

Austin Police Retirement System

Annual Actuarial Valuation - Funding

As of December 31, 2018



July 17, 2019

Board of Trustees
Austin Police Retirement System
2520 South IH 35, Suite 100
Austin, TX 78704

Re: Actuarial Valuation for Funding Purposes as of December 31, 2018

Members of the Board:

We certify that the information contained in this report is accurate and fairly presents the actuarial position of the Austin Police Retirement System (APRS) as of December 31, 2018. This report was prepared at the request of the Board and is intended for use by APRS staff and those designated or approved by the Board. This report may be provided to parties other than APRS only in its entirety and only with the permission of the Board.

Actuarial Valuation

The primary purposes of the actuarial valuation report are to determine the adequacy of the current City contribution rate, describe the current financial condition of APRS, analyze changes in the condition of APRS, and provide various summaries of the data.

Plan Provisions

There were no changes to the plan provisions during the past year. The current plan provisions are outlined in Section E of this report.

Actuarial Assumptions and Methods

The assumptions and methods applied in this actuarial valuation were adopted by the Board of Trustees effective with the December 31, 2018 actuarial valuation. The actuarial assumptions used for the December 31, 2018, actuarial valuation are based on an experience review for the five-year period from January 1, 2013 through December 31, 2017. All actuarial assumptions used in this report are reasonable for the purposes of this actuarial valuation. The current actuarial assumptions and methods are outlined in Section F of this report.

Data

The valuation was based upon information as of December 31, 2018 furnished by APRS staff, concerning system benefits, financial transactions, plan provisions and active members, terminated members, retirees and beneficiaries. We checked for internal and year-to-year consistency, but did not audit the data. We are not responsible for the accuracy or completeness of the information provided by APRS staff.

Certification

All of our work conforms with generally accepted actuarial principles and practices, and to the Actuarial Standards of Practice issued by the Actuarial Standards Board. In our opinion, our calculations also comply with the requirements of, where applicable, the Internal Revenue Code and ERISA.

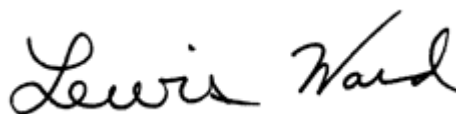
The signing actuaries are independent of the plan sponsor. Ryan Falls is an Enrolled Actuary, a Fellow of the Society of Actuaries, and a Member of the American Academy of Actuaries, and meets the Qualification Standards of the American Academy of Actuaries. Finally, each of the undersigned is experienced in performing valuations for public retirement systems.

Respectfully submitted,

Gabriel, Roeder, Smith & Company



R. Ryan Falls, FSA, EA, MAAA
Senior Consultant & Actuary



Lewis Ward
Consultant

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SECTION A

EXECUTIVE SUMMARY

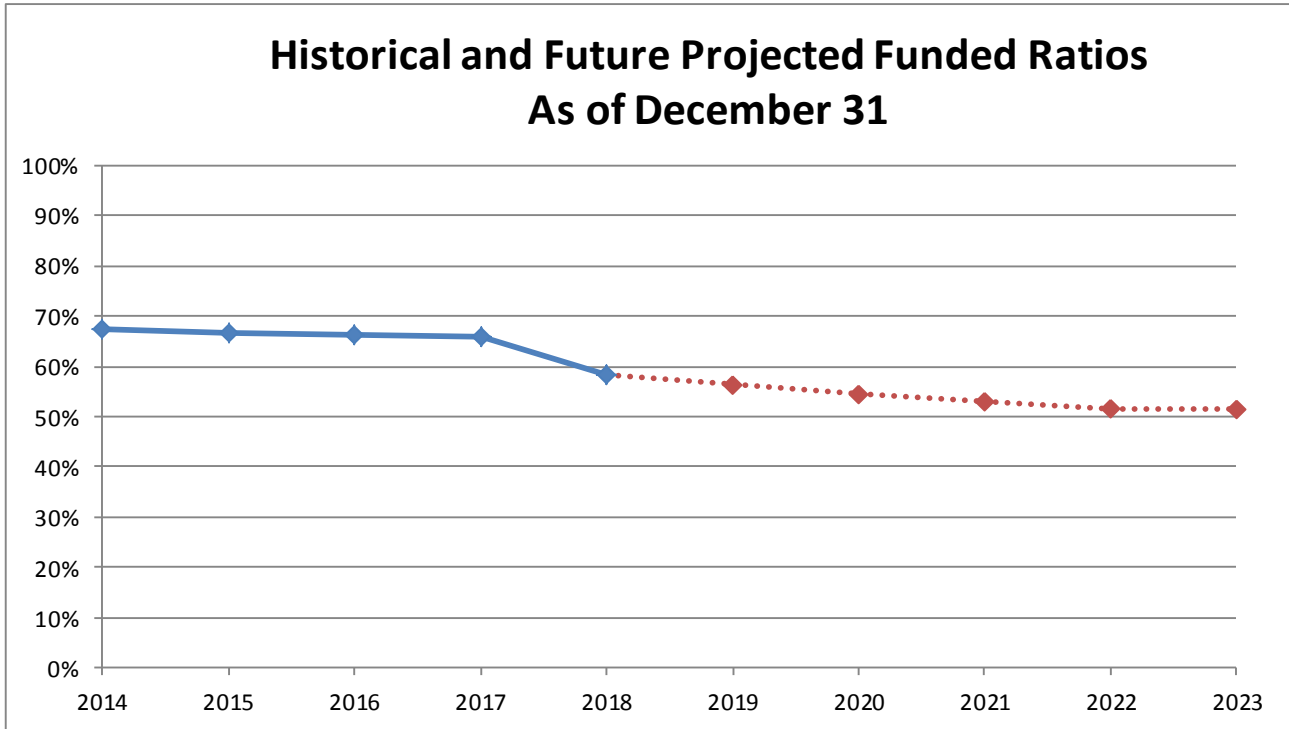
Executive Summary

Item	December 31, 2018	December 31, 2017
Membership <ul style="list-style-type: none"> • Number of <ul style="list-style-type: none"> - Active members - Inactive, vested - Inactive, nonvested - Annuitants - Total • Annualized Payroll on Valuation Date 	1,892 39 72 906 2,909 \$ 166,564,996	1,866 45 53 867 2,831 \$ 162,490,560
Statutory contribution rates <ul style="list-style-type: none"> • Members • City 	13.000% 21.313%	13.000% 21.313%
Contribution to be Allocated to Retiree Death Benefit Fund	0.120%	0.121%
Actuarially Determined Contribution Rates Estimated Years until UAAL is Eliminated: <ul style="list-style-type: none"> • 20 Years • 30 Years • 40 Years 	37.302% 31.965% 29.500%	26.052% 22.269% 20.488%
Assets <ul style="list-style-type: none"> • Market value (MVA) • Actuarial value (AVA) • Return on market value • Return on actuarial value 	\$ 718,519,641 \$ 807,978,988 -5.8% 4.5%	\$ 769,474,743 \$ 779,484,342 11.7% 5.9%
Actuarial Information on AVA (smoothed) <ul style="list-style-type: none"> • Normal cost %¹ • Total normal cost • Actuarial accrued liability • Unfunded actuarial accrued liability (UAAL) • Funded ratio • Funding period (years) 	24.986% \$ 42,486,437 \$ 1,389,660,616 \$ 581,681,628 58.1% Never	22.291% \$ 38,228,170 \$ 1,185,017,294 \$ 405,532,952 65.8% 35
Actuarial Information on MVA <ul style="list-style-type: none"> • Unfunded actuarial accrued liability (UAAL) • Funded ratio • Funding period (years) 	\$ 671,140,975 51.7% N/A	\$ 415,542,551 64.9% 37

Notes:

¹ Includes normal cost associated with the Retiree Death Benefit Fund and a load for assumed administrative expenses of the System. 2017 administrative expense load only includes expenses associated with the PRP.

The following chart illustrates the recent history and outlook of the funded status of APRS over the next five years:



December 31,	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Funded Ratio	67.3%	66.5%	66.1%	65.8%	58.1%	56.3%	54.4%	53.0%	51.6%	51.4%
UAAL (millions)	\$317	\$349	\$377	\$406	\$582	\$640	\$699	\$758	\$819	\$861

The projections beyond 2018 are based on the same assumptions, methods and provisions used for the December 31, 2018 valuation. Additionally, the market value of assets is assumed to earn 7.25% per year.

Based on current contribution patterns, benefit provisions and actuarial assumptions, APRS’s UAAL is projected to continue to increase. The APRS’s funded ratio is expected to continue to decrease until it reaches zero when the assets of the System are depleted.

SECTION B

DISCUSSION

Discussion

Introduction

The results of the December 31, 2018 actuarial valuation of the Austin Police Retirement System (APRS) are presented in this report.

The primary purposes of this actuarial valuation report are to determine the adequacy of the current City contribution rate, describe the current financial condition of APRS, analyze the changes in the condition of APRS, and provide various summaries of the data.

The total contribution rate for the current fiscal year exceeds the normal cost by 9.327% of payroll, which, on an actuarial value of assets basis, is not expected to amortize the unfunded liability over any amortization period. In the prior valuation, the total contribution rate was expected to amortize the unfunded liability in approximately 35 years. There was an increase in the unfunded actuarial liabilities of approximately \$153 million due to a change in the actuarial assumptions (see discussion below). APRS also had an experience loss on the actuarial value of assets and an experience gain on the actuarial liabilities.

The Retiree Death Benefit Fund was established in 2003 as a separate account within the system to advance fund and to pay the \$10,000 post-retirement lump sum death benefits for retirees. Table 12 outlines the portion of the City contribution rate that should be allocated to the Retiree Death Benefit Fund such that the Retiree Death Benefit Plan will be fully funded 17 years following December 31, 2018. With the exception of Table 12, the amounts outlined in this report represent the total assets and liabilities of APRS, inclusive of the Retiree Death Benefit Plan.

Assessment of Risk

Section D of this report, titled “Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions,” outlines a series of risk measures that are intended to aid in the understanding of the effects of future experience differing from the assumptions used in the course of the actuarial valuation.

Plan Provisions

There were no changes to the plan provisions during the past year. The current plan provisions are outlined in Section E of this report.

Actuarial Assumptions and Methods

The assumptions and methods applied in this actuarial valuation were adopted by the Board of Trustees effective with the December 31, 2018 actuarial valuation. The actuarial assumptions used for the December 31, 2018 valuation are based on an experience review for the five-year period from January 1, 2013 through December 31, 2017, dated May 15, 2019. All actuarial assumptions used in this report are reasonable for the purposes of this valuation. The current actuarial assumptions and methods are outlined in Section F of this report. In particular, the following significant assumptions were changed:

- The investment return assumption was decreased from 7.70% to 7.25%
- The inflation assumption was decreased from 3.00% to 2.50%

- Individual salary increase rates were modified to better reflect the current expectation for inflation and the current step schedule
- The payroll growth rate was decreased from 4.00% to 3.00%
- An explicit administrative expense load of 0.90% of payroll was added to the normal cost
- Mortality rates from PubS-2010 were adopted with fully generational mortality improvement using the ultimate mortality improvement rates in the MP tables
- Termination rates were modified to better reflect APRS experience
- Retirement rates were modified to better reflect APRS experience

The reader is encouraged to review our experience study report dated May 15, 2019 for a more detailed description of the analysis and justification for the adopted assumptions.

All of the tables referenced in the following discussion appear in Section C of this report.

Funding Adequacy

The City currently contributes 21.313% of payroll and members contribute 13.000% of payroll.

The unfunded actuarial accrued liability (UAAL) of APRS increased from \$406 million as of December 31, 2017 to \$582 million as of December 31, 2018. Additionally, the funded ratio of APRS—actuarial value of assets divided by the actuarial accrued liability—decreased from 65.8% to 58.1% as of December 31, 2018. The funded status is one of many metrics used to show trends and develop future expectations about the health of a retirement system. The funded status measure itself is not appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan’s benefit obligations or assessing the need for or the amount of future contributions since it does not reflect normal cost contributions, the timing of amortization payments, or future experience other than expected.

The valuation shows that the total normal cost for funding purposes is 24.986% of payroll. The total contribution rate is currently 34.313% of payroll. Thus, the total contribution rate for the current fiscal year exceeds the normal cost by 9.327% of payroll which will be available to amortize the unfunded liability. On an actuarial value of assets basis, the current contribution rate is not expected to amortize the unfunded liability over any amortization period. Based on open group projections with a constant active membership and assuming the current contribution rates and benefit provisions remain in place and that all of the actuarial assumptions are exactly met the System is expected to deplete the assets within the next fifty years.

The Texas Pension Review Board adopted their Pension Funding Guidelines on January 26, 2017. These Guidelines state that “actual contributions made to the plan should be sufficient to cover the normal cost and to amortize the unfunded actuarial accrued liability over as brief a period as possible, but not to exceed 30 years, with 10-25 years being a more the preferable target range.” The City’s current contribution rate of 21.313% is not expected to amortize the unfunded liability over any amortization period. For informational purposes, this report provides an actuarially determined City contribution rate required to amortize the unfunded actuarial accrued liability over a 20-year, 30-year, and a 40-year period, which are 37.302%, 31.965%, and 29.500%, respectively.

System Assets

This report contains several tables that summarize key information with respect to the APRS assets.

The total market value of assets decreased from \$769 million as of December 31, 2017 to \$719 million as of December 31, 2018. Table 5 reconciles the changes in the fund during the year. Total contributions decreased from \$59.5 million to \$57.8 million.

Table 6 shows the development of the actuarial value of assets. The actuarial value of asset method generally recognizes the difference between the actual and expected market value of assets over a five-year period. The total actuarial value of assets is \$808 million, which is greater than the market value of assets of \$719 million. This indicates that there are currently deferred losses to be recognized in the future.

When measured on a market value, the approximate investment return net of administrative and investment-related expenses for the fiscal year ending December 31, 2018 was -5.8%. When measured on an actuarial value, the net investment return was 4.5%, which is lower than the assumed return of 7.25%. APRS experienced a \$25 million actuarial asset loss over the past year. Table 7 shows a history of investment return rates. The APRS five-year average market return is 3.2% and the five-year average actuarial return is 5.3%.

Table 8 provides a history of the contributions paid into APRS and the administrative expenses and benefit payments that have been paid out of APRS. This table shows that APRS received less contributions than it paid out in administrative expenses and benefit payments, or -\$7.6 million (or -1.1% of assets) for the year ending December 31, 2018. Prior to 2018, APRS was in positive cash flow positions but the ratio of outflows to inflows has been increased gradually. Fiscal year ending December 31, 2018 is the first year APRS experienced a negative cashflow position. Negative cashflow is expected for a pre-funded pension program. The entire reason for setting aside assets is to have the ability to use investment earnings to pay for benefits. If the cashflow was always going to be positive there would be no reason to pre-fund the system. Table 11 provides a history of contribution rates, as a percent of payroll, paid into the trust by the City and members.

Data

The valuation was based upon information as of December 31, 2018 furnished by APRS staff, concerning system benefits, financial transactions, plan provisions and active members, terminated members, retirees and beneficiaries. We checked for internal and year-to-year consistency, but did not audit the data. We are not responsible for the accuracy or completeness of the information provided by APRS staff. The tables in Section F show key census statistics for the various groups included in the valuation.

Sustainability

As discussed above, the current contribution rates are not sufficient to support the benefit structure of the System. In addition, the System is currently deferring \$89 million in investment losses not yet recognized in the funded status of the System. We strongly encourage the System to open a dialogue with the City about what steps should be taken to put the System back on a path of sustainability. These steps could include increased contributions (member and/or City), changes to the benefits structure or a combination of both. There is no immediate danger of the System not being able to meet its benefit payment obligations. However, the dialogue with the City should begin sooner rather than later in order to ensure that any necessary changes are incorporated during the 2021 legislative session.

SECTION C

TABLES

Table 1
Development of Employer Cost
(Inclusive of the Retiree Death Benefit Fund)

	<u>December 31, 2018</u>	<u>December 31, 2017</u>
1. Payroll		
a. Annualized Payroll on Valuation Date	\$ 166,564,996	\$ 162,490,560
b. Projected Contributory Payroll	170,040,973	171,495,984
2. Total Normal Cost Rate		
a. Gross normal cost rate	24.086%	22.274%
b. Administrative expenses (PRP only in 2017)	0.900%	0.017%
c. Total (Item 2a + Item 2b)	<u>24.986%</u>	<u>22.291%</u>
3. Actuarial Accrued Liability for Active and Active DROP Members		
a. Present value of future benefits for active members	\$ 1,082,883,703	\$ 915,492,433
b. Less: present value of future normal costs	<u>(370,312,303)</u>	<u>(327,352,075)</u>
c. Actuarial accrued liability	\$ 712,571,400	\$ 588,140,358
4. Total Actuarial Accrued Liability for:		
a. Retirees and beneficiaries	\$ 666,427,331	\$ 578,971,295
b. Inactive members	10,661,885	17,905,641
c. Active and Active DROP members (Item 3c)	<u>712,571,400</u>	<u>588,140,358</u>
d. Total	\$ 1,389,660,616	\$ 1,185,017,294
5. Actuarial Value of Assets	\$ 807,978,988	\$ 779,484,342
6. Unfunded Actuarial Accrued Liability (UAAL) (Item 4d - Item 5)	\$ 581,681,628	\$ 405,532,952
7. City Contribution Rate Needed to Fund Normal Cost and Amortize the UAAL:		
a. Over 20 Years	37.302%	26.052%
b. Over 30 Years	31.965%	22.269%
c. Over 40 Years	29.500%	20.488%
8. Allocation of Contribution Rate		
a. City contribution rate	21.313%	21.313%
b. Member contribution rate	<u>13.000%</u>	<u>13.000%</u>
c. Total contribution rate	34.313%	34.313%
d. Total normal cost rate	24.986%	22.291%
e. Available contribution rate to amortize UAAL	<u>9.327%</u>	<u>12.022%</u>
f. Total contribution rate	34.313%	34.313%
9. Funding period based on statutory contribution rates and Actuarial Value of Assets (years)	Never	35

Table 2
Actuarial Present Value of Future Benefits
(Inclusive of the Retiree Death Benefit Fund)

	<u>December 31, 2018</u>
1. Active Members (not in DROP at the valuation date)	
a. Service Retirement	\$ 977,094,313
b. Disability Benefits	5,780,488
c. Death Before Retirement	6,432,194
d. Termination	<u>18,555,786</u>
e. Total	\$ 1,007,862,781
2. Active DROP Members	\$ 75,020,922
3. Inactive Members	
a. Vested Terminated	\$ 10,068,567
b. Non-Vested Terminated	<u>593,318</u>
c. Total	\$ 10,661,885
4. Annuitants	
a. Service Retirement	\$ 632,293,287
b. Disability Retirement	784,202
c. Beneficiaries and QDROs	<u>33,349,842</u>
d. Total	\$ 666,427,331
5. Total Actuarial Present Value of Future Benefits	\$ 1,759,972,919

Table 3
Analysis of Normal Cost
(Inclusive of the Retiree Death Benefit Fund)

	<u>December 31, 2018</u>	<u>December 31, 2017</u>
1. Gross Normal Cost Rate		
a. Service Retirement	22.490%	20.792%
b. Disability Benefits	0.286%	0.350%
c. Death Before Retirement	0.204%	0.435%
d. Termination	1.106%	0.697%
e. Total	<u>24.086%</u>	<u>22.274%</u>
2. Administrative Expenses ¹	0.900%	0.017%
3. Total Normal Cost	24.986%	22.291%
4. Less: Member Rate	13.000%	13.000%
5. Employer Normal Cost Rate	11.986%	9.291%

¹ Includes normal cost associated with the Retiree Death Benefit Fund and a load for assumed administrative expenses of the System. 2017 administrative expense load only includes expenses associated with the PRP.

Table 4
Historical Summary of Active Member Data

Valuation as of December 31 ¹ ,	Active Members		Covered Payroll		Average Salary		Average Age	Average Service
	Number ²	Percent Increase	\$ Amount (thousands)	Percent Increase	\$ Amount	Percent Increase		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
2011	1,679		133,709		79,636		39.7	11.7
2012	1,709	1.8%	140,273	4.9%	82,079	3.1%	39.6	11.5
2013	1,732	1.3%	145,871	4.0%	84,221	2.6%	39.9	11.6
2014	1,777	2.6%	150,860	3.4%	84,896	0.8%	40.0	11.7
2015	1,761	-0.9%	151,855	0.7%	86,232	1.6%	40.1	11.1
2016	1,837	4.3%	158,761	4.5%	86,424	0.2%	39.8	10.8
2017	1,866	1.6%	162,491	2.3%	87,080	0.8%	40.3	11.7
2018	1,892	1.4%	166,565	2.5%	88,036	1.1%	40.5	12.0

Notes:

¹ Information prior to December 31, 2017 is based on the information provided in the prior actuary's actuarial valuation reports

² Information for December 31, 2017 and later includes all active and active DROP members

Information prior to December 31, 2017 includes only active members not in DROP at the valuation date

Table 5

Reconciliation of Plan Net Assets

	Total	Pension	RDBF
1. Market value of assets at beginning of year	\$ 769,474,743	\$ 768,248,187	\$ 1,226,556
2. Revenue for the year			
a. Contributions for the year			
i. Member Contributions - Payroll	\$ 21,461,482	\$ 21,461,482	\$ 0
ii. Member Contributions - Service Credit Purchases	1,141,907	1,141,907	0
iii. City Contributions - Pension	34,503,533	34,503,533	0
iv. City Contributions - Retiree Death Benefit	228,017	0	228,017
v. City Contributions - Proportionate Retirement	512,692	512,692	0
vi. Total	\$ 57,847,631	\$ 57,619,614	\$ 228,017
b. Net Investment income for the year	\$ (43,398,717)	\$ (43,426,212)	\$ 27,495
c. Total revenue	\$ 14,448,914	\$ 14,193,402	\$ 255,512
3. Disbursements for the year			
a. Retirement and disability benefits	\$ 53,393,809	\$ 53,393,809	\$ 0
b. Lump Sum DROP Distributions	2,009,126	2,009,126	0
c. Lump Sum PROP Distributions	5,482,351	5,482,351	0
d. Retiree Death Benefits	82,500	0	82,500
e. Refund of Member Contributions	3,015,038	3,015,038	0
f. Administrative expenses	1,421,192	1,421,192	0
g. Total disbursements	\$ 65,404,016	\$ 65,321,516	\$ 82,500
4. Increase in net assets (Item 2c - Item 3g)	\$ (50,955,102)	\$ (51,128,114)	\$ 173,012
5. Market value of assets at end of year (Item 1 + Item 4)	\$ 718,519,641	\$ 717,120,073	\$ 1,399,568
6. Actual net investment income (Item 2b - Item 3f)	\$ (44,819,909)	\$ (44,847,404)	\$ 27,495
7. Expected net income at 7.70%			
a. Market value of assets at beginning of year	\$ 59,249,555		
b. Contributions for the year	2,227,134		
c. Disbursements (excluding admin)	(2,463,339)		
d. Total	\$ 59,013,350		
8. Excess investment income (Item 6 - Item 7d)	\$ (103,833,259)		
9. Estimated dollar weighted market yield	-5.8%	-5.9%	2.1%
10. Actuarial Value of Assets			
a. Actuarial value of assets at the beginning of year	\$ 779,484,342	\$ 778,257,786	\$ 1,226,556
b. Actuarial value of assets at the end of year	\$ 807,978,988	\$ 806,579,420	\$ 1,399,568
c. Investment income for the year	\$ 36,051,031	\$ 36,023,536	\$ 27,495
d. Estimated dollar weighted actuarial yield	4.6%	4.7%	2.1%
e. Expected return on the actuarial value of assets	\$ 59,784,089		
f. Asset gain/(loss) (Item 10c - Item 10e)	\$ (23,733,058)		

Table 6 Development of Actuarial Value of Assets

Year Ending
December 31, 2018

1. Excess/(Shortfall) of investment income for 2018 (Table 5, Item 8) \$ (103,833,259)

2. Development of amounts to be recognized as of December 31, 2018:

Fiscal Year End	Remaining Deferrals of Excess		Net Deferrals Remaining	Years Remaining	Recognized for This Valuation	Remaining after This Valuation
	(Shortfall) of Investment Income	Offsetting of Gains/(Losses)				
	(1)	(2)	(3) = (1) + (2)	(4)	(5) = (3) / (4)	(6) = (3) - (5)
2014	\$ (2,740,276)	\$ 2,740,276	\$ 0	1	\$ 0	\$ 0
2015	(20,999,569)	19,317,618	(1,681,951)	2	(840,976)	(840,975)
2016	(8,327,648)	0	(8,327,648)	3	(2,775,883)	(5,551,765)
2017	22,057,894	(22,057,894)	0	4	0	0
2018	<u>(103,833,259)</u>	<u>0</u>	<u>(103,833,259)</u>	5	<u>(20,766,652)</u>	<u>(83,066,607)</u>
Total	\$ (113,842,858)	\$ 0	\$ (113,842,858)		\$ (24,383,511)	\$ (89,459,347)

3. Market value of assets including RDFB assets

a. Including RDFB assets \$ 718,519,641
b. Excluding RDFB assets \$ 717,120,073

4. Actuarial value of assets

a. Including RDFB assets (Item 3.a. - Item 2, Column 6) \$ 807,978,988
b. Excluding RDFB assets \$ 806,579,420

5. Ratio of actuarial value to market value 112.5%

Notes: Remaining deferrals in Column (1) for prior years are from Table 6 of the prior year's report. Column 2 is a direct offset of the current year's excess/(shortfall) return against prior years' excess/(shortfall) of the opposite type (offset against oldest base first).

Table 7 History of Investment Return Rates

Year Ending December 31, ¹	Market Returns ²	Actuarial
(1)	(3)	(4)
2008	-26.3%	
2009	8.8%	
2010	11.8%	
2011	-3.5%	
2012	9.7%	-0.4%
2013	8.9%	6.9%
2014	5.7%	6.5%
2015	-0.3%	4.4%
2016	5.7%	5.4%
2017	11.7%	5.9%
2018	-5.8%	4.5%
Average Returns		
Last Five Years:	3.2%	5.3%
Last Ten Years:	5.1%	N/A

Notes:

¹ Results prior to December 31, 2017 are based on the information provided in the prior actuary's actuarial valuation reports

² Net of Administrative Expenses through December 31, 2018

Table 8
History of Cash Flow
(thousands \$)

Year Ending December 31 ¹ ,	Contributions	Distributions and Expenditures			External Cash Flow for the Year	Market Value of Assets	External Cash Flow as Percent of Market Value
		Benefit Payments and Refunds	Administrative Expenses ²	Total			
(1)	(2)	(3)	(5)	(6)	(7)	(8)	(9)
2008	\$ 34,943	\$ (26,118)		\$ (26,118)	\$ 8,825	\$ 387,120	2.3%
2009	38,448	(28,173)		(28,173)	10,275	432,028	2.4%
2010	40,081	(30,876)		(30,876)	9,205	492,545	1.9%
2011	43,641	(34,863)		(34,863)	8,778	484,089	1.8%
2012	47,302	(40,009)	(1,163)	(41,172)	6,130	538,898	1.1%
2013	50,629	(42,825)	(1,115)	(43,940)	6,689	595,110	1.1%
2014	54,065	(45,403)	(1,327)	(46,730)	7,335	638,019	1.1%
2015	57,948	(50,005)	(1,466)	(51,471)	6,477	644,174	1.0%
2016	56,105	(50,828)	(1,397)	(52,225)	3,880	686,020	0.6%
2017	59,493	(56,548)	(1,563)	(58,111)	1,382	769,475	0.2%
2018	57,848	(63,983)	(1,421)	(65,404)	(7,556)	718,520	-1.1%

Notes:

¹ Results prior to December 31, 2017 are based on the information provided in the prior actuary's actuarial valuation reports

² Information was not provided in the prior actuary's valuation reports

Table 9
Total Experience Gain or Loss
(Inclusive of the Retiree Death Benefit Fund)

Item	Year Ending December 31, 2018
(1)	(2)
A. Calculation of total actuarial gain or loss	
1. Unfunded actuarial accrued liability (UAAL), previous year	\$ 405,532,952
2. Normal cost for the year	37,913,680
3. Contributions for the year	(57,847,631)
4. Interest at 7.70%	
a. On UAAL	\$ 31,226,037
b. On normal cost	1,459,677
c. On contributions	<u>(2,227,134)</u>
d. Total	\$ 30,458,580
5. Changes due to assumptions	152,746,502
6. Expected UAAL, end of year (Sum of Items 1 through 5)	568,804,083
7. Actual UAAL, end of year	581,681,628
8. Total (gain)/loss for the year (Item 6 - Item 5)	\$ 12,877,545
B. Source of gains and losses	
	<u>% of AAL</u>
1. Asset (Gain)/Loss	1.79% \$ 25,154,250
2. Demographic (Gains)/Losses	0.88% <u>(12,276,705)</u>
3. Total	0.92% \$ 12,877,545

Table 10
Funding History
(Inclusive of the Retiree Death Benefit Fund)

Valuation Date December 31 ¹ ,	Actuarial Value of Assets (AVA)	Actuarial Accrued Liability (AAL)	Accrued Liability (UAAL) (3) - (2)	Funded Ratio (2)/(3)	Annual Covered Payroll	UAAL as % of Payroll (4)/(6)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
2009	\$ 518,433,065	\$ 735,334,345	\$ 216,901,280	70.5%	\$ 122,928,285	176.4%
2010	547,364,486	778,005,374	230,640,888	70.4%	127,731,696	180.6%
2011	554,190,027	826,366,581	272,176,554	67.1%	135,264,530	201.2%
2012	559,077,407	858,949,998	299,872,591	65.1%	141,561,047	211.8%
2013	605,530,903	913,591,470	308,060,567	66.3%	147,138,718	209.4%
2014	653,980,764	971,213,766	317,233,002	67.3%	152,544,227	208.0%
2015	690,696,986	1,039,229,249	348,532,263	66.5%	155,832,755	223.7%
2016	733,105,429	1,109,862,137	376,756,708	66.1%	163,894,324	229.9%
2017	779,484,342	1,185,017,294	405,532,952	65.8%	162,490,560	249.6%
2018	807,978,988	1,389,660,616	581,681,628	58.1%	166,564,996	349.2%

Notes:

¹ Results prior to December 31, 2017 are based on the information provided in the prior actuary's actuarial valuation reports

Table 11 Historical Contribution Rates

Valuation as of December 31 ¹ ,	Contributions from:			Total Normal Cost Rate ³	20-Year Actuarially Determined Contribution ⁴	30-Year Actuarially Determined Contribution ⁵
	City ²	Members	Total			
2009	18.630%	13.000%	31.630%	22.372%		
2010	19.630%	13.000%	32.630%	22.472%		
2011	20.630%	13.000%	33.630%	23.277%		
2012	21.630%	13.000%	34.630%	21.774%		
2013	21.630%	13.000%	34.630%	21.806%		
2014	21.630%	13.000%	34.630%	21.647%		
2015	21.313%	13.000%	34.313%	22.473%		
2016	21.313%	13.000%	34.313%	21.767%	24.407%	20.566%
2017	21.313%	13.000%	34.313%	22.291%	26.052%	22.269%
2018	21.313%	13.000%	34.313%	24.986%	37.302%	31.965%

Notes:

¹ Results prior to December 31, 2017 are based on the information provided in the prior actuary's actuarial valuation reports

² City contribution rates were 18.000% prior to 1/1/2009; 18.250% effective 1/1/2009; 18.630% effective 10/1/2009; 19.630% effective 10/1/2010; 20.630% effective 10/1/2011; 21.630% effective 10/1/2012; 21.313% effective 10/1/2015

³ Includes normal cost associated with the death benefit fund and load for assumed administrative expenses

⁴ Employer contribution rate needed to fund normal cost plus amortize the unfunded accrued liability over 20 years

⁵ Employer contribution rate needed to fund normal cost plus amortize the unfunded accrued liability over 30 years

Table 12

Retiree Death Benefit Fund

The Retiree Death Benefit Fund was established effective September 1, 2003. The Fund operates as a separate account within the system that is used to advance fund and to pay the \$10,000 post-retirement lump sum death benefits for retirees. The following table illustrates the allocation of the total plan assets and liabilities between the primary pension fund and the Retiree Death Benefit Fund.

	<u>Pension Fund</u>	<u>Retiree Death Benefit Fund</u>
1. Total Actuarial Present Value of Future Benefits		
a. Active Members	\$ 1,081,722,506	\$ 1,161,197
b. Inactive Members	10,620,069	41,816
c. Annuitants	664,003,850	2,423,481
d. Total	<u>\$ 1,756,346,425</u>	<u>3,626,494</u>
2. Present Value of Future Normal Costs	\$ 369,950,997	\$ 361,306
3. Actuarial Accrued Liability (item 1 - item 2)	\$ 1,386,395,428	\$ 3,265,188
4. Valuation Assets	\$ 806,579,420	\$ 1,399,568
5. Unfunded Actuarial Accrued Liability (UAAL) (item 3 - item 4)	\$ 579,816,008	\$ 1,865,620
6. City Contribution Rate to be Allocated to the Retiree Death Benefit Fund		
a. Normal Cost Rate		0.029%
b. Payment Required to Amortize UAAL over 17 years (as of 12/31/2018)		0.091%
c. Total Allocated Rate		0.120%

SECTION D

ASSESSMENT AND DISCLOSURE OF RISK ASSOCIATED WITH MEASURING PENSION OBLIGATIONS AND DETERMINING PENSION PLAN CONTRIBUTIONS

Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions

The determination of the accrued liability and an actuarially determined contribution (or funding period) requires the use of assumptions regarding future economic and demographic experience. Risk measures, as illustrated in this report, are intended to aid in the understanding of the effects of future experience differing from the assumptions used in the course of the actuarial valuation. Risk measures may also help with illustrating the potential volatility in the accrued liability and an actuarially determined contribution (or funding period) that result from the differences between actual experience and the actuarial assumptions.

Future actuarial measurements may differ significantly from the current measurements presented in this report 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 due to changing conditions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period, or additional cost or contribution requirements based on the Plan's funded status); and changes in plan provisions or applicable law. The scope of an actuarial valuation does not include an analysis of the potential range of such future measurements.

Examples of risk that may reasonably be anticipated to significantly affect the plan's future financial condition include:

1. Investment risk – actual investment returns may differ from the expected returns;
2. Asset/Liability mismatch – changes in asset values may not match changes in liabilities, thereby altering the gap between the accrued liability and assets and consequently altering the funded status and contribution requirements;
3. Contribution risk – actual contributions may differ from expected future contributions. For example, actual contributions may not be made in accordance with the plan's funding policy or material changes may occur in the anticipated number of covered employees, covered payroll, or other relevant contribution base;
4. Salary and Payroll risk – actual salaries and total payroll may differ from expected, resulting in actual future accrued liability and contributions differing from expected;
5. Longevity risk – members may live longer or shorter than expected and receive pensions for a period of time other than assumed;
6. Other demographic risks – members may terminate, retire or become disabled at times or with benefits other than assumed resulting in actual future accrued liability and contributions differing from expected.

The effects of certain trends in experience can generally be anticipated. For example if the investment return since the most recent actuarial valuation is less (or more) than the assumed rate, the cost of the plan can be expected to increase (or decrease). Likewise if longevity is improving (or worsening), increases (or decreases) in cost can be anticipated.

The actuarially determined employer contribution rates shown on the Executive Summary provide a guide for the adequacy of the current statutory contribution rates received from the membership and the City. As shown on the exhibit the current contribution rates are not sufficient to ensure the sustainability of the System. The timely receipt of the actuarially determined contributions is critical to support the financial health of the System. Users of this report should be aware that contributions made at the actuarially determined rate do not necessarily guarantee benefit security.

PLAN MATURITY MEASURES

Risks facing a pension plan evolve over time. A young plan with virtually no investments and paying few benefits may experience little investment risk. An older plan with a large number of members in pay status and a significant trust may be much more exposed to investment risk. Generally accepted plan maturity measures include the following (please see a description of the measures following the table):

Valuation as of December 31 st	2018	2017
Ratio of market value of assets to payroll	4.31	4.74
Ratio of actuarial accrued liability to payroll	8.34	7.29
Ratio of actives to retirees and beneficiaries	2.09	2.15
Ratio of net cash flows to market value of assets	-1.1%	0.2%
Duration of actuarial accrued liability*	15.1	N/A

*Duration measurement not available prior to 2018

RATIO OF MARKET VALUE OF ASSETS TO PAYROLL

The relationship between assets and payroll is a useful indicator of the potential volatility of contributions. For example, if the market value of assets is 2.0 times the payroll, a return on assets 5% different than assumed would equal 10% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in plan sponsor contributions as a percentage of payroll.

RATIO OF ACTUARIAL ACCRUED LIABILITY TO PAYROLL

The relationship between actuarial accrued liability and payroll is a useful indicator of the potential volatility of contributions for a fully funded plan. A funding policy that targets a funded ratio of 100% is expected to result in the ratio of assets to payroll and the ratio of liability to payroll converging over time.

The ratio of liability to payroll may also be used as a measure of sensitivity of the liability itself. For example, if the actuarial accrued liability is 2.5 times the payroll (5 to 2 ratio), a change in liability 2% other than assumed would equal 5% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in liability (and also plan sponsor contributions) as a percentage of payroll.

RATIO OF ACTIVES TO RETIREES AND BENEFICIARIES

A young plan with many active members and few retirees will have a high ratio of active to retirees. A mature open plan may have close to the same number of actives to retirees resulting in a ratio near 1.0. A super-mature or closed plan may have significantly more retirees than actives resulting in a ratio below 1.0.

RATIO OF NET CASH FLOW TO MARKET VALUE OF ASSETS

A positive net cash flow means contributions exceed benefits and expenses. A negative cash flow means existing funds are being used to make payments. A certain amount of negative net cash flow is generally expected to occur when benefits are prefunded through a qualified trust. Large negative net cash flows as a percent of assets may indicate a super-mature plan or a need for additional contributions.

DURATION OF ACTUARIAL ACCRUED LIABILITY

The duration of the actuarial accrued liability may be used to approximate the sensitivity to a 1% change in the assumed rate of return. For example, duration of 10 indicates that the liability would increase approximately 10% if the assumed rate of return were lowered 1%.

ADDITIONAL RISK ASSESSMENT

Additional assessment may include scenario tests, sensitivity tests, stochastic modeling, stress tests, and a comparison of the present value of accrued benefits at low-risk discount rates with the actuarial accrued liability. A robust measurement of additional risk assessment is outside the scope of the annual actuarial valuation. However, we recommend that some scenario testing and sensitivity testing be included in any sustainability study conducted in the future.

SECTION E

SUMMARY OF PLAN PROVISIONS

Summary of Plan Provisions for Austin Police Retirement System

Creditable Service (APRS Service)

Total years and completed months (excluding a month in which service amount to fewer than 15 days) during which a Member makes contributions to the System.

Earnings

Base pay plus longevity pay. Overtime or special pay is not included.

Average Final Compensation

Average Earnings for the highest 36 months over the last 120 months of service.

Member Contributions

13.000% of Earnings.

City Contributions

21.313% effective October 1, 2015.

Normal Retirement

Date:

Earlier of age 62, age 55 and 20 years of Creditable Service, or 23 years of Creditable Service, regardless of age (including Proportionate Service Credit and excluding pre-membership military service).

Benefit:

3.20% of Average Final Compensation times Creditable Service (including pre-membership military service).

Form of Benefit:

Life Annuity. At the death of the member the excess, if any, of the member's accumulated contributions over the amount of payments made to the member will be paid in a lump sum to the member's beneficiary. (Other benefit options available).

Vesting

Schedule:

100% after 10 years of Creditable Service, including Proportionate Service Credit.

Benefit Amount:

Members will receive his (her) accrued benefit payable at the Normal Retirement Date based upon actual Creditable Service prior to termination.

Non-vested members receive a refund of accumulated contributions.

Disability

Eligibility:

10 years of Creditable Service (service requirement is waived if the disability is a direct or proximate result of the performance of the member's employment). Members who are eligible for normal retirement may not apply for disability benefits.

Benefit:

Monthly benefit is calculated in the same manner as the member's normal retirement benefit. Benefit will be calculated with a minimum of 20 years of creditable service if the disability is a direct or proximate result of the performance of the member's employment.

Death Benefits

Before Retirement Eligibility:

Lump sum payment equal to twice the amount of the Member's accumulated contributions subject to a minimum of \$10,000.

After Retirement Eligibility (member is married at the time of death):

In lieu of the lump sum benefit described above, the surviving spouse may select a retirement option in the same manner as if the member had retired immediately prior to his death. When monthly benefits are payable in lieu of the lump sum, a \$10,000 death benefit will be paid to the surviving spouse.

After Retirement Eligibility (member is not married at the time of death):

In lieu of the lump sum benefit described above, the member's beneficiary may select a Fifteen Year Certain benefit calculated in the same manner as if the member had retired immediately prior to his death. When monthly benefits are payable in lieu of the lump sum, a \$10,000 death benefit will be paid to the beneficiary.

Retiree Death Benefit Fund

Effective September 1, 2003, a separate fund (funded as a portion of the City's contribution rate) was established to pay post-retirement lump sum death benefits. Effective September 1, 2007, the amount of these benefits was increased to \$10,000.

Proportionate Retirement Program

Effective September 1, 2009, the System and the City began participating in the statewide Proportionate Retirement Program (PRP). Service in other participating public employee retirement systems can be combined with service in the System to satisfy the System's requirements for service retirement eligibility and for eligibility for vested benefits of a terminated Member. The participating systems, in addition to the System, are the six statewide systems, the City of Austin Employees' Retirement System, and the systems for the City of El Paso employees.

Forward DROP

Eligibility:

Completion of 23 years of Creditable Service (including Proportionate Service Credit and excluding pre-membership military service).

Participation Period:

Not to exceed 60 months. For members with less than 23 years of APRS Service as of February 17, 2016, the maximum participation period was extended to 84 months.

Rate of Return:

Effective August 1, 2015, equal to the PROP interest rate (currently 2.25%). Members with 23 years of APRS service as of July 31, 2015 will receive 5.00% interest credit per year. Additionally, members with less than 23 years of APRS Service as of February 17, 2016 will not receive interest crediting while in DROP.

DROP Fee/Charge:

For members with less than 23 years of APRS Service as of February 17, 2016, a charge for DROP participation will be applied as shown below. The charge will only apply during the period of DROP participation.

<u>Year of DROP Participation</u>	<u>Fee/Charge</u>
1	25%
2	20
3	15
4	10
5	5
6	5
7	5

Form of Distribution:

Cash lump sum (or rollover to PROP account) at termination of employment.

Miscellaneous:

For members with less than 23 years of APRS Service as of February 17, 2016, member contributions will continue to be required during the DROP participation period, but these contributions will be retained by the System.

Retro DROP

Eligibility:

Completion of 23 years of Creditable Service (included Proportionate Service Credit and excluding pre-membership military service). Members with less than 23 years on April 1, 2015 will not be eligible to participate in Retro DROP.

Participation Period:

Not to exceed 36 months.

Rate of Return:

5.0%

Form of Distribution:

Cash lump sum (or rollover to PROP account) at termination of employment.

Post-Retirement Option Plan (PROP)

Retiring members who have participated in DROP may transfer all or a portion of their DROP lump sum into their PROP account for later disbursement.

Retired members may defer receipt of a minimum of \$250 of their monthly annuity. These deferred benefits will be accumulated and available for later disbursement. Participants may change their deferral amount twice per calendar year. The interest crediting rate on a member's PROP deferrals is set by the Board. The current crediting rate is 2.25%.

Cost of Living Adjustment

Eligibility:

Normal Retirement.

Amount:

Determined by the actuary if providing a COLA (not to exceed 6.0% per year) will not impair financial stability of the System. Post-Retirement benefit increases will automatically be provided when the System's benefit accrual rate is increased.

SECTION F

ACTUARIAL ASSUMPTIONS AND METHODS

Summary of Actuarial Assumptions and Methods

The assumptions and methods applied in this actuarial valuation were adopted by the Board of Trustees effective with the December 31, 2018 actuarial valuation. The actuarial assumptions used for the December 31, 2018 actuarial valuation are based on an experience review for the five-year period from January 1, 2013 through December 31, 2017, dated May 15, 2019. Please see this report for a discussion of the analysis and rationale for the recommended assumptions.

I. Valuation Date

The valuation date is December 31 of each plan year. This is the date as of which the actuarial present value of future benefits and the actuarial value of assets are determined.

II. Actuarial Cost Method

The actuarial valuation is used to determine the adequacy of the current City contribution rate, describe the current financial condition of APRS, analyze changes in the condition of APRS, and provide various summaries of the data.

The actuarial valuation uses the Entry Age Normal (EAN) actuarial cost method. Under this method, the first step is to determine the contribution rate (level as a percentage of pay) required to provide the benefits to each member, or the normal cost rate. The normal cost rate consists of two pieces: (i) the member's contribution rate, and (ii) the remaining portion of the normal cost rate which is the employer's normal cost rate. The total normal cost rate is based on the benefits payable to each individual active member.

The Unfunded Actuarial Accrued Liability (UAAL) is the liability for future benefits which is in excess of (i) the actuarial value of assets, and (ii) the present value of future normal costs. The employer contribution provided in excess of the employer normal cost is applied to amortize the UAAL.

The funding period is calculated as the number of years required to fully amortize the UAAL, and is calculated assuming: (a) future earnings on actuarial value of assets, net of investment-related expenses, will equal 7.25% per year, (b) there will be no changes in assumptions, (c) the number of active members will remain unchanged, (d) payroll for covered employees will grow at 3.00% each year, and (e) City contributions will remain the same percentage of payroll as described in Section E of the valuation report.

The Entry Age actuarial cost method is an "immediate gain" method (i.e., experience gains and losses are separately identified as part of the UAAL). However, they are amortized over the same period applied to all other components of the UAAL.

III. Actuarial Value of Assets

The actuarial value of assets is based on the market value of assets with a five-year phase-in of actual investment returns in excess of (less than) expected investment income. Offsetting unrecognized gains and losses are immediately recognized, with the shortest remaining bases recognized first and the net remaining bases continuing to be recognized on their original timeframe. Expected investment income is determined using the assumed investment return rate and the market value of assets (adjusted for receipts and disbursements during the year).

IV. Actuarial Assumptions

Investment Return: 7.25% per year, net of investment-related expenses (composed of an assumed 2.50% inflation rate and a 4.75% real rate of return)

Mortality Decrements:

Pre-retirement

PubS-2010 Employee Mortality Table for males and females. Generational mortality improvements projected from the year 2010 using the ultimate mortality improvement rates in the MP tables.

Healthy Annuitants

PubS-2010 Healthy Retiree Mortality Table for males and females. Generational mortality improvements projected from the year 2010 using the ultimate mortality improvement rates in the MP tables.

Disabled Annuitants

PubS-2010 Disability Mortality Table for males and females. Generational mortality improvements projected from the year 2010 using the ultimate mortality improvement rates in the MP tables.

Service Retirement Decrements:

Members Who Have 23 Years of Service by Age 55

The following rates reflect the members expected departure from active service and are applied based on years of service:

Years of Service	Probability of Retirement
23	28%
24	18
25	18
26	18
27	25
28	25
29	25
30+	35

Years of Service includes APRS Service and Proportionate Service Credit.
100% probability of retirement at age 62.

Members Who Do Not Have 23 Years of Service by Age 55

The following rates reflect the members expected departure from active service and are applied based on the member's age:

Age	Probability of Retirement
55	50%
56	25
57	25
58	25
59	25
60	25
61	25
62+	100

Deferred Retirement Option Program (DROP)

Members eligible for either the Back DROP or 5-year Forward DROP (or both) are assumed to select the most valuable option based on their individual situation at each possible retirement age. Members eligible for only the 7-year Forward DROP are assumed to not participate in DROP.

Post-Retirement Option Plan (PROP) Investment Accounts

75% of members with a PROP account at the valuation date will elect to leave their lump sum in APRS until age 60 and 25% of members will elect to receive their PROP balance at the valuation date. No future PROP deferrals are assumed and current active members are not assumed to enter PROP. Average annual rate credited to the PROP accounts will be 2.25%.

Withdrawal of Employee Contributions

Members that terminate with a vested benefit are assumed to choose the most valuable option available to them at the time of termination: withdrawal of contributions or deferred annuity. Non-vested members are assumed to receive an immediate refund of accumulated contributions.

Disability Retirement Decrements:

Disability Rates

Rates for males and females at selected ages are shown below:

Age	Rate
20	0.0004%
25	0.0025
30	0.0099
35	0.0259
40	0.0494
45	0.0804
50	0.1188
55	0.1647
60	0.2180

Disability rates are set to zero when members become eligible for retirement

In Line of Duty Disability

55% of disability retirements assumed to be in the line of duty.

Termination Decrements for Reasons Other Than Death or Retirement:

Withdrawal Rates

The following service-based rates apply:

Years of Service	Probability of Termination
0	12.00%
1	6.00
2-5	2.00
6-22	0.75
23+	0.00

Years of Service includes APRS Service and Proportionate Service Credit.

Termination rates are set to zero when members become eligible for retirement

Salary Increases: Increases are assumed to vary by years of APRS Service. Salary increases include an underlying inflation component of 2.50% and a productivity component of 0.50%.

Anniversary of Academy Graduation	Percentage Increase
1*	15.20%
2	3.00
3	3.00
4	3.00
5	3.00
6	10.00
7	3.00
8	3.00
9	3.00
10	10.00
11	3.00
12	3.00
13	3.00
14	10.00
15	3.00
16	10.00
17+	3.00

*Rate of Increase for 1st Anniversary of Graduation is for an Officer Position. If member is still a cadet on the valuation date then the increase in the upcoming year will be, either: (1) 46.70% for a regular Academy graduate, or (2) 17.40% plus the 15.20% Step Rate for a Modified Academy graduate.

Cost-of-Living Adjustments (COLA): Cost of living adjustments are granted on an ad hoc basis. No future COLAs are assumed.

Administrative Expenses: 0.90% of payroll. Included in this assumption would be any administrative expenses associated with the proportionate retirement program, which is currently assumed to be 0.017% of payroll.

Payroll Growth: Member Payroll is assumed to grow at 3.00% per year.

Marital Assumptions: 85% of active members are assumed to be married. Male spouses are assumed to be three years older than female spouses.

Decrement Timing: All decrements – mortality, service retirement, disability retirement, and termination of employment for reasons other than death or retirement – are assumed to occur at the middle of the valuation year.

Census Data and Assets

- The valuation was based on members of APRS as of December 31, 2018 and does not take into account future members.
- All census data was supplied by APRS and was subject to reasonable consistency checks.
- There were data elements that were modified for some members as part of the valuation in order to make the data complete. However, the number of missing data items was immaterial.
- Asset data was supplied by APRS.

Other Actuarial Valuation Procedures

- No provision was made in this actuarial valuation for the limitations of Internal Revenue Code Sections 415 or 401(a)17.
- Annualized Payroll on Valuation Date is the annualized payroll of active members on the valuation date. Projected Contributory Payroll for the upcoming fiscal year (used in determining the amortization period) is the estimated pensionable earnings received by all plan members for the just completed calendar year (including earnings for members who are no longer active employees on the valuation date) increased by the assumed payroll growth rate.

Changes in Assumptions since Prior Year

A comprehensive experience study was conducted since the prior valuation and the assumptions used in this valuation reflect the recommendations from that study. In particular the following significant assumptions were modified;

- The investment return assumption was decreased from 7.70% to 7.25%
- The inflation assumption was decreased from 3.00% to 2.50%
- Individual salary increase rates were modified to better reflect the current expectation for inflation and the current step schedule
- The payroll growth rate was decreased from 4.00% to 3.00%
- An explicit administrative expense load of 0.90% of payroll was added to the normal cost
- Mortality rates from PubS-2010 were adopted with fully generational mortality improvement using the ultimate mortality improvement rates in the MP tables
- Termination rates were modified to better reflect APRS experience
- Retirement rates were modified to better reflect APRS experience

Please see the full experience study report dated May 15, 2019 for a complete description of all of the assumption changes.

SECTION G

DETAILED SUMMARIES OF MEMBERSHIP DATA

Detailed Summaries of Membership Data

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C	Status Reconciliation	4
D	Active Members – Distribution by Age and Service	5
E	Annuitants – Distribution by Age	6

Table A

Summary of Active Membership Data

December 31, 2018

Active members

a. Number		1,834
b. Total payroll at the valuation date	\$	160,121,633
c. Average salary	\$	87,307
d. Average age		40.1
e. Average benefit service		11.5

Active members currently in DROP

a. Number		58
b. Total payroll at the valuation date	\$	6,443,363
c. Average salary	\$	111,092
d. Average age		54.5
e. Average benefit service		27.8
f. Total annual benefits	\$	4,891,436
g. Average annual benefit	\$	84,335
h. Total DROP Balance	\$	13,690,391

Vested inactive members

a. Number		39
b. Total annual deferred benefits	\$	1,367,934
c. Average annual deferred benefit	\$	35,075
d. Average age		48.2

Nonvested inactive members

a. Number		72
b. Member contributions due	\$	593,318
c. Average refund due	\$	8,241

Table B

Summary of Annuitant Membership Data

December 31, 2018

Service Retirees

a. Number		792
b. Total annual benefits	\$	53,009,664
c. Average annual benefit	\$	66,931
d. Average age		63.1
e. Total PROP Balance	\$	28,413,665

Disability Retirees

a. Number		2
b. Total annual benefits	\$	63,581
c. Average annual benefit	\$	31,791
d. Average age		53.9
e. Total PROP Balance	\$	0

Beneficiaries

a. Number		62
b. Total annual benefits	\$	2,750,972
c. Average annual benefit	\$	44,371
d. Average age		72.3
e. Total PROP Balance	\$	253,629

QDROs

a. Number		50
b. Total annual benefits	\$	720,529
c. Average annual benefit	\$	14,411
d. Average age		58.8
e. Total PROP Balance	\$	0

Total Members in Payment

a. Number		906
b. Total annual benefits	\$	56,544,746
c. Average annual benefit	\$	62,411
d. Average age		63.5
e. Total PROP Balance	\$	28,667,294

Table C
Status Reconciliation

	Active	Active DROP	Vested Terminated	Non-vested Terminated	Retiree	Disability Retiree	Beneficiary	QDRO
Beginning of Year	1,811	55	45	53	758	2	60	47
Re-hired	-	-	-	-	-	-	-	-
Termination, non-vested	50	-	1	-	-	-	-	-
Termination, vested	9	-	-	-	1	-	-	-
Entered DROP	11	-	-	-	-	-	-	-
Retirement	17	8	15	-	-	-	-	-
Disability retirement	-	-	-	-	-	-	-	-
Contribution refund	-	-	-	17	-	-	-	-
Death	1	-	-	-	6	-	3	-
Total Out	88	8	16	17	7	0	3	0
Continuing	1,723	47	29	36	751	2	57	47
Total In	111	11	10	36	41	0	5	3
End of Year	1,834	58	39	72	792	2	62	50

Table D

Active Members – Distribution by Age and Service

Age	Years of Service									Total
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40+	
Under 25	52	1								53
	\$ 56,244	\$ 73,136								\$ 56,563
25 - 29	170	15								185
	\$ 63,163	\$ 75,460								\$ 64,160
30 - 34	131	135	33	1						300
	\$ 67,194	\$ 76,912	\$ 84,265	\$ 73,078						\$ 73,465
35 - 39	55	113	163	32	3					366
	\$ 68,847	\$ 77,373	\$ 86,394	\$ 96,752	\$ 96,244					\$ 81,958
40 - 44	24	49	72	164	47					356
	\$ 67,003	\$ 78,261	\$ 85,567	\$ 102,848	\$ 110,370					\$ 94,545
45 - 49	11	22	42	101	157	33				366
	\$ 69,544	\$ 79,417	\$ 86,368	\$ 101,436	\$ 111,274	\$ 112,775				\$ 102,667
50 - 54		7	17	43	60	50	6	1		184
		\$ 92,533	\$ 85,120	\$ 99,820	\$ 114,736	\$ 114,674	\$ 112,501	\$ 103,874		\$ 107,520
55 - 59			4	15	13	21	11	2		66
			\$ 83,633	\$ 100,982	\$ 107,186	\$ 108,221	\$ 108,323	\$ 98,126		\$ 104,593
60 - 64	1		1	2	5	5	2			16
	\$ 149,417		\$ 96,618	\$ 106,113	\$ 96,533	\$ 117,875	\$ 104,995			\$ 108,768
Over 64										
Total	444	342	332	358	285	109	19	3		1,892
	\$ 64,806	\$ 77,664	\$ 85,932	\$ 101,398	\$ 111,250	\$ 113,002	\$ 109,292	\$ 100,042		\$ 88,036

Table E

Annuitants – Distribution by Age and Category

Age	Number	Annual Benefit	Average Annual Benefit
Under 60	345	24,400,935	70,727
60 - 64	199	12,639,619	63,516
65 - 69	179	10,283,845	57,452
70 - 74	91	4,799,729	52,744
75 - 80	40	1,979,343	49,484
Over 80	52	2,441,274	46,948
Total	906	56,544,746	62,411

SECTION H

GLOSSARY

Glossary

Actuarial Accrued Liability (AAL): That portion, as determined by a particular Actuarial Cost Method, of the Actuarial Present Value of Future Plan Benefits which is not provided for by future Normal Costs. It is equal to the Actuarial Present Value of Future Plan Benefits minus the actuarial present value of future Normal Costs.

Actuarial Assumptions: Assumptions as to future experience under the Fund. These include assumptions about the occurrence of future events affecting costs or liabilities, such as:

- mortality, withdrawal, disablement, and retirement;
- future increases in salary;
- future rates of investment earnings and future investment and administrative expenses;
- characteristics of members not specified in the data, such as marital status;
- characteristics of future members;
- future elections made by members; and
- other relevant items.

Actuarial Cost Method or Funding Method: A procedure for allocating the Actuarial Present Value of Future Benefits to various time periods; a method used to determine the Normal Cost and the Actuarial Accrued Liability. These items are used to determine the ADC.

Actuarial Gain or Actuarial Loss: A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions, during the period between two Actuarial Valuation dates. Through the actuarial assumptions, rates of decrements, rates of salary increases, and rates of fund earnings have been forecasted. To the extent that actual experience differs from that assumed, Actuarial Accrued Liabilities emerge which may be the same as forecasted, or may be larger or smaller than projected. Actuarial gains are due to favorable experience, e.g., the Fund's assets earn more than projected, salaries do not increase as fast as assumed, members retire later than assumed, etc. Favorable experience means actual results produce actuarial liabilities not as large as projected by the actuarial assumptions. On the other hand, actuarial losses are the result of unfavorable experience, i.e., actual results that produce actuarial liabilities which are larger than projected. Actuarial gains will shorten the time required for funding of the actuarial balance sheet deficiency while actuarial losses will lengthen the funding period.

Actuarially Equivalent: Of equal actuarial present value, determined as of a given date and based on a given set of Actuarial Assumptions.

Actuarial Present Value (APV): The value of an amount or series of amounts payable or receivable at various times, determined as of a given date by the application of a particular set of Actuarial Assumptions. For purposes of this standard, each such amount or series of amounts is:

- a. adjusted for the probable financial effect of certain intervening events (such as changes in compensation levels, marital status, etc.),
- b. multiplied by the probability of the occurrence of an event (such as survival, death, disability, termination of employment, etc.) on which the payment is conditioned, and
- c. discounted according to an assumed rate (or rates) of return to reflect the time value of money.

Actuarial Present Value of Future Plan Benefits: The Actuarial Present Value of those benefit amounts which are expected to be paid at various future times under a particular set of Actuarial Assumptions, taking into account such items as the effect of advancement in age and past and anticipated future compensation and service credits. The Actuarial Present Value of Future Plan Benefits includes the liabilities for active members, retired members, beneficiaries receiving benefits, and inactive, nonretired members either entitled to a refund or a future retirement benefit. Expressed another way, it is the value that would have to be invested on the valuation date so that the amount invested plus investment earnings would be provide sufficient assets to pay all projected benefits and expenses when due.

Actuarial Valuation: The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, Actuarial Value of Assets, and related Actuarial Present Values for a plan. An Actuarial valuation for a governmental retirement system typically also includes calculations of items needed for compliance with GASB.

Actuarial Value of Assets or Valuation Assets: The value of the Fund's assets as of a given date, used by the actuary for valuation purposes. This may be the market or fair value of plan assets, but commonly actuaries use a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the funded ratio and the ADC.

Actuarially Determined: Values which have been determined utilizing the principles of actuarial science. An actuarially determined value is derived by application of the appropriate actuarial assumptions to specified values determined by provisions of the law.

Amortization Method: A method for determining the Amortization Payment. The most common methods used are level dollar and level percentage of payroll. Under the Level Dollar method, the Amortization Payment is one of a stream of payments, all equal, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the Amortization payment is one of a stream of increasing payments, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the stream of payments increases at the assumed rate at which total covered payroll of all active members will increase.

Amortization Payment: That portion of the pension plan contribution or ADC which is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.

Actuarially Determined Contribution (ADC) or Annual Required Contribution (ARC): A calculated contribution for a defined benefit pension plan for the reporting period, most often determined based on the funding policy of the plan. Typically the calculated contribution has a normal cost payment and an amortization payment.

Closed Amortization Period: A specific number of years that is counted down by one each year and therefore declines to zero with the passage of time. For example if the amortization period is initially set at 30 years, it is 29 years at the end of one year, 28 years at the end of two years, etc. See Funding Period and Open Amortization Period.

Decrements: Those causes/events due to which a member's status (active-inactive-retiree-beneficiary) changes, that is: death, retirement, disability, or termination.

Defined Benefit Plan: An employer-sponsored retirement benefit that provides workers, upon attainment of designated age and service thresholds, with a monthly benefit based on the employee's salary and length of service. The value of a benefit from a defined benefit plan is generally not affected by the return on the assets that are invested to fund the benefit.

Defined Contribution Plan: A retirement plan, such as a 401(k) plan, a 403(b) plan, or a 457 plan, in which the contributions to the plan are assigned to an account for each member, and the plan's earnings are allocated to each account, and each member's benefits are a direct function of the account balance.

Employer Normal Cost: The portion of the Normal Cost to be paid by the employers. This is equal to the Normal Cost less expected member contributions.

Experience Study: A periodic review and analysis of the actual experience of the Fund which may lead to a revision of one or more actuarial assumptions. Actual rates of decrement and salary increases are compared to the actuarially assumed values and modified as deemed appropriate by the Actuary.

Funded Ratio: The ratio of the actuarial value of assets (AVA) to the actuarial accrued liability (AAL). Plans sometimes calculate a market funded ratio, using the market value of assets (MVA), rather than the AVA.

Funding Period or Amortization Period: The term "Funding Period" is used in two ways. In the first sense, it is the period used in calculating the Amortization Payment as a component of the ADC. This funding period is chosen by the Board of Trustees. In the second sense, it is a calculated item: the number of years in the future that will theoretically be required to amortize (i.e., pay off or eliminate) the Unfunded Actuarial Accrued Liability, based on the statutory employer contribution rate, and assuming no future actuarial gains or losses.

GASB: The Governmental Accounting Standards Board is an organization that exists in order to promulgate accounting standards for governmental entities.

Normal Cost: That portion of the Actuarial Present Value of pension plan benefits and expenses which is allocated to a valuation year by the Actuarial Cost Method. Any payment in respect of an Unfunded Actuarial Accrued Liability is not part of Normal Cost (see Amortization Payment). For pension plan benefits which are provided in part by employee contributions, Normal Cost refers to the total of employee contributions and employer Normal Cost unless otherwise specifically stated. Under the entry age normal cost method, the Normal Cost is intended to be the level cost (when expressed as a percentage of pay) needed to fund the benefits of a member from hire until ultimate termination, death, disability or retirement.

Open Amortization Period: An open amortization period is one which is used to determine the Amortization Payment but which does not change over time. In other words, if the initial period is set as 30 years, the same 30-year period is used in determining the Amortization Period each year. In theory, if an Open Amortization Period is used to amortize the Unfunded Actuarial Accrued Liability, the UAAL will never completely disappear, but will become smaller each year, either as a dollar amount or in relation to covered payroll.

Unfunded Actuarial Accrued Liability: The excess of the Actuarial Accrued Liability over the Actuarial Value of Assets. This value may be negative in which case it may be expressed as a negative Unfunded Actuarial Accrued Liability, also called the Funding Surplus.

Valuation Date or **Actuarial Valuation Date:** The date as of which the value of assets is determined and as of which the Actuarial Present Value of Future Plan Benefits is determined. The expected benefits to be paid in the future are discounted to this date.