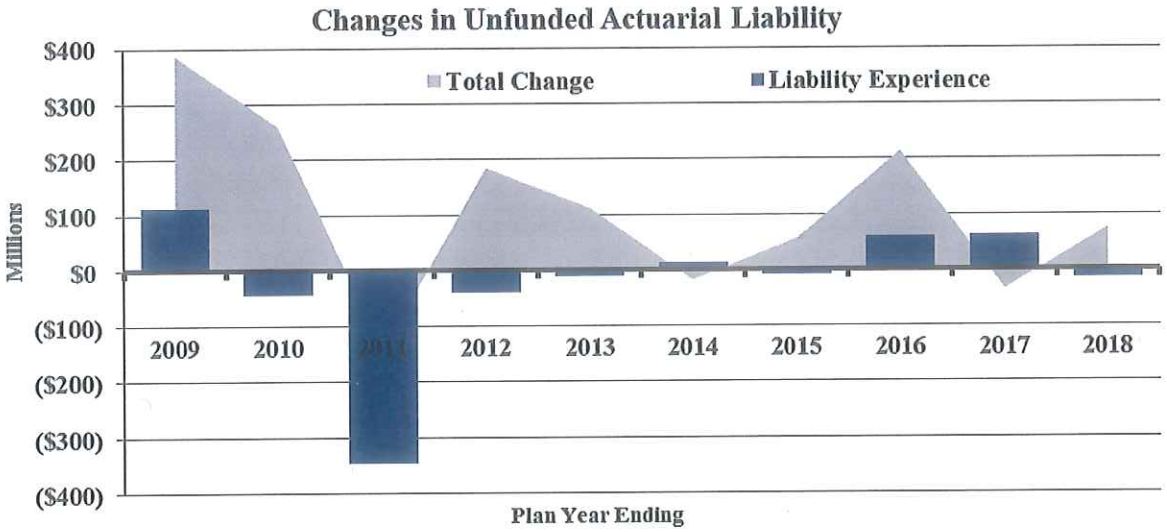
Interest rate risk is the potential for interest rates to be different than expected. For public plans, short-term fluctuations in interest rates have little or no effect as the plan's liability is usually measured based on the expected return on assets. Longer-term trends in interest rates; however, can have a powerful effect. The chart below shows the yield on a 10-year Treasury security compared to the plan's assumed rate of return. The difference is a simple measure of the amount of investment risk taken. As interest rates have declined, plans faced a choice: maintain the same level of risk and reduce the expected rate of return; maintain the same expected rate of return and take on more investment risk; or some combination of the two strategies.



	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Risk Premium	2.7%	3.1%	4.7%	3.3%	4.0%	2.9%	2.9%	3.9%	4.3%	4.6%	4.5%	5.6%	4.8%	4.4%	4.6%	5.2%	4.7%	3.9%
10-Yr Treasury	5.3%	4.9%	3.3%	4.7%	4.0%	5.1%	5.1%	4.1%	3.7%	3.2%	3.0%	1.6%	2.3%	2.6%	2.4%	1.6%	2.2%	2.9%
Discount Rate	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	7.8%	7.5%	7.3%	7.1%	7.0%	7.0%	6.9%	6.9%	6.8%

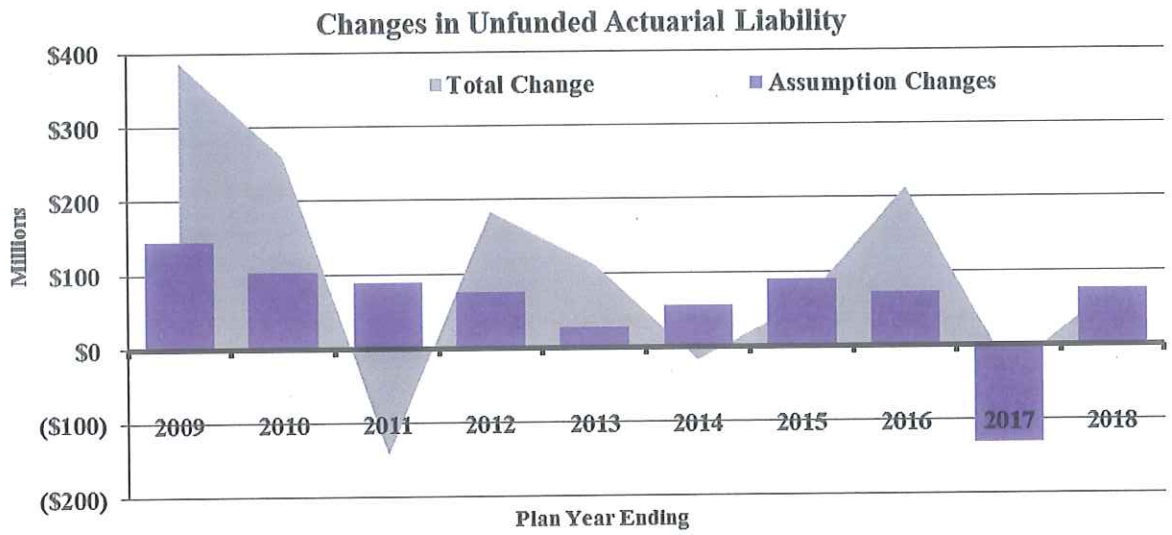
Longevity and other demographic risks are the potential for mortality or other demographic experience to be different than expected. Generally, longevity and other demographic risks emerge slowly over time and are often dwarfed by other changes, particularly those due to investment returns. The chart on the next page shows the demographic gains and losses over the last 10 years compared to the total change in the UAL for each year.

SECTION II – IDENTIFICATION AND ASSESSMENT OF RISK



Assumption change risk is the potential for the environment to change such that future valuation assumptions are different than the current assumptions. For example, declines in interest rates over the last three decades resulted in higher investment returns for fixed income investments, but lower expected future returns necessitating either a change in investment policy, a reduction in discount rate, or some combination of the two. Assumption change risk is an extension of the other risks identified, but rather than capturing the risk as it is experienced, it captures the cost of recognizing a change in environment when the current assumption is no longer reasonable.

As shown in the chart on the following page, there have been consistent changes in assumptions increasing the UAL. Most of these changes are due to reducing the discount rate from 8.0% to 6.75% over this period, but it also includes changes to demographic assumptions such as mortality and retirement rates. The reductions in the discount rate largely reflect the impact of declining interest rates on future expected investment returns.



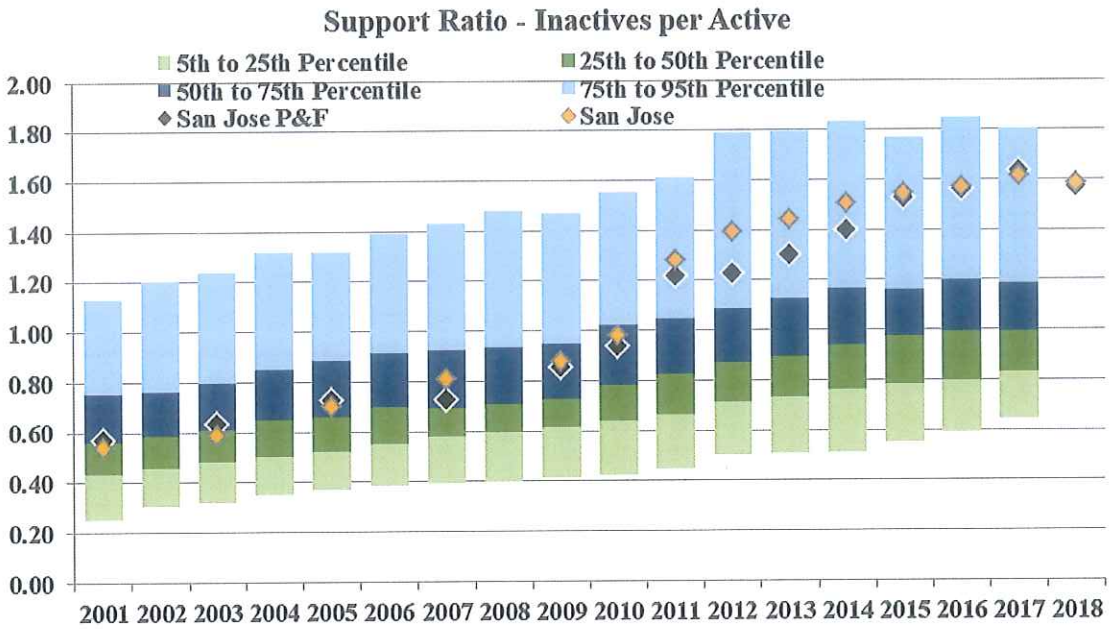
Plan Maturity Measures

The future financial condition of a mature pension plan is more sensitive to each of the risks identified above than a less mature plan. Before assessing each of these risks, it is important to understand the maturity of the plan compared to other plans and how the maturity has changed over time.

Plan maturity can be measured in a variety of ways, but they all get at one basic dynamic – the larger the plan is compared to the contribution or revenue base that supports it; the more sensitive the plan will be to risk. The measures below have been selected as the most important in understanding the primary risks identified for the plan.

Support Ratio (Inactives per Active)

One simple measure of plan maturity is the ratio of the number of inactive members (those receiving benefits or entitled to a deferred benefit) to the number of active members. The revenue base supporting the plan is usually proportional to the number of active members, so a relatively high number of inactives compared to actives indicate a larger plan relative to its revenue base as well.



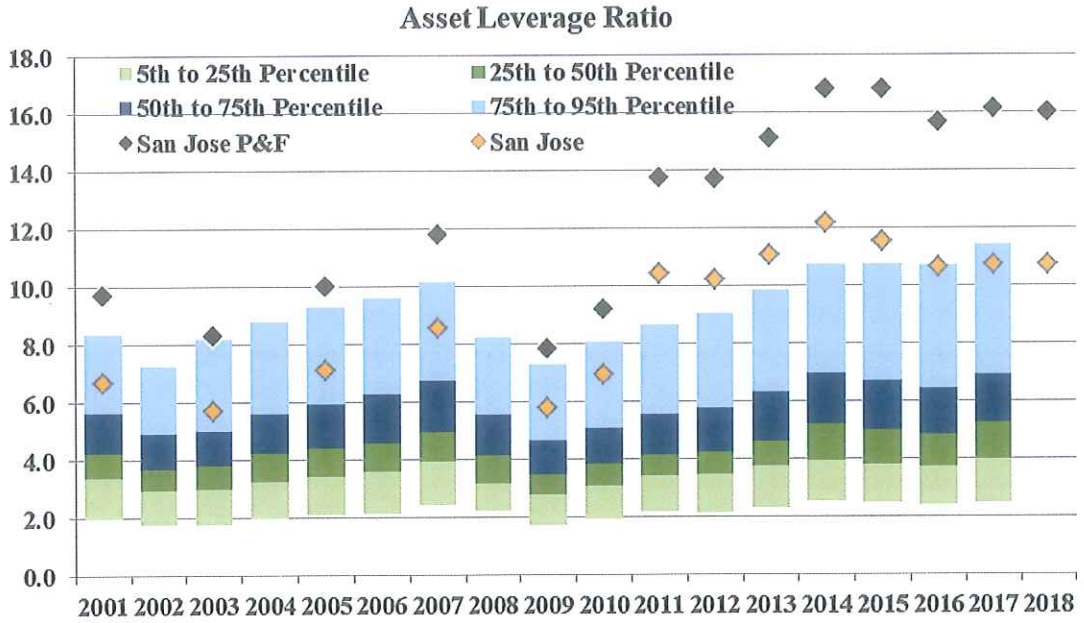
The chart above shows the distribution from the 5th to 95th percentile of support ratios for the plans in the Public Plans Database. The black diamond shows how San José Police and Fire compares, and the gold diamond shows how the combined Federated and Police and Fire plans compare. Through 2007, the Plan was in the middle of the distribution even as the support ratio increased. However, after the Great Recession, the Plan's support ratio increased dramatically and is now among the highest compared to the plans in the database.

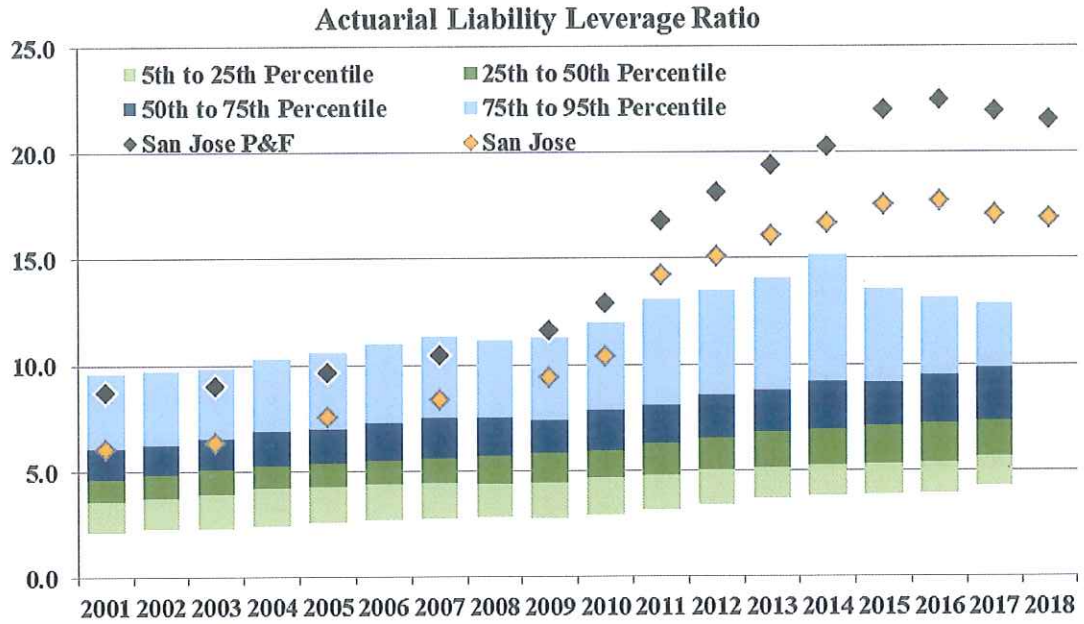
Leverage Ratios

Leverage or volatility ratios measure the size of the plan compared to its revenue base more directly. An asset leverage ratio of 5.0, for example, means that if the Plan experiences a 10% loss on assets compared to the expected return, the loss would be equivalent to 50% of payroll. The same investment loss for a plan with an asset leverage ratio of 10.0 would be equivalent to 100% of payroll.

As the Plan becomes better funded, the asset leverage ratio will increase, and if it was 100% funded, the leverage ratio would equal the Actuarial Liability (AL) leverage ratio. The AL leverage ratio also indicates how sensitive the Plan is to experience gains and losses or assumption changes. For example, an assumption change that increases the AL by 5% would add a liability equivalent to about 50% of payroll if the AL leverage ratio is 10.0.

SECTION II – IDENTIFICATION AND ASSESSMENT OF RISK





The charts above show the distribution from the 5th to 95th percentile of asset and Actuarial Liability leverage ratios for the plans in the Public Plans Database. The black diamond shows how San José Police and Fire compares, and the gold diamond shows how the combined Federated and Police and Fire plans compare. As we have discussed with the Board for several years and as is shown in the charts above, the leverage ratios for the Police and Fire Plan are much higher than most plans. As a Police and Fire plan, it is not unusual to be at the high end of

the distribution, but even when combined with Federated, the leverage ratios are still very high, indicating that San José is much more sensitive to risk than most plans.

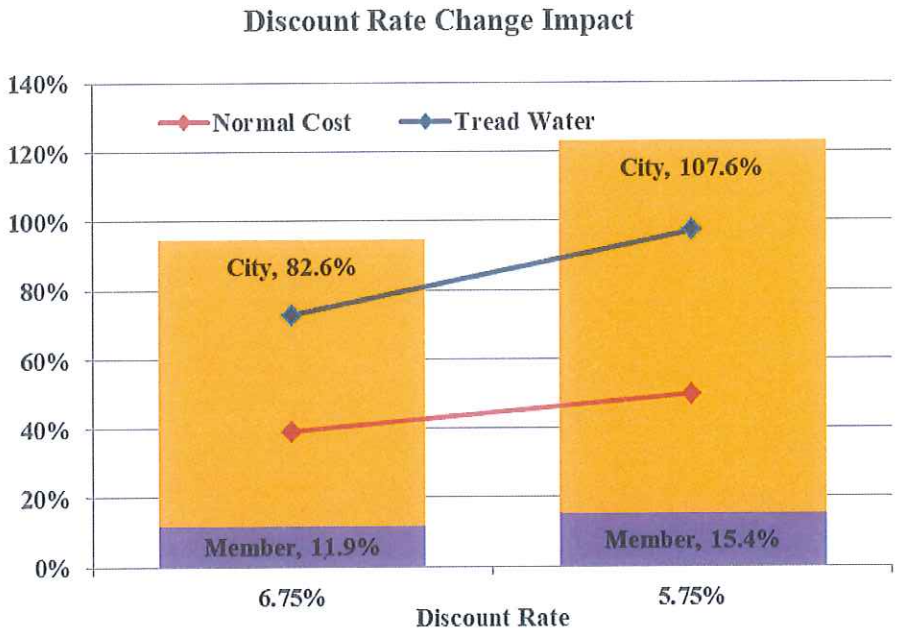
Assessing Costs and Risks

The fundamental risk to the Plan is that the contributions needed to fund the benefits become unaffordable. Assessing this risk, however, is complex because there is no bright line of what is unaffordable and the contribution amounts themselves are affected not just by the experience of the Plan, but also by the interaction of that experience and decisions by the Board related to assumptions, asset smoothing methods, and amortization periods.

Point in Time Assessments

To assess the risks of the Plan independent of the contribution strategy, there are two measures on which to focus: normal cost and interest cost. The normal cost represents the expected cost of the benefits attributable to the next year of service. The interest cost represents the interest on the UAL calculated using the discount rate. Combined, the normal cost plus the interest cost are referred to as the Tread Water Cost. If actual contributions are less than the Tread Water Cost, the UAL would be expected to grow; and if actual contributions are greater than the Tread Water Cost, the UAL would be expected to shrink.

The stacked bars in the chart below show the normal cost and interest cost at the current discount rate compared to a discount rate 100 basis points lower. The black line shows the combined FYE 2019 employee and City contribution rate based on the two discount rates.



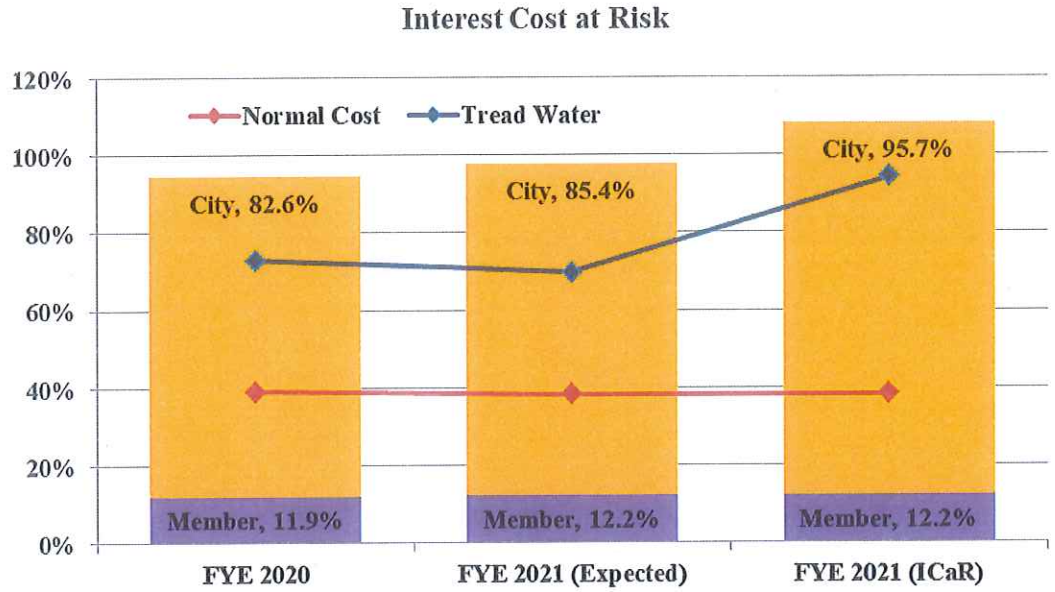
SECTION II – IDENTIFICATION AND ASSESSMENT OF RISK

Decreasing the discount rate by 100 basis points would increase the normal cost by over 10% of payroll and the tread water rate by over 24% of payroll. Using the current amortization methods, the total contribution rate would increase by about 25% of payroll to over 107% of pay.

The recent declines in discount rates have been largely driven by declines in interest rates that affect expectations of future investment returns. If there are further declines in interest rates or if there is a desire or need to reduce investment risk that reduces expected returns, the discount rate may need to be reduced further and the normal cost and interest cost will increase.

Actual investment returns do not affect the normal cost, but they directly affect the interest cost. One simple measure of the risk inherent in the investment policy is the Interest Cost at Risk (ICaR), which is the amount that the interest cost would increase if the investment returns for one year were two standard deviations below the expected return. Based on the capital market assumptions of Meketa over a 10-year horizon, the standard deviation for the current portfolio is 11.8%, making the investment return used to determine ICaR -16.9% (6.75% – 2 x 11.8%).

The chart below shows the contribution rates for the FYE 2020, determined in this valuation report in the far left bar graph and the expected FYE 2021 contribution rates based on a 6.75% investment rate of return for FYE 2019, in the middle of the chart. The FYE 2021 bar graph on the right shows the impact of a -16.9% return for FYE 2019. The tread water cost would increase by almost 25% of pay. Using 5-year asset smoothing with 20% corridor and a 15-year amortization the total contribution rate would increase by 10.3% of pay. The City contribution rate for FYE 2021 in this scenario would be 95.7% of pay and expected to increase in future years.



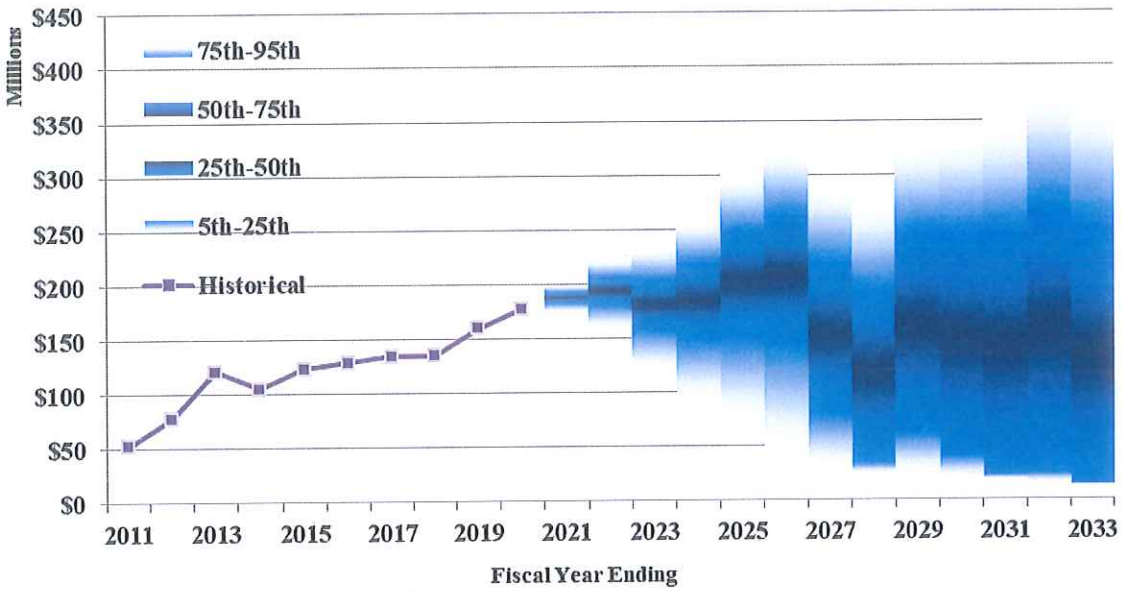
SECTION II – IDENTIFICATION AND ASSESSMENT OF RISK

Stochastic Projections

If experience has taught us anything, it is that there is a significant level of uncertainty in projections of the future. The largest source of uncertainty is the projection of investment returns. In order to better understand the potential impact of investment returns on the Plan, we have included some stochastic projections in the dashboard and in this section of the report. The stochastic projections are based on Meketa's 10-year capital market assumptions for the Plan's investment portfolio, including a 6.0% geometric return and an 11.8% standard deviation. Each projection contains 10,000 trials that are 15 years in length.

The chart below shows the historical and stochastically projected City contribution amounts for Tier 1. The purple line represents the amounts paid historically or the amounts already determined by an actuarial valuation. The projected amounts are shown as bars that are dark blue at the median of the 10,000 trials and fade to white as the range extends to the 5th and 95th percentiles of the 10,000 trials. This range is intended to convey the degree of uncertainty in the projections based on future investment returns.

Historical and Stochastically Projected Tier 1 City Contribution Amounts

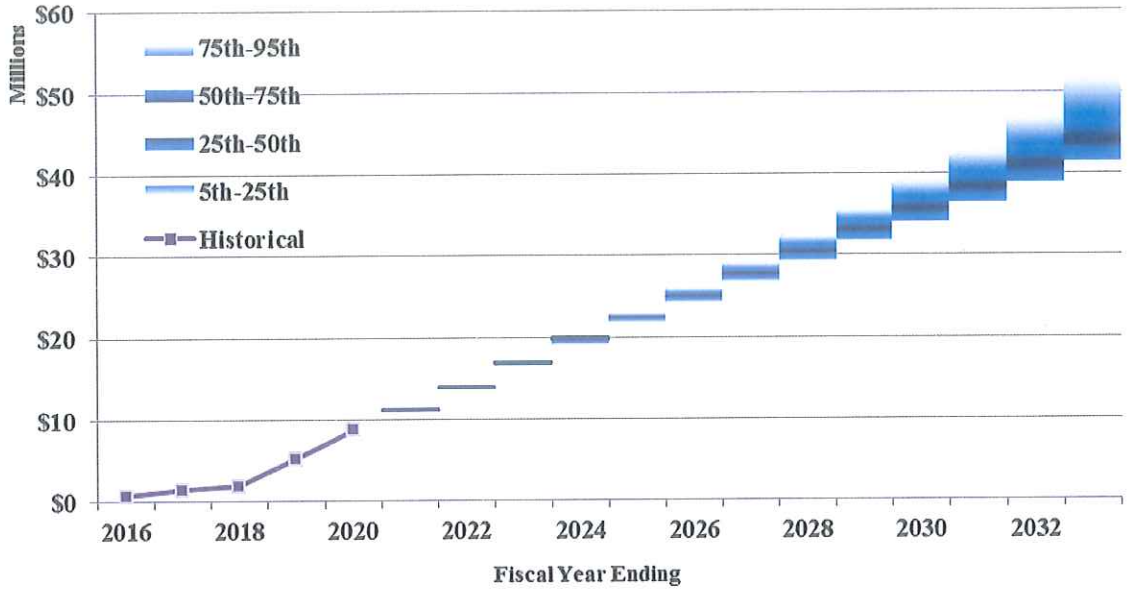


The chart shows a very wide range of potential City contribution amounts depending on actual investment returns. The range between the 5th and 95th percentile for FYE 2026 (based on the 2024 actuarial valuation) is from a contribution of $32 million to a contribution of $329 million. This range is largely driven by the standard deviation of the investment portfolio.

The chart on the following page shows the historical and stochastically projected City contribution amounts for Tier 2. The range of contribution amounts is much narrower for Tier 2

than Tier 1. Tier 2 is projected to grow so quickly and assets are relatively small right now. As a result, actual investment returns have a limited impact on future contribution amounts while the rate of growth will have a larger impact.

Historical and Stochastically Projected Tier 2 City Contribution Amounts



More Detailed Assessment

A more detailed assessment is always valuable to enhance the understanding of the risks identified above. While more detail would provide some additional value, we don't believe it is necessary to perform an in-depth analysis every year. Consequently, we recommend the Board review the less detailed analysis provided above annually and consider a more detailed analysis periodically and when there is a substantial change in the financial position or maturity of the plan.

SECTION III – CERTIFICATION

The purpose of this report is to present the June 30, 2018 Actuarial Valuation of the City of San José Police and Fire Department Retirement Plan ("Plan"). This report is for the use of the Plan and the City of San José.

In preparing our report, we relied on information, some oral and some written, supplied by the Plan. This information includes, but is not limited to, the plan provisions, employee data, and financial information. We performed an informal examination of the obvious characteristics of the data for reasonableness and consistency in accordance with Actuarial Standard of Practice No. 23.

The discount rate used in this report was adopted by the Board of Administration with our input at the November 1, 2018 Board meeting. All other assumptions were adopted at the November 2, 2017 Board meeting based on recommendations from our experience study covering plan experience during the period from July 1, 2009 through June 30, 2017.

The funding ratios in this report are for the purpose of establishing contribution rates. These measures are not appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations.

Future actuarial measurements may differ significantly from the current measurements due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; and, changes in plan provisions or applicable law.

To the best of our knowledge, this report and its contents have been prepared in accordance with generally recognized and accepted actuarial principles and practices that are consistent with the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board. Furthermore, as credentialed actuaries, we meet the Qualification Standards of the American Academy of Actuaries to render the opinion contained in this report. This report does not address any contractual or legal issues. We are not attorneys and our firm does not provide any legal services or advice.

This report was prepared for the Plan for the purposes described herein. This report is not intended to benefit any third party, and Cheiron assumes no duty or liability to any such party.

William R. Hallmark, ASA, EA, FCA, MAAA
Consulting Actuary

Anne D. Harper, FSA, EA, MAAA
Consulting Actuary

SECTION IV – ASSETS

The Plan uses and discloses two different asset measurements which are presented in this section of the report: Market Value and Actuarial Value of Assets. The Market Value of Assets represents the value of the assets if they were liquidated on the valuation date. The Actuarial Value of Assets is a value that smooths annual investment returns over five years to reduce the impact of short-term investment volatility on contribution rates. The Market Value of Assets is used primarily for reporting and disclosure, and the Actuarial Value of Assets is used primarily to determine contribution rates.

This section shows the changes in the Market Value of Assets and develops the Actuarial Value of Assets.

Statement of Changes in the Market Value of Assets

Table IV-1 shows the changes in the Market Value of Assets by tier for the current fiscal year and in total for the prior fiscal year.

Table IV-1

Change in Market Value of Assets	Fiscal Year Ending 2018				FYE 2017
	Tier 1	Tier 2 Fire	Tier 2 Police	Total	Total
Beginning Market Value	$ 3,284,869	$ 1,788	$ 6,600	$ 3,293,257	$ 3,043,651
Contributions					
Member	19,563	1,261	3,017	23,841	20,580
City	153,434	1,261	3,017	157,712	136,957
Total	$ 172,997	$ 2,523	$ 6,034	$ 181,553	$ 157,537
Net Investment Earnings	232,623	212	640	233,474	293,202
Benefit Payments	(206,596)	(22)	(12)	(206,630)	(196,032)
Administrative Expenses	(5,451)	(3)	(10)	(5,464)	(4,632)
Transfers	692	(67)	(625)	0	0
Market Value, End of Year	**$ 3,479,134**	**$ 4,430**	**$ 12,626**	**$ 3,496,190**	**$ 3,293,257**
Estimated Rate of Return	7.0%	7.1%	7.1%	7.0%	9.5%

Dollar amounts in thousands

Under Measure F, certain Tier 2 members who had previous Tier 1 service were returned to Tier 1. The transfers shown above represent the Tier 2 assets for those members that have been transferred to Tier 1.

The net investment earnings for the year ended June 30, 2018 represent approximately a 7.0% return on the Market Value of Assets compared to an assumed return of 6.875%. For the year ended June 30, 2017, the net investment return was approximately 9.5% (6.875% was assumed).

SECTION IV – ASSETS

Actuarial Value of Assets

To determine on-going contribution amounts, most pension funds use an Actuarial Value of Assets that smooths year-to-year market value returns in order to reduce the volatility of contribution rates.

The Actuarial Value of Assets is calculated by recognizing the deviation of actual investment returns compared to the expected return (6.875% for FYE's 2017 and 2018, 7.00% for FYE's 2015 and 2016, and 7.125% for FYE 2014) over a five-year period. The dollar amount of the expected return on the Market Value of Assets is determined using the actual contributions, benefit payments, and administrative expenses during the year. Any difference between the expected return and the actual net investment earnings is considered a gain or loss. Table IV-2 on the next page shows the calculation of the Actuarial Value of Assets separately for each tier. For each of the last four years, it shows the actual earnings, the expected earnings, the gain or loss and the portion of the gain or loss that is not recognized in the current Actuarial Value of Assets. These deferred amounts will be recognized in future years.

SECTION IV – ASSETS

Table IV-2

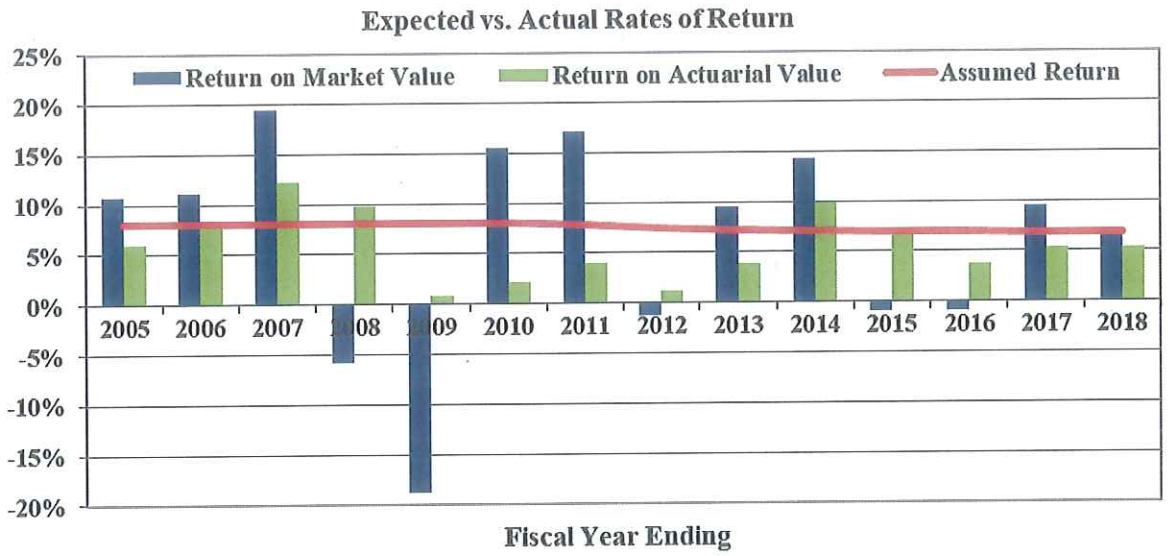
Development of Actuarial Value of Assets	Fiscal Year Ending 2018				FYE 2017
	Tier 1	Tier 2 Fire	Tier 2 Police	Total	Total
Market Value of Assets (MVA)	$ 3,479,134	$ 4,430	$ 12,626	$ 3,496,190	$ 3,293,257
FYE 2018					
Actual Earnings	$ 232,623	$ 212	$ 640	$ 233,474	$ 292,733
Expected Earnings	229,924	203	614	230,741	212,514
Investment Gain or (Loss)	2,699	9	26	2,733	80,220
Deferred (80%)	$ 2,159	$ 7	$ 21	$ 2,187	$ 64,176
FYE 2017					
Actual Earnings	$ 292,157	$ 110	$ 467	$ 292,733	(29,206)
Expected Earnings	212,107	78	330	212,514	221,094
Investment Gain or (Loss)	80,050	33	137	80,220	(250,300)
Deferred (60%)	$ 48,030	$ 20	$ 82	$ 48,132	(150,180)
FYE 2016					
Actual Earnings	$ (29,178)	$ (3)	$ (24)	$ (29,206)	$ (27,690)
Expected Earnings	220,891	25	178	221,094	225,302
Investment Gain or (Loss)	(250,069)	(28)	(203)	(250,300)	(252,992)
Deferred (40%)	(100,028)	(11)	(81)	(100,120)	(101,197)
FYE 2015					
Actual Earnings	$ (27,680)	$ (1)	$ (9)	$ (27,690)	$ 404,979
Expected Earnings	225,224	4	75	225,302	202,301
Investment Gain or (Loss)	(252,904)	(5)	(84)	(252,992)	202,678
Deferred (20%)	(50,581)	(1)	(17)	(50,598)	40,536
Total Deferred Gain or (Loss)	$ (100,419)	$ 14	$ 5	$ (100,400)	$ (146,666)
Preliminary Actuarial Value of Assets	$ 3,579,553	$ 4,416	$ 12,621	$ 3,596,590	$ 3,439,922
Minimum (80% of MVA)	$ 2,783,307	$ 3,544	$ 10,101	$ 2,796,952	$ 2,634,605
Maximum (120% of MVA)	$ 4,174,961	$ 5,316	$ 15,151	$ 4,195,428	$ 3,951,908
Actuarial Value of Assets	**$ 3,579,553**	**$ 4,416**	**$ 12,621**	**$ 3,596,590**	**$ 3,439,922**
Ratio of Actuarial to Market	102.9%	99.7%	100.0%	102.9%	104.5%
Estimated Rate of Return	5.3%	8.5%	11.4%	5.3%	5.4%

Dollar amounts in thousands

On the basis of the smoothed Actuarial Value of Assets, the return for the year ending June 30, 2018 was approximately 5.3%, which is less than both the assumed return of 6.875%, and the return on the Market Value of Assets. The estimated rate of return varies by tier, reflecting the different cash flows for each tier.

SECTION IV – ASSETS

The chart below shows the historical rates of return on both the Market and Actuarial Values of Assets compared to the assumed rates of return (the red line). Because of the 5-year smoothing, the return on the actuarial value is less volatile than the return on the market value.



SECTION V – MEASURES OF LIABILITY

This section presents detailed information on liability measures for the Plan for funding purposes, including:

- Present Value of Future Benefits,
- Normal cost
- Actuarial Liability, and
- Analysis of changes in the Unfunded Actuarial Liability during the year.

Present Value of Future Benefits

The Present Value of Future Benefits represents the amount of money today that is expected to be needed to pay all benefits both earned as of the valuation date and expected to be earned in the future by current plan members under the current plan provisions if all assumptions are met. Table V-1 below shows the Present Value of Future Benefits as of June 30, 2018 and June 30, 2017 separately by Tier for Police and Fire. Police Tier 2 members entered the Plan beginning August 4, 2013. Fire Tier 2 members entered the Plan beginning January 2, 2015.

Table V-1

Present Value of Future Benefits						
	Fire			Police		
	6/30/2018	6/30/2017	% Change	6/30/2018	6/30/2017	% Change
Tier 1						
Actives	$ 812,415	$ 799,705	1.6%	$ 1,104,215	$ 1,068,701	3.3%
Deferred Vested	7,762	8,495	-8.6%	89,767	82,757	8.5%
In Pay Status	1,158,431	1,098,325	5.5%	1,971,344	1,860,791	5.9%
Total Tier 1	**$ 1,978,608**	**$ 1,906,525**	**3.8%**	**$ 3,165,326**	**$ 3,012,249**	**5.1%**
Tier 2						
Actives	$ 49,911	$ 25,782	93.6%	$ 93,599	$ 52,448	78.5%
Deferred Vested	35	62	-43.5%	520	442	17.6%
In Pay Status	0	0	N/A	0	0	N/A
Total Tier 2	**$ 49,946**	**$ 25,844**	**93.3%**	**$ 94,119**	**$ 52,890**	**78.0%**
Total	**$ 2,028,554**	**$ 1,932,369**	**5.0%**	**$ 3,259,445**	**$ 3,065,139**	**6.3%**

Dollar amounts in thousands

SECTION V – MEASURES OF LIABILITY

Normal Cost

Under the Entry Age (EA) actuarial cost method, the Present Value of Future Benefits for each individual is spread over the individual's expected working career under the Plan as a level percentage of the individual's expected pay. The normal cost rate is determined by taking the value of each member's projected future benefits divided by the value of the each member's expected future salary, both at entry age into the Plan. The normal cost rate is multiplied by current salary to determine each member's normal cost. The normal cost of the Plan is the sum of the normal costs for each individual in the Plan. The normal cost represents the amount of money today that is expected to be needed to pay the benefits attributed to the next year of service if all assumptions are met. Table V-2 below shows the EA normal cost and Total normal cost rates as of June 30, 2018 and June 30, 2017 separately by Tier for Police and Fire, as well as a breakdown of the normal cost rate between the Retirement and COLA funds. The increase in normal cost rate for each group is primarily attributable to the reduction of the discount rate from 6.875% to 6.75%.

Table V-2

Entry Age Normal Cost By Group	Fire			Police		
	6/30/2018	6/30/2017	% Change	6/30/2018	6/30/2017	% Change
Tier 1						
Retirement	$ 17,400	$ 17,609	-1.2%	$ 16,907	$ 16,630	1.7%
Termination	1,488	1,369	8.7%	6,295	6,059	3.9%
Death	397	394	0.8%	446	431	3.5%
Disability	10,210	9,799	4.2%	12,741	11,970	6.4%
Reciprocity	182	178	2.1%	1,035	978	5.8%
Total Tier 1 Normal Cost	**$ 29,676**	**$ 29,349**	**1.1%**	**$ 37,425**	**$ 36,068**	**3.8%**
Expected Payroll	$ 71,953	$ 73,447	-2.0%	$ 95,910	$ 96,073	-0.2%
Normal Cost Rate	**41.24%**	**39.96%**	**1.28%**	**39.01%**	**37.55%**	**1.46%**
Retirement	28.40%	27.56%	0.84%	27.01%	26.10%	0.91%
COLA	12.84%	12.40%	0.44%	12.00%	11.45%	0.55%
Tier 2						
Retirement	$ 1,163	$ 603	93.0%	$ 2,444	$ 1,375	77.7%
Termination	115	58	98.0%	1,225	678	80.6%
Death	45	23	95.3%	96	54	77.5%
Disability	1,389	696	99.6%	2,947	1,608	83.3%
Total Tier 2 Normal Cost	**$ 2,712**	**$ 1,380**	**96.6%**	**$ 6,712**	**$ 3,715**	**80.7%**
Expected Payroll	$ 9,066	$ 4,741	91.2%	$ 24,715	$ 14,089	75.4%
Normal Cost Rate	**29.91%**	**29.10%**	**0.81%**	**27.16%**	**26.37%**	**0.79%**
Retirement	23.62%	23.07%	0.55%	21.57%	21.01%	0.56%
COLA	6.29%	6.03%	0.26%	5.59%	5.36%	0.23%

Dollar amounts in thousands

SECTION V – MEASURES OF LIABILITY

Actuarial Liability

The Actuarial Liability represents the amount of money today that is expected to be needed to pay for benefits attributed to service prior to the valuation date under the EA method if all assumptions are met. It is the difference between the Present Value of Future Benefits and the present value of future normal costs. Table V-3 below shows the Actuarial Liability as of June 30, 2018 and June 30, 2017 separately by Tier for Police and Fire, as well as a breakdown of the Actuarial Liability between the Retirement and COLA funds.

Table V-3

	Actuarial Liability					
	Fire			Police		
	6/30/2018	6/30/2017	% Change	6/30/2018	6/30/2017	% Change
Tier 1						
Actives						
Retirement	$ 420,742	$ 412,839	1.9%	$ 691,799	$ 675,581	2.4%
Termination	3,480	4,739	-26.6%	25,561	27,660	-7.6%
Death	2,028	1,972	2.8%	2,527	2,405	5.1%
Disability	152,048	141,656	7.3%	153,452	137,747	11.4%
Total Actives	$ 578,298	$ 561,206	3.0%	$ 873,339	$ 843,393	3.6%
Deferred Vested	$ 7,762	$ 8,495	-8.6%	$ 89,767	$ 82,757	8.5%
In Pay Status						
Service Retirees	$ 464,692	$ 429,302	8.2%	$ 1,292,766	$ 1,219,837	6.0%
Beneficiaries	83,170	75,926	9.5%	83,601	72,562	15.2%
Disabled Retirees	610,569	593,097	2.9%	594,977	568,392	4.7%
Total In Pay Status	$ 1,158,431	$ 1,098,325	5.5%	$ 1,971,344	$ 1,860,791	5.9%
Tier 1 Actuarial Liability	**$ 1,744,491**	**$ 1,668,026**	**4.6%**	**$ 2,934,450**	**$ 2,786,941**	**5.3%**
Retirement	1,011,764	975,861	3.7%	1,696,712	1,626,629	4.3%
COLA	732,727	692,165	5.9%	1,237,738	1,160,312	6.7%
Tier 2						
Actives						
Retirement	$ 2,261	$ 1,126	100.8%	$ 6,032	$ 3,234	86.5%
Termination	(92)	(71)	29.6%	1,401	867	61.6%
Death	49	26	88.5%	124	72	72.2%
Disability	2,322	1,123	106.8%	4,835	2,554	89.3%
Total Actives	$ 4,540	$ 2,204	106.0%	$ 12,392	$ 6,727	84.2%
Deferred Vested	$ 35	$ 62	N/A	$ 520	$ 442	17.6%
Tier 2 Actuarial Liability	**$ 4,575**	**$ 2,266**	**101.9%**	**$ 12,912**	**$ 7,169**	**80.1%**
Retirement	3,568	1,776	100.9%	10,150	5,726	77.3%
COLA	1,007	490	105.5%	2,762	1,443	91.4%
Total Actuarial Liability	**$ 1,749,066**	**$ 1,670,292**	**4.7%**	**$ 2,947,362**	**$ 2,794,110**	**5.5%**

Dollar amounts in thousands

SECTION V – MEASURES OF LIABILITY

Analysis of Change in Unfunded Actuarial Liability (UAL)

The UAL of any retirement plan is expected to change at each subsequent valuation for a variety of reasons. In each valuation, we analyze the sources of the change in the UAL and report the most significant causes of the change. Table V-4 below develops the expected UAL by Tier and identifies the primary sources for changes in the UAL since the last valuation.

Table V-4

Development of Experience Gain or (Loss)	Tier 1	Tier 2 Fire	Tier 2 Police	Total
Unfunded actuarial liability, 6/30/2017	$ 1,022,998	$ 533	$ 949	$ 1,024,480
Interest	70,331	37	65	70,433
Expected unfunded actuarial liability payment with interest	(111,718)	(50)	(92)	(111,859)
Change due to Measure F	191	0	0	191
Change in assumptions/methods	75,863	143	420	76,425
Expected unfunded actuarial liability, 6/30/2018	$ 1,057,666	$ 663	$ 1,342	$ 1,059,670
Actual unfunded actuarial liability	1,099,388	160	291	1,099,838
Experience Gain or (Loss)	**$ (41,722)**	**$ 503**	**$ 1,051**	**$ (40,168)**
Portion due to investment experience				$ (53,615)
Portion due to salary experience				8,207
Portion due to retirement experience				4,121
Portion due to other experience (including contributions)				1,120
Total				$ (40,168)

Dollar amounts in thousands

The most significant loss compared to assumptions are due to the investment experience on the Actuarial Value of Assets. The UAL also increased about $76 million due to the reduction in the discount rate from 6.875% to 6.75%.

SECTION VI – CONTRIBUTIONS

Under the contribution allocation procedure employed by the Plan, there are three components to the total contribution: the normal cost, assumed administrative expenses, and the Unfunded Actuarial Liability contribution. The normal cost rate was developed in Section V. This section develops the UAL and administrative expense contribution rates and divides the contributions between the members and the City.

Table VI-1 on the following page shows the outstanding balance, remaining period, and amortization payments for each component of the Tier 1 UAL as of June 30, 2018. Each component is amortized as a level percent of expected payroll with payroll assumed to increase 3.25% each year. The City is responsible for all components except the contribution rate increase delay for Police in 2006 and a portion of the liability attributable to certain members who were reclassified from Tier 2 to Tier 1 under Measure F. At the bottom of each section, the total is divided into the portion attributable to the basic retirement benefits and the portion attributable to COLA benefits. These amounts are used to set separate contribution rates for the basic retirement benefits and the COLA benefits portions of the Plan.

SECTION VI – CONTRIBUTIONS

Table VI-1

Tier 1 UAL Amortization Bases and Payments

Source	Date	Balance Total	Remaining Period	Amortization Payment Fire	Amortization Payment Police	Amortization Payment Total
Members						
Rate Increase Delay	12/17/2006	106	3.5	0	34	34
Measure F	6/30/2016	413	16.0	3	32	35
Total Members		$ **519**		$ **3**	$ **66**	$ **69**
Retirement		285		1	41	42
COLA		234		2	25	27
City						
Experience Loss	6/30/2005	$ 17,710	3.0	$ 2,867	$ 3,646	$ 6,513
Ben Improvement	6/30/2005	14,506	3.0	0	5,335	5,335
Ben Improvement	6/30/2007	18,972	5.0	4,325	0	4,325
Experience Gain	6/30/2007	(79,185)	5.0	(7,946)	(10,105)	(18,051)
Assumption Change	6/30/2007	18,409	5.0	1,847	2,349	4,197
Experience Loss	6/30/2009	169,113	7.0	12,518	15,921	28,439
Assumption Change	6/30/2009	100,938	7.0	7,472	9,503	16,974
Experience Loss	6/30/2010	119,170	8.0	7,843	9,975	17,818
Assumption Change	6/30/2010	78,028	8.0	5,135	6,531	11,666
Experience Gain	6/30/2011	(198,474)	9.0	(11,797)	(15,003)	(26,800)
Assumption Change	6/30/2011	51,014	13.0	2,235	2,842	5,077
Experience Loss	6/30/2012	111,804	10.0	6,076	7,727	13,803
SRBR Elimination	6/30/2012	(27,267)	10.0	(1,482)	(1,885)	(3,366)
Assumption Change	6/30/2012	100,941	14.0	4,170	5,303	9,473
Experience Loss	6/30/2013	71,333	11.0	3,580	4,553	8,133
Assumption Change	6/30/2013	26,942	15.0	1,055	1,342	2,396
Experience Gain	6/30/2014	(57,960)	12.0	(2,708)	(3,444)	(6,153)
Assumption Change	6/30/2014	54,014	16.0	2,013	2,560	4,573
Experience Gain	6/30/2015	(9,535)	13.0	(418)	(531)	(949)
Assumption Change	6/30/2015	88,247	17.0	3,143	3,997	7,139
Experience Gain	6/30/2016	154,038	13.0	6,748	8,582	15,330
Assumption Change	6/30/2016	71,806	18.0	2,452	3,118	5,570
Measure F (Rehires)	6/30/2016	2,985	14.0	38	242	280
Experience Loss	6/30/2017	105,326	14.0	4,351	5,534	9,885
Assumption/Method Change	6/30/2017	(130,675)	19.0	(4,291)	(5,457)	(9,747)
Measure F (Classic/Fed)	6/30/2018	95	15.0	1	8	8
Experience Loss	6/30/2018	41,722	15.0	1,634	2,077	3,711
Assumption/Method Change	6/30/2018	75,863	20.0	2,402	3,055	5,456
7/1 UAL Payment		108,987				
Total City		$ **1,098,869**		$ **53,263**	$ **67,774**	$ **121,037**
Retirement		537,741		23,149	29,400	52,549
COLA		561,128		30,114	38,374	68,488
Total Tier 1		$ **1,099,388**		$ **53,266**	$ **67,840**	$ **121,106**

Dollar amounts in thousands

Table VI-2 on the next page shows the outstanding balance, remaining period, and amortization payments for each component of the Tier 2 UAL as of June 30, 2018. Each component is

amortized from the valuation date in which it was first recognized. All components of the Tier 2 UAL are split evenly between the members and the City.

Table VI-2

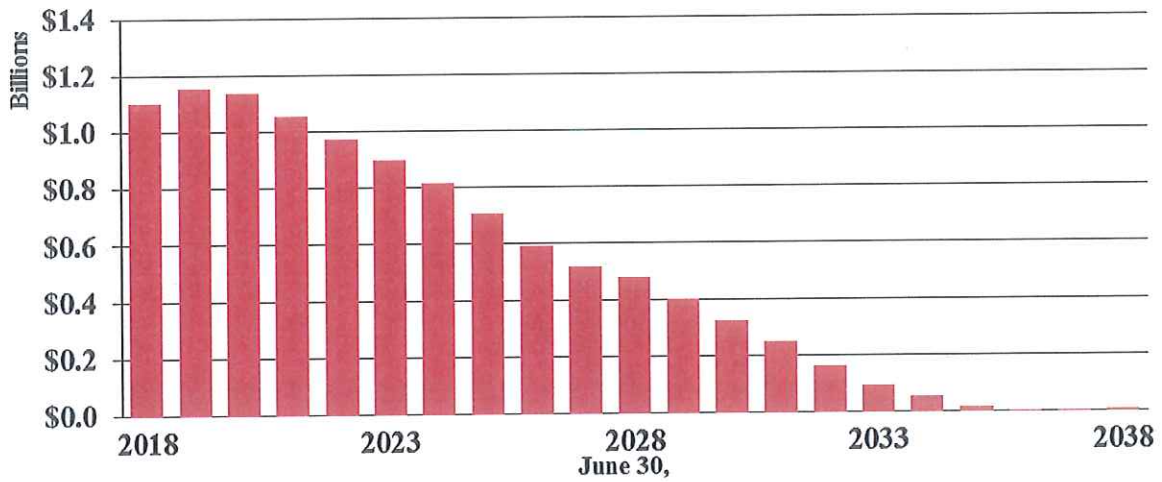
Tier 2 UAL Amortization Bases

Source	Date	Outstanding Balance Fire	Outstanding Balance Police	Remaining Period	Amortization Payment Fire	Amortization Payment Police
Members and City						
Experience Gain	6/30/2014	$ 0	$ (26)	12.0	$ 0	$ (3)
Assumption Change	6/30/2014	0	(5)	16.0	0	(0)
Experience Gain	6/30/2015	43	18	13.0	4	2
Assumption Change	6/30/2015	7	(18)	17.0	1	(1)
Experience Gain	6/30/2016	(58)	(134)	13.0	(6)	(13)
Assumption Change	6/30/2016	18	88	18.0	1	7
Measure F (Rehires)	6/30/2016	211	685	14.0	20	64
Experience Loss	6/30/2017	443	802	14.0	42	75
Assumption/Method Change	6/30/2017	(144)	(489)	19.0	(11)	(37)
Experience Loss	6/30/2018	(503)	(1,051)	15.0	(45)	(93)
Assumption/Method Change	6/30/2018	143	420	20.0	10	30
Total Tier 2		**$ 160**	**$ 291**		**$ 17**	**$ 31**
Retirement		(42)	(295)		(2)	(24)
COLA		202	586		19	55

Dollar amounts in thousands

The chart below shows the projected aggregate balance of the UAL based on the Actuarial Value of Assets for the Plan under the amortization schedules shown above assuming all expected payments are made and all assumptions are met. This projection includes new amortization bases for the unrecognized investment gains and losses that will be recognized over the next four years.

Projected Unfunded Actuarial Liability Based on Actuarial Value of Assets



SECTION VI – CONTRIBUTIONS

In addition to the UAL payments shown above, Tier 1 members pay 3/11ths of the normal cost (excluding reciprocity normal cost) plus their historical share of administrative expenses. Tier 2 members pay half of the EA normal cost, half of administrative expenses, and half of the UAL payments.

The administrative expense assumption was changed to $1,175 per member following the June 30, 2017 experience study, and increased by 3.25% to $1,213 for the June 30, 2018 valuation. Table VI-3 below shows the development of the administrative expense rates for FYE 2020.

Table VI-3

Administrative Expense By Group	Fire		Police	
	Tier 1	Tier 2	Tier 1	Tier 2
Members	1,478	106	2,319	309
Administrative Expense	$ 1,793	$ 129	$ 2,813	$ 375
Member Admin Expense Rate	**0.28%**	**0.38%**	**0.28%**	**0.43%**
Retirement	0.19%	0.30%	0.19%	0.34%
COLA	0.09%	0.08%	0.09%	0.09%
City Admin Expense Rate	**2.19%**	**0.38%**	**2.76%**	**0.43%**
Retirement	1.51%	0.30%	1.91%	0.34%
COLA	0.68%	0.08%	0.85%	0.09%

Dollar amounts in thousands

SECTION VI – CONTRIBUTIONS

Table VI-4 below shows the member contribution rates for FYE 2020 by Tier split between Police and Fire groups. All Tier 1 members contribute at the rates shown in the subtotal. Certain Tier 1 members also pay a portion of the cost under Measure F either individually or as a part of a designated group. The Measure F UAL rates shown in the table are averaged over the entire Tier 1 payroll. Individuals may pay at a substantially higher rate.

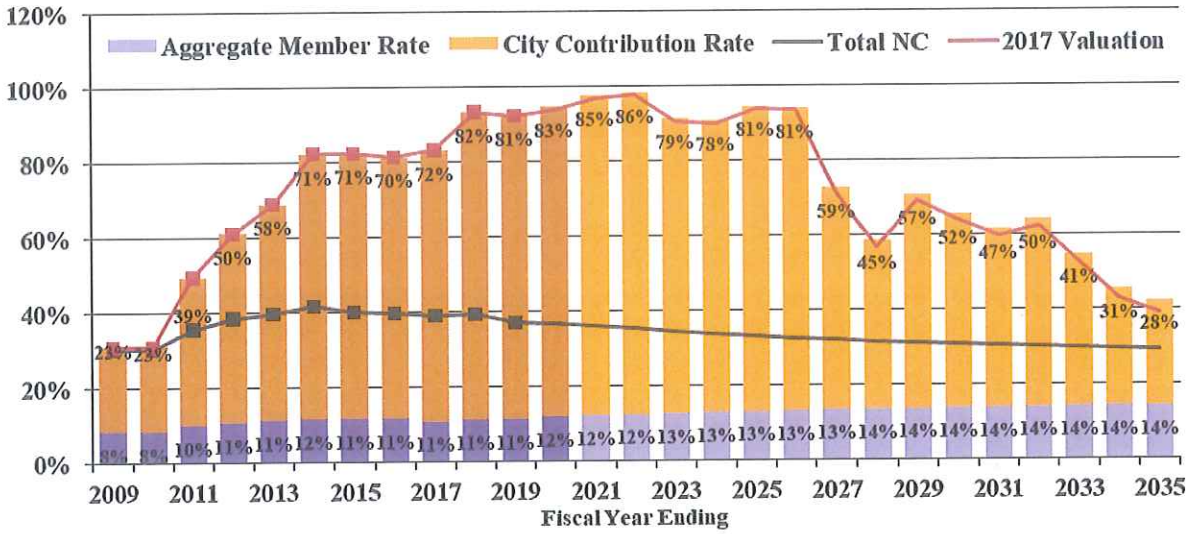
Table VI-4

Fiscal Year Ending 2020 Member Contribution Rates						
	Fire			Police		
	Retirement	COLA	Total	Retirement	COLA	Total
Tier 1						
Normal Cost	7.69%	3.49%	11.18%	7.13%	3.21%	10.34%
Admin Expense	0.19%	0.09%	0.28%	0.19%	0.09%	0.28%
Regular UAL	0.00%	0.00%	0.00%	0.03%	0.01%	0.04%
Subtotal	**7.88%**	**3.58%**	**11.46%**	**7.35%**	**3.31%**	**10.66%**
Measure F UAL	0.00%	0.00%	0.00%	0.02%	0.02%	0.04%
Total	**7.88%**	**3.58%**	**11.46%**	**7.37%**	**3.33%**	**10.70%**
Tier 2						
Normal Cost	11.81%	3.15%	14.96%	10.79%	2.80%	13.59%
Admin Expense	0.30%	0.08%	0.38%	0.34%	0.09%	0.43%
UAL	-0.01%	0.06%	0.05%	-0.03%	0.07%	0.04%
Total	**12.10%**	**3.29%**	**15.39%**	**11.10%**	**2.96%**	**14.06%**

The chart on the next page shows historical and projected aggregate contribution rates for the Plan compared to those projected in the prior valuation. The purple bars are weighted average member contribution rates for Police and Fire for both Tier 1 and Tier 2. The gold bars are weighted average city contribution rates for Police and Fire for both Tier 1 and Tier 2. The darker shaded bars represent historical amounts and the lighter shades represent projected rates. The projected rates assume that all assumptions are met. The chart in the dashboard (page 1) shows potential variations from these projections for stochastically generated investment returns. The black line shows the weighted average normal cost rate. All contribution rates above this rate represent payments toward the UAL. The red line represents the projection from the prior valuation.

SECTION VI – CONTRIBUTIONS

Historical and Projected Aggregate Contribution Rates



The normal cost rate is projected to decline as Tier 1 members terminate employment or retire and are replaced by Tier 2 members who have a significantly lower normal cost rate. Since the last valuation, there is not a significant change in projected City contribution rates. There is a significant decrease in City contribution rates projected between FYE 2026 and FYE 2028 due to the completion of payments on the amortization schedules for the 2009 and 2010 assumption changes and experience losses.

SECTION VI – CONTRIBUTIONS

Table VI-5 below shows the estimated dollar amounts of the City's contributions assuming contributions are made throughout the fiscal year.

Table VI-5

Fiscal Year Ending 2020 Estimated City Contributions
Dollar Contributions Throughout the Year

	Fire			Police		
	Retirement	COLA	Total	Retirement	COLA	Total
Tier 1 UAL Payment	$ 23,917	$ 31,114	$ 55,031	$ 30,376	$ 39,648	$ 70,024
Tier 1 Normal Cost	$ 15,051 20.71%	$ 6,797 9.35%	$ 21,847 30.06%	$ 18,371 19.88%	$ 8,125 8.79%	$ 26,495 28.67%
Tier 1 Admin Expenses	$ 1,095 1.51%	$ 495 0.68%	$ 1,590 2.19%	$ 1,769 1.91%	$ 786 0.85%	$ 2,555 2.76%
Tier 2 Contribution	$ 2,018 12.10%	$ 549 3.29%	$ 2,567 15.39%	$ 4,856 11.10%	$ 1,295 2.96%	$ 6,151 14.06%
Aggregate Contribution	**$ 42,081 47.09%**	**$ 38,954 43.60%**	**$ 81,035 90.69%**	**$ 55,371 40.66%**	**$ 49,853 36.61%**	**$ 105,224 77.27%**

Dollar amounts in thousands

Historically, the City has made Tier 1 contributions at the beginning of the fiscal year and Tier 2 contributions throughout the year. Table VI-6 shows the estimated dollar amounts of the City's Tier 1 contributions assuming contributions are made at the beginning of the fiscal year. In accordance with the Board's policy, contributions made at the beginning of FYE 2020 are discounted for one-half year of interest at 55% of the valuation discount rate. To the extent the City's contributions are made after the beginning of the fiscal year, the amounts should be adjusted for interest.

Table VI-6

Fiscal Year Ending 2020 Estimated City Contribution Amounts
Beginning of Year

	Fire			Police		
	Retirement	COLA	Total	Retirement	COLA	Total
Tier 1						
Normal Cost	$ 14,779	$ 6,674	$ 21,453	$ 18,039	$ 7,978	$ 26,017
Admin Expense	1,075	486	1,561	1,737	771	2,508
UAL	23,485	30,552	54,037	29,827	38,932	68,759
Total	**$ 39,339**	**$ 37,712**	**$ 77,051**	**$ 49,603**	**$ 47,681**	**$ 97,284**

Dollar amounts in thousands

SECTION VII – ACTUARIAL SECTION OF THE CAFR

The Government Finance Officers Association (GFOA) maintains a checklist of items to be included in the System's Comprehensive Annual Financial Report (CAFR) in order to receive recognition for excellence in financial reporting. The schedules in this section are listed by the GFOA for inclusion in the Actuarial Section of the System's CAFR.

Table VII-1

Schedule of Funding Progress

Actuarial Valuation Date	Actuarial Value of Assets	Actuarial Liability (AL)	Unfunded Actuarial Liability	Funded Ratio	Covered Payroll	Unfunded AL as a % of Covered Payroll
6/30/2018	$ 3,596,590	$ 4,696,428	$ 1,099,838	76.6%	$ 218,429	503.5%
6/30/2017	3,439,922	4,464,402	1,024,480	77.1%	203,816	502.6%
6/30/2016	3,303,550	4,355,990	1,052,440	75.8%	194,072	542.3%
6/30/2015	3,212,776	4,058,410	845,634	79.2%	184,733	457.8%
6/30/2014	3,025,101	3,813,825	788,724	79.3%	188,189	419.1%
6/30/2013	2,771,924	3,578,031	806,107	77.5%	184,645	436.6%
6/30/2012	2,703,539	3,397,792	694,253	79.6%	187,959	369.4%
6/30/2011	2,685,721	3,196,007	510,286	84.0%	190,726	267.5%
6/30/2010	2,576,705	3,230,456	653,751	79.8%	251,058	260.4%
6/30/2009	2,569,569	2,963,482	393,913	86.7%	255,223	154.3%

Amounts prior to June 30, 2011 calculated by prior actuary

Dollar amounts in thousands

SECTION VII – ACTUARIAL SECTION OF THE CAFR

Table VII-2

Schedule of Funded Liabilities by Type

Actuarial Valuation Date	Actuarial Liability For: Active Member Contributions (A)	Retirees, Beneficiaries and Other Inactives (B)	Remaining Active Members' Liability (C)	Reported Assets	Portion of Actuarial Liability Covered by Reported Assets (A)	(B)	(C)
6/30/2018	$ 304,454	$ 3,227,859	$ 1,164,115	$ 3,596,590	100%	100%	6%
6/30/2017	299,933	3,050,871	1,113,598	3,439,922	100%	100%	8%
6/30/2016	294,535	2,999,773	1,061,682	3,303,550	100%	100%	1%
6/30/2015	285,538	2,819,410	953,462	3,212,776	100%	100%	11%
6/30/2014	288,227	2,585,611	939,987	3,025,101	100%	100%	16%
6/30/2013	280,727	2,452,728	844,576	2,771,924	100%	100%	5%
6/30/2012	276,047	2,310,295	811,450	2,703,539	100%	100%	14%
6/30/2011	260,172	2,174,044	761,791	2,685,721	100%	100%	33%
6/30/2010	246,356	1,907,931	1,076,169	2,576,705	100%	100%	39%
6/30/2009	243,302	1,630,914	1,089,266	2,569,569	100%	100%	64%

Amounts prior to June 30, 2011 calculated by prior actuary

Dollar amounts in thousands

In the exhibit below, non-recurring items include changes in assumptions and changes in plan provisions.

Table VII-3

Analysis of Financial Experience

Actuarial Valuation Date	Gain or (Loss) for Year(s) Ending on Valuation Date Due To: Investment Income	Combined Liability Experience	Total Financial Experience	Non-Recurring Items	Total Experience
6/30/2018	$ (53,615)	$ 13,448	$ (40,167)	$ (76,425)	$ (116,592)
6/30/2017	(50,882)	(57,971)	(108,853)	127,571	18,718
6/30/2016	(106,785)	(54,528)	(161,313)	(72,680)	(233,993)
6/30/2015	2,806	7,291	10,097	(90,004)	(79,907)
6/30/2014	78,462	(14,678)	63,784	(55,787)	7,997
6/30/2013	(92,499)	11,115	(81,384)	(28,233)	(109,618)
6/30/2012	(172,759)	39,432	(133,327)	(75,220)	(208,548)
6/30/2011	(96,473)	278,051	181,578	12,360	193,938
6/30/2010	(149,621)	43,880	(105,741)	(104,240)	(209,981)
6/30/2009	(138,383)	(113,495)	(251,878)	(145,351)	(397,229)

Amounts prior to June 30, 2011 calculated by prior actuary

Dollar amounts in thousands

APPENDIX A – MEMBERSHIP INFORMATION

Data Assumptions and Methods

In preparing our data, we relied on information supplied by the San José Department of Retirement Services. This information includes, but is not limited to, plan provisions, employee data, and financial information. Our methodology for obtaining the data used for the valuation is based upon the following assumptions and practices:

- Records on the "Active" data file are considered to be Active if they do not have a reason for termination.
- Records on any of the data files are considered to be Inactive if they have a reason for termination of deferred vested or leave of absence/inactive.
- Records on the "Retiree" and "Beneficiary/QDRO" files are considered in pay status if they do not have a date of death, are not inactive, and have not withdrawn from the plan.
- Salary for the year commencing on the valuation date is defined as the greater of:
    - Annualized "compensation rate 2," increased with one year of wage inflation and one half year of merit increase; and,
    - "Pensionable compensation" for the year ending on the valuation date, increased with one year of wage inflation and one year of merit increase.
- The annual benefit for deferred vested members is set to be the accrued benefit provided. If an accrued benefit is not provided, then an annual benefit is estimated at the later of their current age and assumed retirement age, using the benefit service provided and annualized "compensation rate 2."
- We assume any member found in last year's "Retiree" file and not in this year's file is deceased without a beneficiary and should be removed from the valuation data.
- We assume all deceased members with payments continuing to a beneficiary have already been accounted for in the "Retiree" file.
- If a spouse continuance amount is not provided on a Tier 1 retiree or disabled member's record, it is assumed to equal the member's benefit, multiplied by 37.5%, and divided by the member's benefit multiplier at retirement.

APPENDIX A – MEMBERSHIP INFORMATION

Table A-1

Active Member Data	June 30, 2018			June 30, 2017	
	Fire	Police	Total	Total	% Change
Count					
Tier 1	562	718	1,280	1,333	-4.0%
Tier 2	102	256	358	211	69.7%
Total	664	974	1,638	1,544	6.1%
Average Current Age	43.0	41.4	42.0	42.7	-1.6%
Average Vesting Service	13.8	13.8	13.8	14.6	-5.7%
Expected Pensionable Earnings					
Total	$ 86,541,115	$ 131,888,183	$ 218,429,298	$ 203,816,439	7.2%
Average	$ 130,333	$ 135,409	$ 133,351	$ 132,005	1.0%

Table A-2

Schedule of Active Member Data				
Valuation Year	Active Count	Annual Payroll	Monthly Average Pay	Percent Change in Average Pay
2018	1,638	$ 218,429,298	$ 11,113	1.02%
2017	1,544	203,816,439	11,000	12.69%
2016	1,577	184,733,063	9,762	2.96%
2015	1,654	188,188,712	9,481	5.19%
2014	1,707	184,645,250	9,014	-1.13%
2013	1,718	187,958,523	9,117	-0.48%
2012	1,735	190,726,258	9,161	-11.51%
2011	2,021	251,058,473	10,352	1.38%
2010	2,083	255,222,552	10,211	14.92%
2009	2,136	227,734,449	8,885	1.68%*

**Increase over a two-year period.*

APPENDIX A – MEMBERSHIP INFORMATION

Table A-3

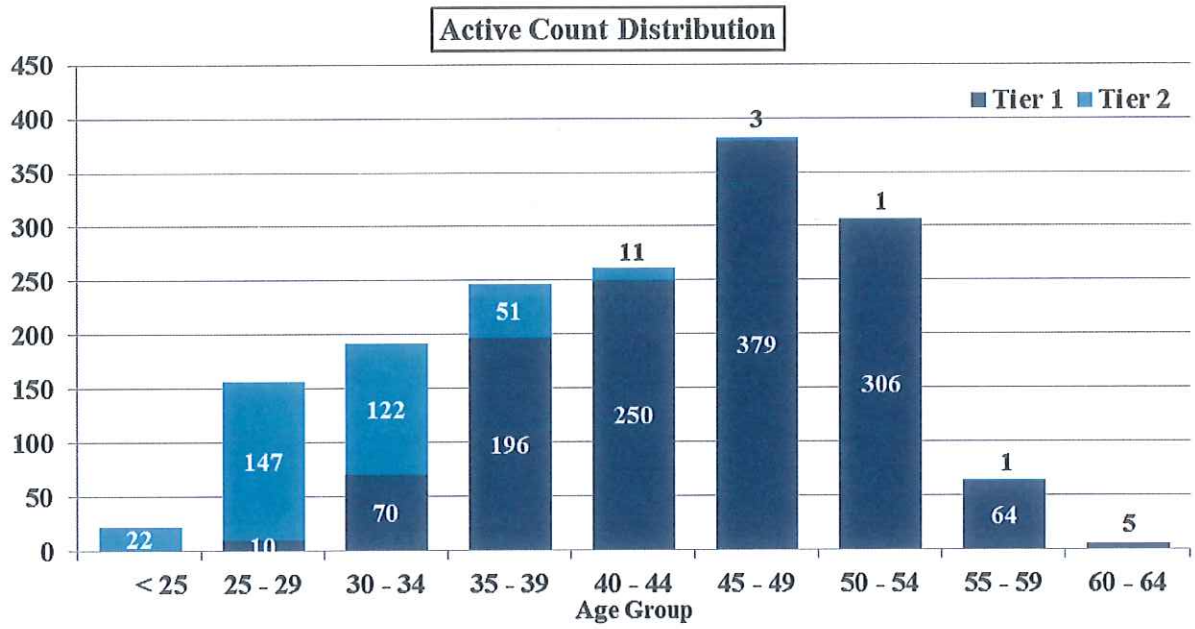
Non-Active Member Data	Count			Average Age		
	June 30, 2018	June 30, 2017	%Change	June 30, 2018	June 30, 2017	%Change
Retired	1,007	974	3.4%	64.7	64.4	0.5%
Disabled	912	912	0.0%	68.0	67.9	0.1%
Beneficiaries	331	306	8.2%	68.1	67.9	0.3%
In-Pay Total	2,250	2,192	2.6%	66.6	66.3	0.5%
Terminated	324	333	-2.7%	44.4	41.2	7.8%

Table A-4

Non-Active Member Data	Total Benefit*			Average Benefit*		
	June 30, 2018	June 30, 2017	%Change	June 30, 2018	June 30, 2017	%Change
Retired	111,289,372	104,800,003	6.2%	110,516	107,598	2.7%
Disabled	85,536,829	82,587,125	3.6%	93,790	90,556	3.6%
Beneficiaries	14,393,909	12,809,856	12.4%	43,486	41,862	3.9%
In-Pay Total	211,220,109	200,196,985	5.5%	247,792	240,016	3.2%
Deferred Benefits	6,190,641	6,158,937	0.5%	27,514	27,013	1.9%
Refund Benefits	3,541,012	4,040,183	-12.4%			

* Refund benefits are a one-time payment. All other benefits shown are annual amounts.

Chart A-1



APPENDIX A – MEMBERSHIP INFORMATION

Table A-5

Distribution of Active Members as of June 30, 2018

	Years of Benefit Service								
Age	Under 1	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 and Up	Total
Under 25	16	6	-	-	-	-	-	-	22
25 to 29	71	77	9	-	-	-	-	-	157
30 to 34	49	79	44	20	-	-	-	-	192
35 to 39	23	36	75	100	13	-	-	-	247
40 to 44	3	10	36	96	107	9	-	-	261
45 to 49	2	2	16	46	130	174	12	-	382
50 to 54	1	2	1	14	72	165	49	3	307
55 to 59	-	1	1	1	9	29	23	1	65
60 to 64	-	-	-	-	3	1	1	-	5
65 to 69	-	-	-	-	-	-	-	-	-
70 and up	-	-	-	-	-	-	-	-	-
Total Count	165	213	182	277	334	378	85	4	1,638

Table A-6

Distribution of Active Members as of June 30, 2018

	Average Expected Salary Years of Benefit Service								
Age	Under 1	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 and Up	Total
Under 25	$ 98,327	$ 103,307	$ -	$ -	$ -	$ -	$ -	$ -	$ 99,685
25 to 29	97,950	108,541	128,593	-	-	-	-	-	104,901
30 to 34	95,186	112,908	127,354	135,786	-	-	-	-	114,079
35 to 39	99,334	110,817	127,806	136,537	147,167	-	-	-	127,232
40 to 44	92,853	112,845	131,060	135,361	144,332	149,051	-	-	137,566
45 to 49	98,327	117,761	127,847	134,069	141,157	150,052	168,404	-	144,307
50 to 54	138,344	110,777	120,104	138,346	138,955	148,421	161,435	169,777	147,657
55 to 59	-	100,276	113,728	138,646	144,188	141,711	149,748	138,646	143,735
60 to 64	-	-	-	-	129,489	138,646	206,602	-	146,743
65 to 69	-	-	-	-	-	-	-	-	-
70 and up	-	-	-	-	-	-	-	-	-
Avg. Salary	$ 97,515	$ 110,669	$ 128,263	$ 135,764	$ 141,910	$ 148,646	$ 159,788	$ 161,994	$ 133,351

APPENDIX A – MEMBERSHIP INFORMATION

Table A-7

Retirees and Disabled by Attained Age and Benefit Effective Date
As of June 30, 2018

Benefit Effective	Age										Total
	Under 50	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89	90 and up	
Pre-1998	-	1	6	9	13	82	151	117	42	14	435
PYE 1998	-	-	1	1	5	38	16	4	-	-	65
PYE 1999	-	-	-	1	5	28	14	4	-	-	52
PYE 2000	-	-	1	-	7	22	15	2	-	-	47
PYE 2001	-	-	2	2	12	32	5	1	-	-	54
PYE 2002	-	-	3	1	14	25	5	-	-	-	48
PYE 2003	1	1	2	2	30	32	4	1	-	-	73
PYE 2004	-	-	-	5	24	14	2	-	-	-	45
PYE 2005	-	1	3	6	41	19	4	1	-	-	75
PYE 2006	-	-	-	9	11	15	1	-	-	-	36
PYE 2007	-	2	1	21	31	9	-	-	-	-	64
PYE 2008	2	2	-	27	25	6	-	-	-	-	62
PYE 2009	1	3	9	68	54	16	2	-	-	-	153
PYE 2010	1	1	31	71	30	2	-	-	-	-	136
PYE 2011	4	3	47	46	10	-	1	-	-	-	111
PYE 2012	6	3	34	20	4	1	-	-	-	-	68
PYE 2013	7	8	27	10	2	1	-	-	-	-	55
PYE 2014	9	3	32	9	-	-	-	-	-	-	53
PYE 2015	9	27	51	8	2	-	-	-	-	-	97
PYE 2016	6	33	13	4	-	-	-	-	-	-	56
PYE 2017	10	29	26	2	-	-	-	-	-	-	67
PYE 2018	7	38	19	2	1	-	-	-	-	-	67
Total	63	155	308	324	321	342	220	130	42	14	1,919

Average Age at Retirement/Disability		52.4
Average Current Age		64.7
Average Annual Pension	$	110,516

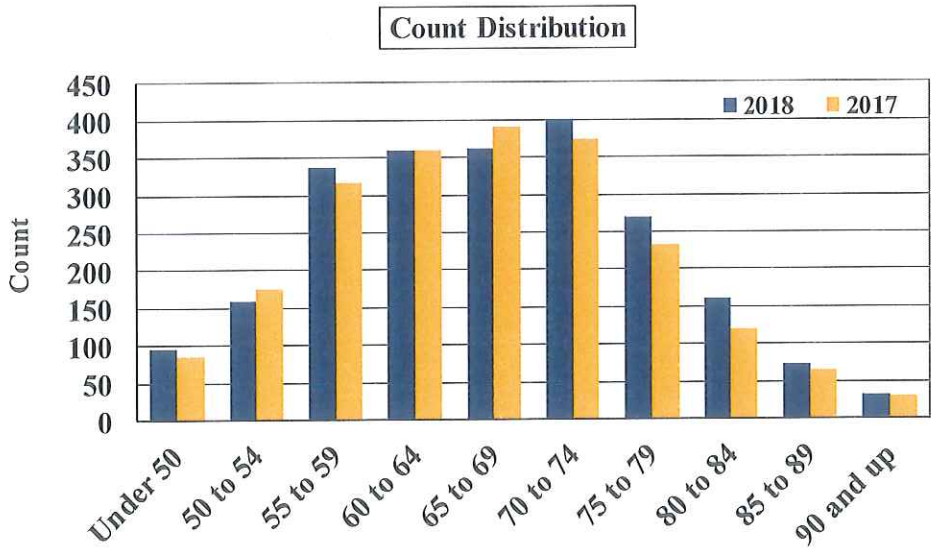
APPENDIX A – MEMBERSHIP INFORMATION

Table A-8

Distribution of Retirees, Disabled Members, and Beneficiaries

Age	June 30, 2018	June 30, 2017
Under 50	95	86
50 to 54	160	176
55 to 59	337	317
60 to 64	360	359
65 to 69	361	390
70 to 74	401	375
75 to 79	270	232
80 to 84	162	120
85 to 89	72	65
90 and up	32	29
Total	**2,250**	**2,149**

Chart A-2



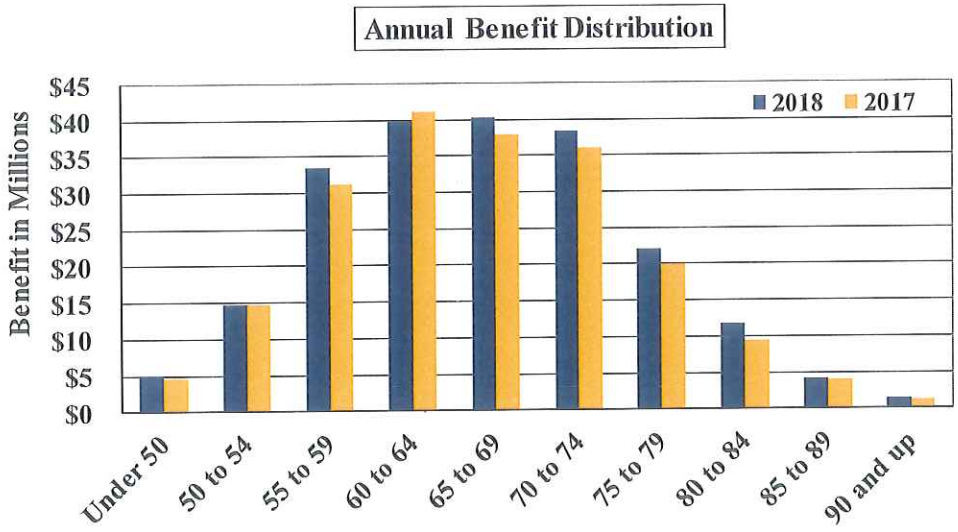
APPENDIX A – MEMBERSHIP INFORMATION

Table A-9

Distribution of Annual Benefit Amounts

Age	June 30, 2018	June 30, 2017
Under 50	$ 4,989,655	$ 4,579,327
50 to 54	14,628,841	14,812,172
55 to 59	33,610,620	31,124,020
60 to 64	39,750,126	41,206,100
65 to 69	40,286,559	38,023,573
70 to 74	38,404,634	36,039,674
75 to 79	22,085,769	20,000,867
80 to 84	11,849,838	9,333,881
85 to 89	4,141,344	3,864,580
90 and up	1,472,723	1,212,790
Total	**$ 211,220,109**	**$ 200,196,985**

Chart A-3



APPENDIX A – MEMBERSHIP INFORMATION

Table A-10

Changes in Plan Membership	Actives		Terminated			In-Pay			
	Tier 1	Tier 2	Non-Vested	Vested	Reciprocal	Retirees	Disabilities	Beneficiaries	Total
June 30, 2017	**1,333**	**211**	**105**	**76**	**152**	**974**	**912**	**306**	**4,069**
New Entrants	7	152							159
Rehires	15	4	(5)	(5)	(8)				1
Non-Vested Terminations	(5)	(3)	8						0
Vested Deferrals	(8)			8					0
Transfers	(4)		(9)	(7)	20				0
Return of Contributions		(1)	(4)	(1)	(1)				(7)
Disabilities	(12)		(1)	(2)	(1)	(13)	29		0
Retirements	(50)			(3)	(6)	59			0
Deaths	(1)					(13)	(29)	30	(13)
Beneficiary Deaths								(7)	(7)
Measure F Transfers	5	(5)							0
Adjustments			5	3				2	10
June 30, 2018	**1,280**	**358**	**99**	**69**	**156**	**1,007**	**912**	**331**	**4,212**

Table A-11

Schedule Of Retirees and Beneficiaries Added to and Removed from Rolls										
	Beginning		Added to Rolls		Removed from Rolls		End of Period		% Increase	Average
Period	Count	Annual Allowances	Count	Annual Allowances	Count	Annual Allowances	Count	Annual Allowances	in Annual Allowances*	Annual Allowances
2017-2018	2,192	$ 200,197	120	$ 15,558	62	$ 4,535	2,250	$ 211,220	5.5%	$ 93,876
2016-2017	2,149	190,897	87	11,816	44	2,516	2,192	200,197	4.9%	91,331
2015-2016	2,108	182,185	72	10,843	31	2,131	2,149	190,897	4.8%	88,831
2014-2015	2,032	170,872	115	13,700	39	2,387	2,108	182,185	6.6%	86,426
2013-2014	1,994	162,716	73	10,142	35	1,986	2,032	170,872	5.0%	84,091
2012-2013	1,942	154,381	91	10,259	39	1,924	1,994	162,716	5.4%	81,603
2011-2012	1,885	144,139	88	11,583	31	1,341	1,942	154,381	7.1%	79,496
2010-2011	1,810	131,014	133	15,384	58	2,259	1,885	144,139	10.0%	76,466
2009-2010	1,700	115,573	152	17,238	42	1,797	1,810	131,014	13.4%	72,383
2007-2009	1,477	90,061	276	27,537	53	2,025	1,700	115,573	28.3%	67,984
2005-2007	1,385	76,071	143	15,913	51	1,923	1,477	90,061	18.4%	60,976
2003-2005	1,271	62,314	161	15,619	47	1,862	1,385	76,071	22.1%	54,925

** Years prior to 2009-2010 are increases over a two-year period, not an annual increase*

Annual Allowances in Thousands

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

A. Actuarial Assumptions

The discount rate used in this report was adopted by the Board of Administration with our input at the November 1, 2018 Board meeting. All other assumptions were adopted at the November 2, 2017 Board meeting based on recommendations from our experience study covering plan experience during the period from July 1, 2009 through June 30, 2017. Please refer to the experience study for the rationale for each of the assumptions.

1. Discount Rate

6.75% net of investment expenses. The long-term expected return on assets based on Meketa's capital market assumptions for a 20-year time horizon is 7.0%. The Board applied a margin for adverse deviation to improve the probability of achieving the discount rate.

2. Price Inflation

2.75% per annum.

3. Wage Inflation

3.25% per annum (0.50% real wage growth).

4. Salary Increase Rate

The following merit component is added to wage inflation, based on an individual member's years of service:

Table B-1

Salary Merit Increases	
Years of Service	Merit/ Longevity
0	6.00%
1	5.50
2	5.00
3	4.50
4	4.00
5	3.50
6	2.75
7	2.00
8	1.50
9	1.00
10	0.75
11+	0.50

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

5. Rates of Retirement

Rates of retirement are based on age and service according to the following Tables B-2, B-3, and B-4. Tier 1 rates only apply when the member is eligible for unreduced benefits.

Table B-2

Tier 1 Rates of Retirement by Age and Service				
	Police		Fire	
Age	<30 Years	30+ Years	<30 Years	30+ Years
50	55.0%	100.0%	35.0%	100.0%
51	45.0	100.0	35.0	100.0
52	40.0	100.0	35.0	100.0
53 – 55	35.0	100.0	35.0	100.0
56 – 57	35.0	100.0	27.5	100.0
58 – 61	50.0	100.0	27.5	100.0
62+	100.0	100.0	100.0	100.0

Table B-3

Tier 2 Rates of Retirement by Age and Service				
	Police			
Age	5 – 19 Years	20 – 24 Years	25 – 29 Years	30+ Years
50 – 56	2.0%	2.0%	2.0%	5.0%
57 – 59	7.5	10.0	20.0	100.0
60 – 61	10.0	20.0	35.0	100.0
62 – 64	25.0	50.0	75.0	100.0
65+	100.0	100.0	100.0	100.0

Table B-4

Tier 2 Rates of Retirement by Age and Service				
	Fire			
Age	5 – 19 Years	20 – 24 Years	25 – 29 Years	30+ Years
50 – 56	1.0%	1.0%	1.0%	2.5%
57 – 59	5.0	7.5	15.0	100.0
60 – 61	7.5	15.0	25.0	100.0
62 – 64	20.0	35.0	50.0	100.0
65+	100.0	100.0	100.0	100.0

Tier 1 vested terminated members are assumed to retire at age 55 and Tier 2 vested terminated members are assumed to retire at age 60.

6. Rates of Termination

Sample rates of termination are shown in the following Table B-5.

Table B-5

	Rates of Termination	
Service	Police	Fire
0	16.00%	25.00%
1	11.75	7.00
2	9.85	3.50
3	8.35	1.75
4	7.00	1.25
5	5.75	1.00
6	4.75	0.90
7	4.00	0.80
8	3.50	0.70
9	3.50	0.60
10	3.50	0.50
11	3.50	0.50
12	3.00	0.50
13	2.50	0.50
14	2.00	0.50
15+	2.00	0.50

* Termination rates do not apply once a member is eligible for unreduced retirement.

75% of terminating employees are assumed to subsequently work for a reciprocal employer and receive 3.25% pay increases per year.

7. Rates of Disability

For Police, disability rates are equal to the CalPERS police industrial and non-industrial rates for public agencies multiplied by 90% for ages under 50 and 140% for ages 50 and older. For Fire, disability rates are equal to the CalPERS fire industrial and non-industrial rates for public agencies multiplied by 90% for ages under 50 and 180% for ages 50 and older. Sample disability rates of active participants are provided in Table B-6.

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

Table B-6

Rates of Disability at Selected Ages		
Age	Police	Fire
25	0.16%	0.03%
30	0.45	0.08
35	0.74	0.15
40	1.03	0.28
45	1.32	0.50
50	2.70	5.08
55	6.88	7.54
60	8.71	10.77
65	10.47	14.84

100% of disabilities are assumed to be duty related.

8. Rates of Mortality

Mortality rates for actives, retirees, beneficiaries, terminated vested, and reciprocals are based on the sex-distinct employee and annuitant mortality tables shown below. Future mortality improvements are reflected by applying the SOA MP-2017 projection scale on a generational basis from the base year of 2009.

Table B-7

Base Mortality Tables		
Category	Male	Female
Healthy Annuitant	0.948 times the CalPERS 2009 Healthy Annuitant Mortality Table (Male)	1.048 times the CalPERS 2009 Healthy Annuitant Mortality Table (Female)
Healthy Non-Annuitant	0.948 times the CalPERS 2009 Employee Mortality Table (Male)	1.048 times the CalPERS 2009 Employee Mortality Table (Female)
Disabled Annuitant	0.903 times the CalPERS 2009 Industrial Disability Mortality Table (Male)	0.903 times the CalPERS 2009 Industrial Disability Mortality Table (Male)

It is assumed that 50% of active deaths are service related.

9. Family Composition

Percentage married is shown in the following Table B-8. Women are assumed to be three years younger than men.

Table B-8

Percentage Married	
Gender	**Percentage**
Males	85%
Females	85%

10. Administrative Expenses

For FYE 2018, administrative expenses are assumed to equal $1,175 per member and are assumed to increase at the wage inflation assumption of 3.25% per annum. Historically, the administrative expenses were assumed to reduce the investment return assumption by 10 basis points which resulted in a higher normal cost. To maintain the same historic division of Tier 1 member and City contributions for administrative expenses for this valuation, members were allocated a portion of the administrative expenses equal to 3/11ths of the difference in normal cost that a 10 basis point reduction in the investment return assumption would cause. Tier 2 members pay 50 percent of administrative expenses.

11. Changes Since Last Valuation

The discount rate was reduced from 6.875% to 6.75%.

B. Contribution Allocation Procedure

The contribution allocation procedure primarily consists of an actuarial cost method, an asset smoothing method, and an amortization method as described below. All components of the contribution allocation procedure were established prior to the June 30, 2011 actuarial valuation except as specifically noted below.

1. Actuarial Cost Method

The Entry Age actuarial cost method was used for active employees, whereby the normal cost is computed as the level annual percentage of pay required to fund the retirement benefits between each member's date of hire and assumed retirement. The Actuarial Liability is the difference between the Present Value of Future Benefits and the present value of future normal cost. The Unfunded Actuarial Liability is the difference between the Actuarial Liability and the Actuarial Value of Assets.

2. Asset Valuation Method

For the purposes of determining the employer's contribution, we use an Actuarial Value of Assets. The asset smoothing method dampens the volatility in asset values that could occur because of the fluctuations in market conditions. Use of an asset smoothing method is consistent with the long-term nature of the actuarial valuation process. Assets are assumed to be used exclusively for the provision of retirement benefits and expenses.

The Actuarial Value of Assets is calculated by recognizing the deviation of actual investment returns compared to the expected return (6.875% for FYE's 2017 and 2018, 7.00% for FYE's 2015 and2016, and 7.125% for FYE 2014) over a five-year period. The dollar amount of the expected return on the Market Value of Assets is determined using the actual contributions and benefit payments during the year. Any difference between this amount and the actual net investment earnings is considered a gain or loss.

Finally, the Actuarial Value of Assets is restricted to a corridor between 80 percent and 120 percent of the Market Value of Assets.

3. Amortization Method

Actuarial gains and losses and plan changes are amortized as a level percentage of pay assuming 3.25% annual growth in payroll over a 15-year period (16 years for gains and losses prior to June 30, 2016) beginning with the valuation date in which they first arise. Changes in methods and assumptions are amortized as a level percentage of pay assuming 3.25% annual growth in payroll over a 20-year period (16 years for changes prior to June 30, 2011) beginning with the valuation date on which they are effective.

APPENDIX C – SUMMARY OF PLAN PROVISIONS
TIER 1

1. Membership Requirement

Participation in the plan is immediate upon the first day of employment with the City of San José as a police officer or fire fighter except for the following:

- Independent contractors,
- Person in City service principally for training or educational purposes,
- Auxiliary or voluntary police officers or fire fighters,
- Part-time or non-salaried employees, and
- Employees receiving credit in any other retirement or pension system.

Persons eligible for Tier 1 membership include:

- Any police officer hired prior to August 4, 2013 or any firefighter hired prior to January 2, 2015.
- Any person who was a member of this plan as an employee of the police department prior to August 4, 2013, and terminated employment with the city, and returned to employment with the city in a position covered by this plan on or after August 4, 2013.
- Any person who was a member of this plan as an employee of the fire department prior to January 2, 2015, and terminated employment with the city, and returned to employment with the city in a position covered by this plan on or after January 2, 2015.
- Any person accepting employment in the police department or fire department of the city on or after January 1, 2013, who is otherwise eligible for this plan and who was an active member in another California public retirement system with which this plan has reciprocity under Part 16, and who has a break in service of less than six months from that covered employment and employment with the city.

2. Final Compensation

The highest twelve consecutive months of compensation in covered employment. However, in determining Final Compensation, no compensation in the last 12 months of employment that exceeds 108% of compensation during the 12 months immediately preceding the last 12 month shall be considered. Compensation excludes overtime pay and expense allowances.

3. Credited Service

Years of service in covered employment plus service purchased for military leave of absence, Federated service, and unpaid leaves of absence.

APPENDIX C – SUMMARY OF PLAN PROVISIONS
TIER 1

4. Contributions

a. Member:

The amount needed to fund 3/11ths of normal cost calculated under the Entry Age actuarial cost method plus the amortization payment on the February 4, 1996 benefit improvement. For Police members, there is an additional amortization payment for member contributions not made for the last 6 months of 2006.

b. Employer:

The Employer contributes the remaining amounts necessary to fund the Plan in accordance with the Board's funding policy.

5. Service Retirement

Eligibility

Age 55 with 20 years of service, age 50 with 25 years of service, age 70 with no service requirement, or any age with 30 years of service. Reduced benefits are also available at age 50 with 20 years of service.

Benefit

Police: 2.5% of Final Compensation for each year of credited service up to 20 years plus 4.0% of Final Compensation for each year of credited service in excess of 20, subject to a maximum of 90% of Final Compensation.

Fire: For members with less than 20 years of service, 2.5% of Final Compensation for each year of credited service. For members with 20 or more years of service, 3.0% of Final Compensation for each year of service, subject to a maximum of 90% of Final compensation.

6. Service Connected Disability Retirement

Eligibility

No age or service requirement.

Benefit

Police: 50% of Final Compensation plus 4.0% of Final Compensation for each year of credited service in excess of 20, subject to a maximum of 90% of Final Compensation.

APPENDIX C – SUMMARY OF PLAN PROVISIONS
TIER 1

Fire: For members with less than 20 years of service, 50% of Final Compensation. For members with 20 or more years of service, 3.0% of Final Compensation for each year of service, subject to a maximum of 90% of Final Compensation.

7. Non-Service Connected Disability Retirement

Eligibility

Two years of service.

Benefit

For members with less than 20 years of service, 32% of Final Compensation plus 1% of Final Compensation for each year of service in excess of two. For members with 20 or more years of service, the benefit amount equals the amount that would be calculated under the service retirement formula.

8. Non-Service-Connected Death

Less than 2 Years of Service:
Lump sum benefit equal to the greater of accumulated employee contributions with interest or $1,000.

Disabled retirees or members ineligible for service retirement:
Spouse receives 24% of Final Compensation plus 0.75% of Final Compensation for each year of service in excess of two, subject to a maximum of 37.5% of Final Compensation. If a member has eligible dependent children, an additional benefit is payable as follows:

1 Child: 25% of Final Compensation
2 Children: 37.5% of Final Compensation
3+ Children: 50% of Final Compensation

The total benefit payable to a family is limited to 75% of Final Compensation.

If a member does not have a spouse or eligible dependent children, a lump sum benefit equal to the greater of accumulated employee contributions with interest or $1,000.

Service retirees or members eligible for service retirement:
Spouse receives the greater of 37.5% of Final Compensation or 50% of the member's service retirement benefit, subject to a maximum of 42.5% of Final Compensation for Police and 45% of Final Compensation for Fire. Eligible dependent children will receive the same benefit as defined under the non-service-connected death for disabled retirees or

APPENDIX C – SUMMARY OF PLAN PROVISIONS
TIER 1

members ineligible for service retirement. The total benefit payable to a family is limited to 75% of Final Compensation.

9. Service-Connected Death

Spouse receives the greater of 37.5% of Final Compensation or 50% of the member's service retirement benefit, subject to a maximum of 42.5% of Final Compensation for Police and 45% of Final Compensation for Fire. If a member has eligible dependent children, an additional benefit of 25% of Final Compensation is payable for each eligible dependent child. The total benefit payable to a family is limited to 75% of Final Compensation.

10. Termination Benefits

Less than 10 Years of Service:
Lump sum benefit equal to the accumulated employee contributions with interest at 2% per annum.

10 or more years of credited service:
The amount of the service retirement benefit, payable at the later of age 55 or 20 years from date of membership.

11. Post-retirement Cost-of-Living Benefit

Benefits are increased every February 1 by 3.0%.

12. Changes Since Last Valuation

Membership requirements were changed by Measure F to allow former members and certain hires with reciprocity to enter Tier 1.

APPENDIX C – SUMMARY OF PLAN PROVISIONS
TIER 2

1. Membership Requirement

Any police officer who is hired by the City on or after August 4, 2013, or any fire fighter who is hired by the City on or after January 2, 2015, and who does not meet the eligibility requirements for Tier 1.

2. Final Compensation

The highest average monthly compensation of the member during any thirty-six consecutive months of covered employment. Compensation excludes overtime pay and expense allowances.

3. Credited Service

One year of service credit is given for 2,080 or more hours of city service rendered in any calendar year. A partial year (fraction with the numerator equal to the hours worked, and the denominator equal to 2,080) is given for each calendar year with less than 2,080 hours worked.

4. Member Contributions

50% of total Tier 2 contributions to the pension plan, including, but not limited to administrative expenses, normal cost, and Unfunded Actuarial Liability. Increases in members' Unfunded Actuarial Liability contribution are limited to one-third of one percent of compensation each year. Contributions cannot be less than 50% of normal cost.

5. Unreduced Service Retirement

Eligibility

Age 57 with five years of service.

Benefit – Member

2.4% of Final Compensation for each year of credited service up to 20 years, plus 3.0% of Final Compensation for each year of credited service between 20 years and 25 years, plus 3.4% of Final Compensation for each year of credited service in excess of 25 years, subject to a maximum of 80% of Final Compensation.

Benefit – Survivor

50% joint and survivor annuity.

APPENDIX C – SUMMARY OF PLAN PROVISIONS
TIER 2

6. Early Service Retirement

Eligibility

Age 50 with five years of service.

Benefit – Member

Reduced 7% per year for each year between age 57 and the member's age at retirement.

7. Service-Connected Disability Retirement

Eligibility

No age or service requirement.

Benefit – Member

The greater of:

- Monthly benefit equivalent to 50% of Final Compensation,
- The service retirement benefit, if eligible for service retirement,
- A service retirement benefit actuarially reduced from age 50, if not eligible for service retirement.

8. Non-Service Connected Disability Retirement

Eligibility

Five years of service.

Benefit – Member

1.8% of Final Compensation for each year of credited service if less than age 50, or the service pension benefit if older than age 50.

APPENDIX C – SUMMARY OF PLAN PROVISIONS
TIER 2

9. Death Before Retirement

If death occurs before retirement eligibility is reached and after two years of service

Monthly benefit equal to 24% of Final Compensation plus 0.75% of Final Compensation for each year of service in excess of two, up to a maximum of 37.5% of Final Compensation

If death occurs after retirement eligibility is reached

Benefit equivalent to what the employee would have received if retired at the time of death.

Employees killed in the line of duty

Monthly benefit equal to the greater of:

- 37.5% of Final Compensation or
- 50% of what the employee would have received if retired at the time of death.

10. Withdrawal Benefits

Less than five years of credited service

Lump sum benefit equal to the accumulated employee contributions with interest.

Five or more years of credited service

The amount of the service retirement benefit, actuarially reduced for early retirement, and payable when retirement eligibility is reached.

11. Benefit Forms

Retiree may choose an optional settlement at retirement that reduces their allowance to provide a higher survivorship allowance to their spouse/domestic partner.

12. Post-retirement Cost-of-Living Benefit

Benefits are increased every April 1 by the change in the December CPI-U for San José-San Francisco-Oakland, subject to a cap of 2.0%. The first COLA after retirement shall be prorated based on the number of months retired.

13. Changes Since Last Valuation

There have been no changes in plan provisions since the last valuation.

APPENDIX C – SUMMARY OF PLAN PROVISIONS
TIER 2

Note: The summary of major plan provisions is designed to outline principal plan benefits. If the Department of Retirement Services should find the plan summary not in accordance with the actual provisions, the actuary should immediately be alerted so the proper provisions are valued.

APPENDIX D – GLOSSARY OF TERMS

1. Actuarial Liability

The Actuarial Liability is the difference between the Present Value of Future Benefits and the present value of total future normal costs. This is also referred to by some actuaries as the "accrued liability" or "actuarial accrued liability." The Actuarial Liability represents the amount of assets a plan should have as of a valuation date according to the Actuarial Cost Method.

2. Actuarial Assumptions

Estimates of future experience with respect to rates of mortality, disability, turnover, retirement rate or rates of investment income, and salary increases. Demographic actuarial assumptions (rates of mortality, disability, turnover, and retirement) are generally based on past experience, often modified for projected changes in conditions. Economic assumptions (price inflation, wage inflation, and investment income) are generally based on expectations for the future that may differ from the Plan's past experience.

3. Actuarial Cost Method

A mathematical budgeting procedure for allocating the dollar amount of the Present Value of Future Benefits between future normal cost and Actuarial Liability.

4. Actuarial Gain (Loss)

The difference between actual experience and the anticipated experience based on the actuarial assumptions during the period between two actuarial valuation dates.

5. Actuarial Present Value

The amount of funds currently required to provide a payment or series of payments in the future. It is determined by discounting future payments at the discount rate and by probabilities of payment.

6. Actuarially Determined Contribution

The payment to the Plan as determined by the actuary using a Contribution Allocation Procedure. It may or may not be the actual amount contributed to the Plan.

7. Amortization Method

A method for determining the amount, timing, and pattern of payment of the Unfunded Actuarial Liability.

APPENDIX D – GLOSSARY OF TERMS

8. Asset Valuation Method

The method used to develop the Actuarial Value of Assets from the Market Value of Assets typically by smoothing investment returns above or below the assumed rate of return over a period of time.

9. Contribution Allocation Procedure

A procedure typically using an actuarial cost method, an asset valuation method, and an amortization method to develop the Actuarially Determined Contribution.

10. Discount Rate

The rate of interest used to discount future benefit payments to determine the actuarial present value. For purposes of determining an Actuarially Determined Contribution, the discount rate is typically based on the long-term expected return on assets.

11. Funded Status or Funding Ratio

Either the Market or Actuarial Value of Assets divided by the Actuarial Liability. For purposes of this report, the Funded Status represents the proportion of the actual assets as of the valuation date compared to the assets expected by the actuarial cost method. These measures are for contribution budgeting purposes and are not appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations.

12. Normal Cost

The portion of the Present Value of Future Benefits allocated to the current year by the actuarial cost method.

13. Present Value of Future Benefits

The actuarial present value of all benefits both earned as of the valuation date and expected to be earned in the future by current plan members based on current plan provisions and actuarial assumptions.

14. Unfunded Actuarial Liability (UAL)

The Unfunded Actuarial Liability is the difference between Actuarial Liability and either the Market or the Actuarial Value of Assets. This value is sometimes referred to as "Unfunded Actuarial Accrued Liability." It represents the difference between the actual assets and the amount of assets expected by the actuarial cost method as of the valuation date.

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